GLOBAL INNOVATION

MANAGING INTERNATIONAL INNOVATION PROJECTS AT ABB AND ELECTROLUX
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GLOBAL INNOVATION

MANAGING INTERNATIONAL INNOVATION PROJECTS AT ABB AND ELECTROLUX

Jonas Ridderstråle
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PREFACE

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Örjan Sövell
Director Institute of International Business
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Anyone who has endured the process of writing a dissertation realizes that Winston Churchill was more right than perhaps he ever imagined when he stated, "This is not the end. It is not even the beginning of the end. It is merely the end of the beginning." Naturally, the content of this dissertation does not represent more than a small fraction of the ideas and impressions gained during my years as a researcher. Still, given the extensive number of pages included in this volume, I guess most people are glad that I did not try to include them all.

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Lidingö in November 1996
Jonas Ridderstråle
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CHAPTER 1

GLOBAL INNOVATION
- An emerging phenomenon

Introduction

The subject of this study is how the modern multinational company (MNC) attempts to gain competitiveness through utilizing its global network to develop new products for the international market. Our overriding interest is focused on a topic that arguably represents the 'avant garde' of modern managerial work and research; the recent phenomenon of international innovation projects (IIPs) in MNCs. Global or cross-border innovation processes embody some of the greatest challenges imaginable to managers, and they take place in one of the most complex and important organizational forms of today, the multinational corporation.

The importance of innovation has become further accentuated in recent years; ever shorter product life-cycles and increasing development costs make it crucial for the firm to master product development so as to ensure future survival. The possibility for the modern MNC to utilize globally dispersed knowledge in a joint innovation project provides a new and challenging approach to product development. Indeed, it could be argued that the ability to leverage assets across borders may constitute one of the main advantages of the modern multinational firm. Our definition of IIPs imposes three distinct requirements of 'internationalism':

Asset internationalism: Several countries contain MNC units which play critical strategic roles in the project. By 'strategic' we mean that initiative is exercised and that the outcome is important for the total project. This criterion excludes projects in which all critical work is performed in one country, with units in other countries relegated to implementing roles.
Market internationalism: The expected outcome of the project is a product intended for an international market, i.e., with or without minor modifications. This criterion excludes projects aimed at only one country, even if resources from many countries are involved.

Administrative internationalism: An identifiable project structure exists. The structure may or may not be geographically concentrated and centralized. This criterion excludes spontaneous transfer of knowledge in more organic and emergent thrusts, unless part of an organized project.

The primary challenge generally associated with development processes relates to their highly uncertain nature. Experience provides ample evidence of how difficult they are to run along the lines of more operational management practices, particularly in large and often bureaucratic organizations. In the case of IIPs, innovation management is even more intricate. It is not only a question of integrating activities across functions generally separated in the basic configuration of the firm, a task demanding in itself, but also across geographical and cultural borders.

Using four case studies of IIPs at the Swedish multinational Electrolux and the Swedish/Swiss company ABB, we will seek to contribute to the understanding of how these projects are managed, and attempt to identify the principal problems encountered, as well as their underlying sources. We will also utilize more quantitative data from a survey of 32 IIPs at 11 other Swedish MNCs, to expand the empirical base of our findings. Given that international innovation projects are carried out and nested in what we will call an overall "organizational architecture", we will also elaborate on the broader implications for the organization and management of the modern multinational company.

The organizational architecture of the firm

The central concept which emerged during the course of this study is that of “architectural dependence”, i.e., that activities performed in the international innovation projects, from birth to completion, are heavily influenced by a number of structures on the organizational level. As we see it, the organizational architecture is best thought of as comprising two basic
structures; an asset structure, and an administrative structure. At least potentially, the nature of a company's organizational architecture may change over time. The administrative structures may be altered, and assets sold off or acquired. Thus, it is vital to note that the relevant architecture of today not only comprises the present structures of the firm. To interpret the architecture of a company, we must focus also on its historical heritage. In other words, the accumulated structures of a company make up its organizational architecture.

In Chapter 3, we will devote considerable discussion to the structural heritage of Electrolux and ABB so that we can relate the actions undertaken in connection with the IIPs to their respective organizational contexts. Since a number of terms will be used throughout the text, it is appropriate at this time to define further the concept of an organizational architecture. We would point out that our conceptual framework evolved during the research process as we tried to interpret what was going on in the IIPs; it did not exist prior to our study. Moreover, the influence of the organizational architecture, e.g., in terms of when, in what ways, and why it affects certain processes, is the most critical finding, not the exact nature of the architecture.

The first structure in the organizational architecture relates to the geographical concentration-dispersion of assets and contains three elements; a) strategic resources, in the form of physical-, financial-, and human resources, b) strategic knowledge, manifested in various competencies at the individual level and in different primary capabilities at the supra-individual levels, i.e., group, organization, and inter-organizational, and c) the access of relevant units to a strategic external network. The external network has both an output aspect, i.e., the size of the market, and an input one, i.e., the importance of external actors like critical suppliers, customers, etc. In referring to 'strategic' assets, we limit our analysis to include only those assets that provide the basis for a company's creation of competitive advantage.

We will treat the administrative structures of a firm as consisting of two partly overlapping sub-structures: a) configurative structures, and b) co-ordinative structures. The nature of the configurative structures is determined by the vertical and horizontal differentiation of roles in the company. Vertical differentiation of roles refers to the number of levels created in the administrative hierarchy, ranging from a tall to a flat configuration. Horizontal differentiation of roles refers to the mechanism(s) used to group organizational tasks into roles and roles into
sub-units. In the case of an MNC, this mechanism could be represented by either products, geography, functions, brands etc., or several of the above in a matrix type of configuration.

The co-ordinative structures of a firm comprise all mechanisms used to integrate activities within the firm and in relation to its environment. These mechanisms serve to link assets internationally in new patterns of action. By centralizing authority, the administrative hierarchy itself can also perform an integrating role. A more accurate way of conceiving this dimension, however, relates to the level (for instance divisional, subsidiary, or functional) at which authority resides. It is also critical to bear in mind what types of decisions are decentralized (the simplest distinction would be between strategic and operative decisions).

If persons and tasks could only be properly clustered, there would be no problems of co-ordination, but since this case seldom (or never) exists, additional structures are usually added. By formalization, i.e., the use of written rules, routines, plans, and other procedures to standardize operations, and/or by socialization, i.e., employees learning and internalizing the culture or values of an organization, a company may further try to integrate its operations. Formalization can take a number of different forms, such as standardization of input, work processes, output, or even norms and values, and often results in a more planned or programmed process. Socialization, on the other hand, refers to more informal contacts, both vertically and horizontally, and generally leads to a more non-programmed process of mutual adjustment. Practical examples of socialization include personal contacts in terms of traveling, meetings, conferences, rotation of personnel, etc. From a co-ordination point of view, a company may range from tightly integrated to largely fragmented. Moreover, mechanisms of coordination may be applied either locally or more globally. The table below is intended to summarize the structures inherent in the organizational architecture of the firm.

<table>
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<th>Type of structure</th>
<th>Key components</th>
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<td>Resource structures</td>
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<td></td>
<td>Knowledge structures</td>
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<td>Administrative structures</td>
<td>Configurative structures</td>
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<td></td>
<td>Co-ordinative structures</td>
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Table 1.1: The basic structures inherent in the organizational architecture of a firm
Firms continuously utilize their assets by employing the administrative structures in place to further their overall strategic intent.\textsuperscript{17} In our view, strategy gradually emerges. It can be conceived as these patterns of action over time.\textsuperscript{18} In turn, every action can be characterized in terms of focusing on \textit{exploitation} or \textit{creation}, respectively.\textsuperscript{19} Exploitation is aimed at the effective utilization of given resources and knowledge, and the appropriation of value stemming from current activities. Creation is focused on seeking opportunities for the future. The former relates to drawing on the current potential; the latter, to changing the future potential. Rather than viewing exploitation and creation as two separate categories, however, it is better to envision them as two end points of a continuum. Accordingly, most actions would show elements of exploitation as well as of creation. In this study we will focus on one specific type of processes - the management of international innovation projects.

\textbf{Classical innovation processes in the MNC}

Ever since their birth some hundred years ago, multinational companies have been closely associated with product innovation. A large number of MNCs originate, and have continuously prospered, from successful applications of new technologies or the creation of novel combinations of existing ones. One could argue that innovations actually constitute the genesis of many multinationals, since their early international activities were often triggered by a new product offering which had been developed in the home country.\textsuperscript{20} The linkages between MNCs and product development are still strong. Multinationals perform an overwhelming share of all industrial research and development (R&D), and thus exercise a dominant influence on the creation and diffusion of technology on a global basis.\textsuperscript{21} Traditionally, and still very much so today, one of two innovation processes - mainly depending on whether strategic development resources were concentrated or dispersed (although largely unco-ordinated) - has characterized new product development efforts in the MNC:\textsuperscript{22} a) home-based innovation processes (HBIPs), and b) local innovation processes (LIPs).

In the former, an opportunity is perceived in the home country of the MNC, and the home-based resources of the parent are used to develop the product for worldwide exploitation. This
type of multinational is usually characterized by an ‘ethnocentric’ attitude, which emphasizes the importance of the home-country. In the latter type of innovation process, largely autonomous national subsidiaries create innovations, using their own resources and capabilities, to respond to local demands. These multinationals are marked by a distinctively different attitude, often referred to as ‘polycentrism’, highlighting that the capability to respond to specific customer needs and manage certain national units is localized. Both processes are associated with certain advantages and disadvantages. The home-based innovation process faces the risk of market insensitivity but generally permits greater economies of scale (EOS). Local innovation processes, on the other hand, risk needless differentiation and duplication of efforts on a corporate level in an attempt to satisfy disparate local customer preferences.

In general, successful HBIPs can be found in home-country-oriented organizations operating in industries in which customer needs have been relatively similar across national boundaries, such as in consumer electronics. The homogeneous demand patterns in these types of industries have enabled Japanese companies like Sony and Matsushita, with structures and strategies characterized by home-based development and manufacturing of standardized products, to gain extraordinary EOS. Matching the dominant industry requirement with appropriate strategic and organizational responses, has made these firms global industrial leaders. In other industries, like branded packaged goods, the dominant requirement has been the ability to adapt to differing market needs in different countries or regions. Historically, the winners in these industries have been companies, such as the Dutch organization Unilever, which have been flexible enough to let each subsidiary serve the specific needs of consumers in their local market, by use of LIPs.

On a more general level, HBIPs and LIPs reflect the dilemma facing all companies; diversity and adaptation to many customer groups or segments are attained only at the expense of economies of scale. This predicament is further complicated in the case of the multinational company as it faces many different local environments. Accordingly, from this perspective it is not so much the complexity or uncertainty of the environment per se that poses the greatest problem for the MNC, but rather the variety of markets and needs which confront it. As a result, it is often difficult and less meaningful to talk about ‘the multinational environment’,
which may vary considerably from country to country. Historically, managers of multinational companies tackled this problem by using solutions in which co-ordination costs, at least across national borders, were kept to a minimum. The most striking similarity between the two traditional innovation processes is that both HBIPs and LIPs are geographically concentrated. Strictly from the point of view of innovation management, these processes would thus seem to pose almost the same difficulties as do product development ventures in the national firm. The specific problem for the MNC, at least for those predominantly using HBIPs, would be to gain internal and external acceptance for the new product when transferring it to foreign units for commercialization.

The changing organizational architecture of the MNC

In a world characterized by perfectly homogeneous demand across geographical borders, the adaptation-standardization dilemma would no longer exist. However, although some authors suggest that the globe is shrinking in terms of customer preferences and psychic distance, we can assert that often important differences between regional preferences still exist. These differences naturally pose major obstacles for multinationals trying to develop new products.

On the other hand, the MNC could also have a potential advantage in its global network. It may well gain a competitive edge from sensing needs on one market, using its combined assets (i.e., resources and/or knowledge) - often located elsewhere - to respond, and diffusing the innovation on a global scale. For this type of synergistic cross-border interaction to take place, however, two principal conditions seem necessary. First, the company needs knowledge and/or resources of a strategic nature - not merely an operational or implementing one - in more than one geographical location. Second, the administrative relationships between these ‘strategic’ units must be inter-dependent.

In traditional MNCs, in which strategic assets were either geographically concentrated or dispersed, without the units’ being systematically specialized (other than geographically) or inter-dependent to any greater extent, these types of international development efforts would make little sense. Lately, however, a number of contributions to our understanding of how the evolving multinational operates have suggested partly new and contesting conceptions of
MNC organization and processes. Whether called ‘transnational’, ‘heterarchical’, ‘wired’, ‘multifocal’, or ‘horizontal’, these archetypal descriptions all share a preoccupation with the total global ‘network’ of the MNC.  

The modern multinational is argued to have not only one but many strategic centers scattered over the globe, and the geographical ‘centers of gravity’ may shift over time depending on the situation and the specific assets required. Thus, the emerging organization is a much more elusive creature to capture, since it is highly temporary in nature; the ‘assistant’ in one situation could well be the ‘supervisor’ in another. Rather than emphasizing bilateral relationships between headquarters and subsidiaries, on the one hand, and independent foreign subsidiaries, on the other, these authors highlight the systemic properties of the organization as a whole. It could even be argued that some of these models make the traditional distinction between headquarters and foreign subsidiaries less useful in describing the organizational architecture of contemporary multinationals.

**Forces for change**

The transformation toward these less ‘conventional’ models of the MNC seems to be driven by two broad categories of factors; a) recent changes in the global environment, and b) shifts in the intra-organizational distribution of critical knowledge and resources. Within each group, a number of conditions can be described as challenging, in that they make the traditional uni-dimensional strategies and structures of concentration or un-co-ordinated dispersion less appropriate, whereas others are best thought of as enabling, since they open the way for new solutions.

**External factors**

When it comes to environmental changes, the increased geographical dispersion of technology is important. Not long ago, in most industries the supply of advanced technological knowledge, in terms of skilled people and critical suppliers as well as more general research activities, was confined to the USA and a number of West European
countries. With the rise of Japan as one of the leading economies of the world, and the growing importance of the NIC countries, critical assets are spread over a much larger geographical area. Further, we have witnessed many products' turning into multi-technology offerings, for which a variety of different competencies is needed. Combined, these two tendencies produce a situation in which many companies find themselves dependent on geographically separated 'pools of resources and knowledge' when trying to develop competitive products to meet the challenges from other global (and local) players. In effect, the traditional models of the MNC and its innovation processes are less appropriate when cooperation among geographically distributed clusters of assets is necessary.

Another effect of the global shift of macro-economic power from the West to the Far East is of course that a large number of the potential customers are located in these and other new markets of rising importance. This fact is critical not only in the output sense, i.e., in terms of sales, but also in an input logic. To attract sales on these markets, new products may also have to reflect the preferences of these customers. Given the documented importance of 'lead users' and 'sophisticated and demanding buyers' in innovation processes, there is reason to believe that in many cases the use of localized HBIPs and LIPs will not enable the MNC to capture all the essentials of dispersed and sometimes complementary resources and knowledge. Finally, trade barriers are falling as an effect of successful GATT (Global Agreement on Tariffs and Trade) negotiations, and supra-national institutional arrangements like the European Union (EU) or the North American Free Trade Agreement (NAFTA) are becoming increasingly important. Combined with the emergence of global standards (opening up for greater EOS), this development tends to thwart the utilization of product development processes with high differentiation costs, which generally result from LIPs.

However, environmental changes in general, and technological ones in particular, are not only challenging the feasibility of historical configurations and processes. They are also opening the way for new possibilities and solutions. Throughout the 20th century, innovations have made the globe more manageable in terms of flows of personnel, products, components, and information. During the early decades, the increasing speed of travel from country to country by car, train, and airplane, had a strong impact on international business. With the recent revolution in telecommunications and information technology, physical transfer of people is
often no longer required or as important. By telephone, fax, and information systems, we can communicate with people at the other end of the world on a continual basis. Accordingly, many of the restrictions on the MNC of yesterday, in terms of both speed and frequency of cross-border interaction, have disappeared because of modern communications technology.36

**Internal factors**

Among intra-organizational forces challenging the traditional solutions, one of the more pivotal relates to the increased growth of knowledge in foreign subsidiaries. In the Swedish case, this expansion of international competence was strongly accentuated by the mergers and acquisition (M&A) boom of the late 1970s and 1980s.37 Moreover, in many cases, the historically implementation-oriented subsidiaries of the strategically concentrated MNC started to build assets of their own. This effect was partly due to the growing access to knowledge in these countries, as outlined above, but also to an effort to improve responsiveness to the specific demands of local customers, and to beat local and other multinational competitors by focusing on adaptation. The strategically dispersed multinational was already in most cases based on the principle of decentralization and self-sufficiency. As local units grew older and more mature, they normally became more fully-fledged, in terms of knowledge and resources. Consequently, in a number of MNCs one could find that the same type of product was being developed by several units in different countries, in many cases without sharing either competence, components, or costs. The need to consider the problems of this approach became particularly apparent when the subsidiaries started exporting, thereby often competing with other units in their own firm.

The recent M&A wave greatly reinforced this trend toward increased geographical fragmentation of internal assets. One consequence of multinationals’ buying major competitors was that the acquiring firm typically ended up with more than one strong ‘center of excellence’ (and often more than one within each division, or equivalent, of the firm). Since the costs of product development were growing year by year, many companies concluded that duplication of efforts would be too costly. Management had to decide whether to keep the existing centers or reduce the number considerably. Their dilemma was often that in closing down all units but one, presumably the one located in the home-country of the
MNC, they would lose critical internal assets or access to vital actors in the local environment, while it would also be too costly to let all the critical units work entirely as autonomous entities. Consequently, new solutions were called for.

The impact of acquired and maturing foreign subsidiaries also had a motivational aspect. In some cases, less eminent and formerly small, non-essential markets were becoming increasingly strategic. Typically, this development boosted confidence at subsidiaries in these countries. With access to critical internal assets and/or an important customer base, they could demand greater influence on the development of new products, indeed on the entire strategy of the firm. Moreover, as noted above, in the dispersed MNC, previously self-sufficient entities started to sense demand and sales opportunities abroad for their locally developed products.

Given that strategic assets are becoming increasingly dispersed in a number of multinational firms, and, perhaps as important, that top management has become aware (or are made aware) of this tendency, the company has not only a collection of spatially scattered strategic nodes, but also the potential for a co-ordinated international web of resources and knowledge. However, for this transition from 'bi-lateralism' or 'no-lateralism', in terms of products, components, communication, control etc., to 'cross-lateralism' or 'multi-lateralism' to occur, administrative linkages between the units, including ties also between the critical subsidiaries and individuals, must be created, nurtured, and maintained. This imperative also extends to learning - over time some companies seem to develop competence in managing the complex international network, just as a number of firms developed the capability to acquire and integrate foreign competitors successfully. The principal driving forces toward a new organizational architecture of the modern multinational company are summarized in the figure below.
### Effects on traditional models of the MNC

<table>
<thead>
<tr>
<th><strong>Challenging</strong></th>
<th><strong>Enabling</strong></th>
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<tr>
<td><strong>External</strong></td>
<td>Information transfer revolution</td>
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<td><strong>Globalization of:</strong></td>
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<tr>
<td>- technology</td>
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<td>- markets</td>
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<td>Technology mergers</td>
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<td><strong>Internal</strong></td>
<td>Organizational learning</td>
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<td><strong>Dispersion of:</strong></td>
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<td>- resources</td>
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<td>- knowledge</td>
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**Figure 1.1:** Important forces for change affecting the organizational architecture of the MNC

However, the new models of the MNC are not unchallenged. Some authors posit that the home country still is, and will continue to be, the dominant source of renewal in the multinational company. Their arguments include the primacy of national- over corporate culture, the importance of trust, as well as anticipated problems of co-ordinating the more elaborate and speculative recent constructions. Not only does this ‘home-based’ view largely neglect the fact that many multinationals of the past were better described as dispersed or polycentric - we acknowledge that the home-country often matters as a (or the) major supplier of technology - but we also believe that assets located elsewhere are becoming increasingly important. Furthermore, innovation is not only a question of technology. Units with primary responsibilities in marketing or manufacturing may also play critical roles in new-product development. Moreover, those companies that learn to operate the global network will at least potentially have an advantage over their more locally constrained or globally unco-ordinated competitors.

Nevertheless - as will be discussed in more depth primarily in Chapters 3 and 10 - the multinationals of today live in turbulent times in which the preferable architecture of tomorrow is not altogether obvious, either to most managers or to the majority of academics. The management processes highlighted in these new and speculative models of the MNC pose a series of practical problems to managers at various levels, and the resistance from either home-country management or some local managers to the foreseen redistribution of authority to other centers of excellence may impede the impact of the forces described. Rather
than taking a specific stance on this question at this point, we hope that the empirical results of this study will help us better to interpret where the modern multinational is heading.

**Toward international innovation processes**

Despite the fact that firm empirical evidence is still scant and a number of potential barriers to change can be identified, we argue that the forces described have already driven many multinationals to search for new ways to create competitive advantage. These new processes can be hypothesized to entail a considerable degree of cross-border communication, cooperation, and learning. The modern MNC will try to utilize its ability to draw upon a multitude of separate and complementary ‘pools of resources and knowledge’. In recent years, a number of advanced MNCs have begun (or been forced) to use international innovation projects, not as a substitute for HBIPs and LIPs, but in addition to them.

**Ford Mondeo - an IIP**

Detailed descriptions of IIPs are rare. A recent example, however, can be found in the automotive industry. In 1993, Ford Motor launched its mid-size ‘world car’ Mondeo in Europe, and in the summer of 1994 it succeeded the Ford Tempo and Mercury Topaz in the USA. Mondeo was said to represent a truly international effort, a first in the history of Ford. Three different engineering centers took part: Detroit designed the V-6 engine and the automatic transmission, as well as the heating and air-conditioning units; Dunton (UK) developed the interior, the steering, the suspension, the electronics, and the four-cylinder engine; and, finally, Cologne (Germany) performed the basic structural engineering. The project was managed by an Englishman, located in Cologne, but final responsibility rested at Ford headquarters in Dearborn, Michigan.

In all, the company spent some six billion dollars on developing the new car, i.e., twice as much as was spent on the previous successes, Taurus and Sable. Also, it took some eight years - twice as much as usually - to move from the initial idea to first sales. Ford had to harmonize divergent American and European engineering standards and fly hundreds of
people back and forth across the Atlantic. In addition to the extreme costs of co-ordination, the company mentioned a number of other reasons for the high expenditures and long development time: expensive retooling and renovations at nine large factories, late changes in design and component upgrading, and excessive defects in pilot production. Although the Mondeo has been praised by industry experts and was awarded the “European Car of the Year” award for 1993, given all the problems encountered, one wonders why IIPs are set up and in what sense they appear so difficult to manage?

Reasons for IIPs

Despite all the difficulties enumerated, a number of multinational companies are trying to utilize the potential of their international network. From our survey we know that as many as 60% of the development projects at these companies were regarded as international ventures, compared to some 40% ten years ago. Naturally, our sample is somewhat biased, since we only studied a few highly internationalized Swedish MNCs, but the figures are still surprisingly high, even if we take these limitations into account. Possibly IIPs are more common than the research on new product development in general, and on MNCs in particular, would lead us to believe.

On the basis of the quantitative and qualitative research underlying this study, we gradually realized that the rationales for these types of international collaborative efforts can be divided into two broad categories which include both internal and external aspects. The four different rationales discussed are not mutually exclusive; therefore, any collaborative effort can be attributed to one or several of them.

First, international co-operation may be demanded by political necessity. This rationale is illustrated by cases in which a company with units in two countries is compelled to set up an IIP even though each unit has the required skills in design, manufacturing, marketing, etc. to develop the new product single-handedly. Despite this duplication, the company decides to form a joint project, so as to avoid the well-documented ‘not invented here’ (NIH) syndrome.
The political aspects are by no means restricted to intra-organizational processes. Inter-organizational relations can also be major drivers for cross-border collaboration, such as when two newly merged companies from different countries decide to develop a common product to replace two different existing solutions. A joint approach involving the two country units can of course be explained by internal politics, but also by the requirement of critical local customers that their interests be safeguarded by local participation in the project. Consequently, the company is more or less forced to engage in joint development to preserve existing external linkages.

The other rationale can be labeled asset complementarity. Also this class of co-operative efforts seems to be promoted by intra-organizational and inter-organizational factors. Internal factors are at work when the organization is forced to use units for design, manufacturing, and marketing, respectively, from geographically separate markets. The cause may be that the strategic internal centers for the specific task are not co-located, or that manufacturing capacity is only available in places other than where the strategic centers are located. (The latter would imply that also asset availability matters.)

The external aspects become visible when the firm must work with sophisticated suppliers or customers in countries other than those where the internal complementary assets are located. It may be necessary to set up a temporary base in these countries, or to transfer people from these companies to the project center. The four basic rationales for cross-border collaboration that we identified during the course of the study are summarized in Figure 1.2. (The empirical support for the classification will be presented in Chapters 4-7).

<table>
<thead>
<tr>
<th>Asset complementarity</th>
<th>Intra-organizational</th>
<th>Inter-organizational</th>
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<td>Utilizing assets from geographically separate and specialized internal unit</td>
<td>Utilizing assets from external actors, geographically separate from internal units</td>
</tr>
<tr>
<td>Political necessity</td>
<td>Securing a productive internal climate between geographically separate units</td>
<td>Securing critical external linkages in geographically separate markets</td>
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Figure 1.2: Rationales for IIPs
Research on IIPs

So far, surprisingly little attention in the literature on the MNC and on the management of innovation has been given to how multinationals can organize product development projects to utilize the potential for world-wide innovation. The main reason, perhaps, is that the phenomenon of international innovation projects and processes, as we have defined them, is a fairly recent one, although we saw many examples of them in our Swedish survey companies. One of the most quoted sources advises managers of MNCs to create; a) inter-dependencies among resources and responsibilities, b) inter-unit integrating devices, and c) national competence and a world-wide perspective. These scholars also suggest that the main problems are associated with excessive costs of co-ordination.44 Although all these points may be true at a general level, they merely tell us which conditions, on the organizational level, may facilitate a steady stream of IIPs within the MNC. They do not really address the more detailed questions about how to manage the international innovation project once it has been formed, nor do they tell us much about the process leading up to the decision to proceed with development.

A number of other studies have investigated the internationalization of the R&D function as well as the co-ordination of dispersed R&D units, and the communication patterns that evolve over time and space.45 However, these studies are primarily investigations of one function; they are not focused on the entire innovation process. Another related vein of literature is on the management of cross-functional groups.46 Research in this area suggests that the existence of multiple nationalities may cause distrust, stereotyping, and communication problems. Moreover, several studies have attempted to outline the characteristics of high-performance teams47, but seldom have aspects of project management and organization, multinationality, multifunctionality, and product innovation been treated jointly and in-depth in one single research effort.

Consequently, as of today, we know rather little about how specific IIPs are managed, what problems occur and why, or the managerial implications for future efforts. The traditional studies have been geared toward understanding the conditions surrounding the innovation process, on the organizational or the more narrow functional level, rather than focusing on the
project in which "real action" takes place, or they have concerned the management of cross-cultural issues per se. We believe that one explanation for the apparent failure to consider the actual content of the innovation process is that few studies in international business have incorporated the findings of scholars more specifically focused on new product development. Accordingly, having elaborated on the forces for change and the rationales for IIPs, we now turn to the management of innovation.

Management of innovation

Any attempt to summarize the literature on the management of innovation and technology would suffer from being sketchy, rough, and biased. Our main interest for now is to identify the primary areas that we regard as critical in providing the cornerstones for a framework for describing and analyzing the IIPs. In addition, our brief summary serves two other fundamental purposes, both with somewhat of a pedagogical twist. First, we would like to demonstrate that the research in international business has by and large neglected a theoretical area with a rich potential of new knowledge on innovation processes within the MNC. Second, and as noted above, the literature on innovation management is vast, but also slightly fragmented. Consequently, in designing our framework we will structure the findings around certain common ‘themes’ to identify the basic building blocks. Deeper theoretical analysis will be undertaken in parallel with the empirical reporting in Chapters 4-7. Holding no pretensions to be complete, we would like to start by identifying three primary dimensions along which to discuss and study product development within an international context; a) time, b) space, and c) scope.

Innovation as a process unfolding over time

Time is the dimension most clearly distinguishable in the literature, and perhaps also easiest to comprehend. The first important distinction is that invention and innovation are two different concepts. They have both been given great many meanings. Definitions can be broadly classified into two categories; those that see innovation as the final event, and those that see it as a process. As has surfaced throughout the previous discussion, we have
adopted the latter meaning, and define invention as “to conceive the idea”, and innovation as “the process by which an invention or idea is translated into the economy”. The process during which the initial idea is transformed into a product and finally launched on the market is called an innovation process. Consequently, will use the terms ‘innovation’ and ‘innovation process’ interchangeably.

The importance of considering innovation as a process is evident in that a number of problems are related to a specific point in time - phase-specific problems - whereas others follow the entire process and the sequencing/separation of activities - processual problems. Thus, if we take a snap-shot look at the process at one point in time, we could uncover a number of problems, but it would be difficult to analyze the underlying sources. Moreover, many events that later could cause problems may have occurred without anyone being able to register these events as critical. The second important consequence of considering the entire process is that a multitude of different skills are required. A good idea is necessary, but unless the entire process, from idea to market launch, works relatively smoothly, results will probably not be successful. It is difficult to postulate a definite number of steps that would occur in any specific innovation process. However, generally, the process is divided into a number of phases. A number of different ‘phase models’ exist in the literature, with differing numbers of phases which are assigned varying labels. Nevertheless, most of these frames of reference have a lot in common. The model which we have adopted covers four distinct phases, presented below. They may but need not follow each other sequentially. Thus, it is possible for, say, the commercialization phase to start before and proceed in parallel with the development phase.

- The Stimulus Phase
- The Conception and Planning Phase
- The Development Phase
- The Commercialization Phase

All phases will be discussed later in much greater detail, but we will define them briefly here so as to identify the activities which we include within each phase. During the stimulus phase, the idea for the new product is born. Thus, we also include the origin of the idea and
the sources of the concept in our analysis. Generally, in the literature, this procedure is described as either a ‘market-pull’ or a ‘technology-push’. In the conception and planning phase a number of specifications (specs) are set as the product offering begins to unfold. Furthermore, several variables such as time, cost, target market, etc. are anticipated. During this phase conceptual designs and models for small-scale testing may also be generated. In conjunction with a decision to proceed with development, the project is generally manned, and a planned organization of development efforts is established. Development includes two substantial elements: detailed design of the product and tools/equipment, and the building and testing of prototypes. Commercialization, lastly, refers to transfer to manufacturing, pilot-production, and factory start-up. Included in this phase are also initial sales and marketing activities.

Innovation across cultural and geographical space

The time span is also of special importance in an international context, since activities performed during the distinct phases may well be located in different countries or regions. Our second dimension - space - embodies two different aspects: a) physical distance, and b) cultural distance. It is a common assertion that physical proximity greatly increases the likelihood of success in an uncertain activity like innovation. Clearly, large physical distance is potentially one of the main impediments to the successful management of IIPs, by entailing high co-ordination costs in form of traveling, telecommunication, etc.

Just as important, or perhaps even more so, could be the second dimension - cultural distance. Intuitively, one might expect people with disparate cultural backgrounds to have at least initial difficulties in co-operating as their behavior may differ and their ways of thinking may be based on divergent conceptions of how things work and ought to work. However, national culture is but one of the influential factors. Professional, hierarchical (positional), or functional cultures, and also age or gender, may well separate people just as much. Our main objective at this point is not to enumerate all conceivable cultural aspects, but rather to establish that physical separation is not the only kind of distance that may be an obstacle in managing IIPs.
Innovation involving multiple levels

Our third and final important dimension - scope - is the one that has attracted the greatest academic interest and is the subject of the largest body of literature. Also this dimension contains two aspects: a) depth, i.e., the number of levels incorporated in the analysis (and affecting the process), and b) span, i.e., the number of business functions involved in the innovation process. As regards depth, scholars often refer to different levels when discussing innovative capability and the firm. Historically, innovations have often been associated with creativity and the myth of the great genius. An emphasis on the individual is still evident in much of the literature. Over time, however, the single-minded focus on the entrepreneur has been modified to include other critical roles in the innovation process, such as the idea generator, the champion, the project leader, the gatekeeper, and the sponsor or coach.

The next level of interest is that of the project (sometimes called the group or the team). A number of studies with this focus have emphasized the criticality of highly dedicated and committed teams. Other researchers have highlighted the impact of group homogeneity and heterogeneity. In yet another area that has attracted a lot of interest, the effectiveness of different communication patterns among the members of the group has been examined. However, the discussion has revolved mainly around the advantages and disadvantages of multi-functional and uni-functional teams, respectively, as well as the integration of efforts, and the extraordinary difficulties involved therein. This type of research will be discussed in more detail under the second aspect (span).

The third level, the organization, is perhaps the one that has attracted the greatest interest. The roots of the dominant view on innovative organizations can be traced back to research conducted in the USA during the 1960s, where 'mechanistic' structures were contrasted with more 'organic' ones. The fundamental idea underlying these contributions was that the more uncertain and changing the environment or task, the less rigid and hierarchical a successful firm should be. Then, what more specifically is an organic structure? Originally, four basic principles of the organic structure were implicitly defined:
1. Ambiguous reporting relationships, with unclear hierarchy
2. Unclear job responsibilities
3. Consultative decision making based on task expertise
4. Communications patterns that are as much lateral as vertical

This line of research later led to a number of academic contributions and illustrious buzzwords such as ‘adhocracies’ and ‘skunkworks’. The hallmark of all these models has been that the large firm which seeks to retain its innovative capabilities must design structures in which the traditional internal boundaries of the firm are more or less dissolved, horizontally as well as vertically, resulting in an ‘unstructured’ or ‘loosely coupled’ organization. Basically, it is recommended that we introduce the climate and structure of a small and entrepreneurial company within the larger and more mechanistic organization. However, most important to us for the time being is that a number of variables at the organizational level (such as task and role differentiation and definition, and the structuring of control, authority, and communication systems) are claimed to affect the innovativeness of the company.

Closely linked to the question of innovative organizations is research on the fourth and final level - the environment. As has already been mentioned, a large body of literature has focused on how different environmental characteristics, such as change and uncertainty, affect the organization. Another line of inquiry has centered around issues of competitive behavior, discussing questions such as the advantages and disadvantages of being a first-mover, the impact of rivalry, and how to preserve a newly created advantage. Yet other researchers have devoted their time to the economic analysis of standards and patents; one body of literature pertains to the effects of government policy on the innovative behavior of firms. However, the area of greatest interest to us relates to the use of external actors in the innovation process. This practice could mean including universities, suppliers, customers, or even competitors in development efforts. Stories of how Japanese auto manufacturers have relied heavily on supplier development are widespread. Furthermore, some of the more celebrated concepts in the popular business press echo the increased importance of core competencies, downsizing, outsourcing, and sticking to the knitting. There is reason to believe that these trends are already affecting, or at least will affect, MNCs and their new
product development activities. By utilizing knowledge and/or resources in the external network, the company can reduce the need for internal diversity and complexity in the development process; however, the managerial intricacies could increase as difficult issues of inter-organizational co-ordination may arise. These problems could be accentuated if the external partners are located in another region or country.

Innovation involving different knowledge bases

This leads us to the second important dimension of scope - span. Our final category includes research on who is responsible for new product development, in which of course external organizations could also play important roles, and issues related to this question. Some influential scholars seem to hold that innovation is primarily the responsibility of one function - research and development - and that the others only play background parts. Consequently, much of their attention has been devoted to finding the right mix of basic versus applied R&D, effective ways of co-ordinating R&D laboratory activities, the best design of work premises, etc. A number of studies have also focused on the influence of other functions on product development. The role of manufacturing and marketing figure prominently. However, these functional studies are primarily preoccupied with somewhat narrowly defined tasks for the department in question, such as how to launch a new product or what consumer research methods provide useful information prior to market introduction.

Still, most researchers have treated innovation as a multi-functional issue, a task involving people from almost every department within the firm, depending on the nature of the venture. As suggested by numerous academics, of particular importance is the capability to work cross-functionally, so as to decrease development time or the rate of defaults, not to miss important consumer preferences, etc. We believe that this point is central. Recently, innovation has been described as a knowledge-creation process by a number of scholars. In our judgment, it is relevant to discuss three primary bases of knowledge, since they all seem more or less indispensable in developing successful new products.

First, the company must be able to generate and solve the technical problems related to the process of developing the new product. Second, the design must make it possible to
manufacture the product as efficiently as possible. A failure to consider manufacturing in the development stage may result in time-consuming and expensive redesigns in later stages, or yield an unsatisfactorily high price or devastating service-call rates. Finally, the company must have knowledge about what kind of product (design, price, etc.) the market demands, or perhaps anticipate what the customers want even before they know it themselves.²⁵

We will refer to these three types of knowledge as technical-, manufacturing-, and market knowledge, respectively. Knowledge of each type constitutes a knowledge base. Of the three bases, one or the other may be dominant in different types of innovation processes and in different phases of the product life cycle. For example, in radical innovation processes, technical know-how could be the predominant knowledge base; in late stages of the product life cycle, when day-to-day improvements in efficiency and cost effectiveness become necessary, manufacturing knowledge may increase in importance.²⁶ Many innovation processes extend over the entire knowledge base of the company and therefore demand cooperation and integration of organizationally separate groups of individuals. Thus, we do not claim that, for instance, the creation of market knowledge is the task of one single function, most likely the marketing and sales one. Rather, the three knowledge requirements which we have identified should be regarded as hurdles or restrictions that the team must pass in order to succeed. Our framework for studying IIPs is displayed below.

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**Figure 1.3: Dimensions in the international innovation process**

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<thead>
<tr>
<th>Stimulus</th>
<th>Conception &amp; Planning</th>
<th>Development</th>
<th>Commercialization</th>
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<tbody>
<tr>
<td>Cultural distance</td>
<td>Space</td>
<td>Physical distance</td>
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<table>
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<tr>
<th>Scope</th>
<th>Span</th>
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<td>Individual</td>
<td>Technology</td>
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<td>Project</td>
<td>Manufacturing</td>
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<td>Organization</td>
<td>Marketing</td>
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<tr>
<td>Environment</td>
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</tbody>
</table>

23
Global innovation - a complex managerial puzzle

Earlier we noted that the diverse and organic global environment can be seen as a potential trigger of knowledge creation, learning, and innovation. However, utilization of each source of information, and of knowledge within and outside the organization, is dependent on the actions taken by organizational members and management. In other words, the free flow of communication, information, and knowledge is blocked by boundaries to knowledge creation and innovation. These boundaries act as intra- and inter-organizational resistance to developing invisible, but constraining, membranes around: a) the organization (in relation to actors in the environment), b) different sub-organizational units, such as functions or national units, and c) individuals.

The development project, and in our case more specifically the IIP, potentially represents an opportunity to surpass some of these boundaries, particularly those separating functions and nations. However, at the same time, the international project could be regarded as a latent arena for political power struggles and destructive conflicts between people from parts usually separated in the formal configuration of the firm, or by sheer geographical distance and cultural differences. Although bearing a great potential, as noted also by others, these global ventures will prove extremely tricky to organize and manage in a number of respects.

We think that the management of IIPs is best seen as containing four important dimensions. It can be portrayed as a multi-level, multi-functional, and multi-national process that enfolds over time. Therefore, even though our main concern is the individual project, we assert that it can not be treated in isolation. It seems reasonable to posit that, at least to some extent, an organization (as well as its members) is a captive of its history and of the environment within which it does business. Still, we do not take an entirely deterministic stance on the question. We do believe that it is possible for management and the organization to affect the flow of information and knowledge, and to enhance the capacity for knowledge creation and innovation. The main point for the time being, however, is that to be able to grasp how and why IIPs are managed in a certain way, we need to consider also the other levels - the environment, the organization, and the individual.
Our diagnosis of the complexity related to the management of IIPs makes it necessary to follow a relatively broad line of research, and we thus risk becoming too sweeping in our description, analysis, and conclusions. Nevertheless, our arguments for such an approach are reinforced by the findings and recommendations of some of the more recent studies of innovation in large and complex organizations. Furthermore, the main body of research has been criticized for applying an overly narrow approach. In addition to treating the management of IIPs as a multifaceted empirical problem, we also assert that knowledge from a number of academic disciplines must be brought together to increase our understanding. We will attempt to bridge theories from three primary areas; a) organization and management theory, b) international business theory, and c) theories on the management of innovation and technology.

**Purpose of the study**

Now that we have described the problem area and discussed the more general pressures on the multinational company to develop IIPs, as well as argued for a multilevel analysis linking theories from three fundamental schools of thought, it is time to specify the purpose of this study.

Our overriding purpose is to describe and analyze how multinational companies organize and manage international innovation projects, with the aim of contributing to the development of the theory of the large, complex, and geographically dispersed firm.

Our purpose is twofold; each part could be regarded as a separate research objective. The first is descriptive in that we will portray different modes of organizing and managing the projects. We believe that this particular objective is important since few (if any) systematic and detailed descriptions of IIPs exist in the academic literature.

The second is explorative and explanatory in that we will search for patterns concerning the effects of the varying forms of organization and management, focusing on the critical problems faced by project managers and members. Of special interest to us here will be the
link between the overall organizational architecture and the project; the reason is that over
time we came to realize that a number of factors on the organizational level appeared to
influence the basic conditions of the project, and to affect the actions of the individuals taking
part in these ventures. We will try to identify and discuss the critical issues that arise over
time in IIPs. By analyzing the sources of these key challenges and problems, we will seek to
interpret and explain why and in what ways these boundary-transcending processes pose
managerial difficulties. As these problems may be rooted not only at the project level itself,
we will also discuss the implications for the organizational architecture of the modern MNC.

Expected contributions

The trend toward increased international competition will place a considerable demand on the
managers of MNCs, and IIPs, to utilize the total knowledge and learning potential of the
company. In our view, this type of international project organization could well be used to an
increasing extent in the future, not only for product development but also for other tasks with
global reach. Moreover, the management of international innovation projects involves many
of the issues encountered in managing the multinational more generally; therefore, in a sense
these projects could be regarded as 'micro-MNCs', or at least mirrors reflecting images of the
larger company. A study of these projects and their organizational contexts could also give us
cues on how to manage and organize the MNC in its totality in the future. This study, to
some extent, represents a test of the new and more speculative models of the MNC, which all
implicitly, and some more explicitly, assert that the future MNC will rely heavily on cross-
border co-operative projects. We are not primarily interested in whether the concept of IIPs is
well chosen, but in whether our findings can give us clues on the applicability of the notions
present in the 'heterarchy' or the 'transnational'.

In relation to previous research in international business, our research approach differs
significantly in that it is much wider in scope but also because our focus on the project.
Further, as noted earlier, few studies in this field have treated product development as a
process and followed innovations from initial idea to market launch. We will try to add to the
existing literature, by also considering levels other than those of the organization-
environment, and by treating innovation as a process that spans three critical knowledge bases, and thus as a multi-functional issue.

We also believe that by considering space as a definite variable, geographically and culturally, we will be able to add to the literature on the management of innovation. Also, our conception of innovation as a multi-level phenomenon diverges from the traditional uni-level studies of product development within this theoretical vein. Finally, we hope that our explicit analysis of the link between organizational architecture and project activities in an international context will add to both bodies of literature, as well as to organization theory more generally.

To conclude, we will set out to develop a conceptual framework for interpreting the nature of the international innovation process and the questions of how, when, and why the organizational architecture influences the evolution of IIPs. Particular interest will be paid to questions of why certain behavior and specific problems occur. Since our focus is also on the organizational level, we will seek to outline one possible architecture for those multinational companies which need to rely on cross-border initiatives and interaction. Accordingly, it lies within the scope of this dissertation to contribute to the formulation of the theory of the large, complex, and geographically dispersed firm, on both a micro and a more macro level.

Summary of the chapter

In this first chapter we have described the focal area of interest in this research: to study international innovation projects (IIPs) in multinational companies. For development projects to qualify as IIPs, we imposed three distinct requirements: a) asset internationalism, b) market internationalism, and finally c) administrative internationalism. On the basis of four cases taken from ABB and Electrolux (two cases on each company), and a survey of 32 IIPs at 11 other Swedish MNCs, we will try to contribute to the knowledge of how these processes evolve and are managed.
The principal concept that developed during the course of our research was that of architectural dependence, i.e., that organizations are captives of their architectures, which influence the activities performed in the innovation processes. We believe that the organizational architecture of the modern multinational is best understood as comprising two important structures; an asset structure, and an administrative structure. The asset structure describes the geographical concentration-dispersion of strategic resources and knowledge, as well as the access to an external network. The administrative structure comprises configurative, and co-ordinative structures, and it outlines the organization in terms of differentiation and integration.

The emergence of IIPs is a relatively recent phenomenon. Historically, strategic knowledge and resources within the MNC were generally either concentrated in the home-country or dispersed among the international units; these were neither systematically specialized nor interdependent to any great extent. Consequently there were two traditional processes of innovation: a) home-based innovation processes (HBIPs), in which an opportunity was perceived in the home country of the multinational and later exploited globally; and b) local innovation processes (LIPs), in which each autonomous national unit within the company developed its own products to adapt to the specific requirements of its own region.

As an effect of contemporary changes in the global environment and the internal distribution of strategic assets throughout the MNC, this explanation of how the modern multinational operates is no longer complete. Institutional changes, such as falling trade barriers and the development of global standards, are triggering more intense international competition in most industries. Simultaneously, the diffusion of technological knowledge and the increasing spread of vital markets, in output as well as input terms, combined with the growth of multi-technology products, pose a challenge to the MNC that relies too heavily on one base for its development, or dares to let dispersed units work entirely on their own.

Recent developments in transportation and perhaps more importantly in information and communications technology, also enable the modern multinational to co-ordinate activities over geographical distances in ways that were unimaginable only a few decades or even years ago. At the same time, many MNCs have foreign units with strategic resources and
knowledge of a magnitude never seen before, partly because of internal growth but in many cases resulting from major acquisitions.

From the research underlying the study we can identify four basic rationales for a multinational to set up IIPs. Companies are compelled to take these decisions by the geographical separation of complementary resources and knowledge, as well as to secure and strengthen critical relationships between actors from different countries or regions. Both motives are at work within the organization as well as in relation to actors in the environment, and a specific IIP can be based on more than one of the basic rationales.

A number of new contributions to our understanding of the MNC contain similar ideas, and the models all share a preoccupation with innovation and the systemic properties of the evolving organizational architecture. However, few scholars have conducted real in-depth studies of how these new cross-border processes actually work (or not), and surprisingly little attention in the field of international business or innovation management has been given to the management and organization of internationally dispersed innovation projects.

Drawing upon insights from the latter area, we propose three dimensions which are crucial for studying and analyzing IIPs: a) time, b) space, and c) scope. Time relates to the fact that innovation should be treated as a process consisting of a number of phases, which may be sequential or overlapping. Space may affect development in terms of geographical distance, but also in terms of various cultural differences. Finally, scope contains two elements: depth and span. As regards the former, although development activities are carried out within a project, three other levels also come into play, as they affect the basic conditions for the development team: the environmental, the organizational, and the individual level. The latter element - span - matters since we believe that the knowledge-creation processes that are critical to successful innovation involve more than one functional area of the firm. We identify three primary bases of knowledge, all of which are important: technical knowledge, manufacturing knowledge, and market knowledge.

We conclude the chapter by formulating the aim of the study. Our overriding purpose is to describe and analyze how multinational companies organize and manage international
innovation projects. Thus, our research objectives cover descriptive as well as exploratory and explanatory issues. Using this approach, we will try to contribute to the theory of the large, complex, and geographically dispersed firm.

Outline of the thesis

In Chapter 2 we will outline the research design of the study. A brief summary of the four IIP cases is also included. Special attention is paid to four separate questions:

- How and why did we choose a particular design?
- How were the companies and cases selected?
- How was the research approach applied?
- How can the quality of our research be judged?

Chapter 3 deals with the historical evolution of Electrolux and ABB. The companies are discussed from three aspects:

- Company and industry evolution,
- Strategic heritage and direction of today, and
- Organizational evolution.

The first phase of the innovation process - the stimulus phase - is described in Chapter 4. Four questions are at the center of our analysis:

- Why did the firms start searching for the concepts, or encounter them?
- Where did they look and what factors guided or restricted them in their search?
- How was the process conducted?
- Who took initiative in starting the projects?

In Chapter 5, we follow the IIPs into the conception and planning phase. We focus on answering three separate questions:
• Why did the projects end up as international ventures?
• How did the phase proceed?
• What difficulties and problems were encountered?

Chapter 6 deals with the development phase. Four questions make up the core of the description and analysis:

• How were the projects organized?
• How were the projects managed?
• How were co-operative arrangements with external partners managed?
• What major problems or difficulties were encountered?

The commercialization of the products is described in Chapter 7. Two questions are central:

• How was the transfer to manufacturing managed?
• How was transfer to the market-launch phase managed?

In Chapter 8, we summarize and further develop our theoretical findings. We seek to outline a conceptual framework for interpreting the nature of international innovation process and the influence of the organizational architecture.

Chapter 9 outlines the more practical findings concerning the management of IIPs. The projects are described in terms of key problems identified. Finally, we discuss the underlying sources of these problems.

The organizational architecture of the MNC is discussed in Chapter 10. We are interested in two specific questions:

• What can be said about the nature of the organizational architecture?
• What are the implications of our study for the future architecture of the modern MNC?
Notes to Chapter 1

1 Ghoshal and Westney (1993: 6) refer to the current definition of the MNC accepted by the UN; “an enterprise (a) comprising entities in two or more countries, regardless of legal form and fields of activity of those entities, (b) which operates under a system of decision-making permitting coherent policies and a common strategy throughout one or more decision-making centers, (c) in which the entities are so linked, by ownership or otherwise, that one or more of them may be able to exercise a significant influence over the activities of the others, and, in particular, to share knowledge, resources, and responsibilities with others.”

2 By ‘innovation’, we refer to the development of new products, except when otherwise noted.

3 Casson (1987:1) argues that: “The modern theory of the MNE (multinational enterprise) has the potential to become a general theory of the enterprise in space, and as such, to embrace the theories of the multi-regional and multi-plant firm. The theory of the uninational single plant firm under perfect competition - a theory which is used to be known quite simply as ‘the theory of the firm’ - turns out to be a quite trivial special case.”

4 Common explanations for escalating costs of innovation include increased product complexity, and costs related to adaptation of products to local needs. The R&D expenditures of the 20 largest Swedish MNCs increased by 214 percent between 1980 and 1987 (Håkanson, 1989). Further, according to Twiss (1986) only some ten percent of the development projects initiated were successful. Hoduck (1990) states that as many as one third of all new products fail at market launch. Moreover, Japanese companies underscore the increased importance of product development to overall success in the future (Moss Kanter, 1991).

5 The term organizational architecture can be found in Nadler et al (1992).

6 We will use the term ‘structure’ rather broadly, not restricting organizational structures to the organizational chart (the boxes and arrows) of a company. Rather, a structure may be defined as “the pattern or organization of elements in a society and culture” (The Random House College Dictionary, 1988). Thus, in the organizational architecture of a firm, structures could also be interpreted as systems.

7 The idea of the co-existence of multiple structures originates with Hedlund (1993), who talks about knowledge, position, and action. Also see Hedlund and Hagström (1994) for a practical application of the framework. We are well aware of the existence of structures, other than those of assets and administration. However, in our view, these two comprise the basic building blocks of the firm. To the framework of Hedlund, and Hedlund and Hagström, we would add notions of internal and external resources, as well as co-ordinative structures. We believe that these structures are also critical, since access to or control over them, in part determine the more informal power base of organizational units (see Pfeffer, 1981, and Mintzberg, 1983), an aspect largely neglected in the Hedlund framework, which can be interpreted as favoring an ideal ‘technocratic’ organization.

8 See Teece et al (1990) for a similar definition of core capabilities.


10 A number of different taxonomies of integration mechanisms exist in the literature. Thompson (1967) introduced standardization, planning, and mutual adjustment as the three general classes of co-ordination mechanisms. A similar idea can be found in March and Simon (1958) who refer to programming, planning, and feed-back as the primary integrating devices. A more detailed distinction is made by Mintzberg (1979), who identified the following six co-ordination mechanisms; 1) Mutual adjustment, 2) Direct supervision, 3) Standardization of work process, 4) Standardization of output, 5) Standardization of skills (and knowledge), and finally 6) Standardization of norms. However, most definitions seem to overlap to a large extent, in that formalization is closely related to standardization, and socialization to mutual adjustment. Our framework is akin to the one used by Bartlett and Ghoshal (1989).

11 See March and Simon (1958).

12 See Cyert and March (1963), and Nelson and Winter (1982), for a discussion of organizational routines.
Culture has been given great many interpretations and definitions in the literature. Deal and Kennedy (1982: 4) refer to "The way we do things around here.", whereas Schein (1983: 14) describes culture as "The pattern of basic assumptions that a given group has invented, discovered, or developed, in learning to cope with its problems of external adaptation and internal integration.". Finally, Hofstede (1980: 25) defines the term as "The collective programming of the mind."

Two types of values are generally identified in the literature: terminal values and instrumental values (Rokeach, 1973). Terminal values represent desired end states or outcomes, whereas instrumental values relate to desired modes of behavior. Unlike most other scholars we do not only include those values "shared" by the entire organization. Rather, in our view, a focus on diversity of beliefs and values is critical to understanding the nature of the organizational architecture. These differences could exist over both geographical and organizational space. Thus, from a cultural point of view, firms may range from having diverse to shared values and beliefs. Also see Van Maanen and Schein (1979), and Jones (1986) for a more general discussion of values and socialization.

See March and Simon (1958), and Thomson (1967).

Ibid.

The term strategic intent originates with Hamel and Prahalad (1989). Naturally, not everyone in a particular firm may agree on what direction to take in the future, or the nature of the strategic intent could be quite unclear to people in an organization during certain periods of time. Moreover, differences may exist in terms of ideas about how to realize strategic intent. As we shall see, in different departments, and different countries, there may be quite dissimilar goals, as well as ideas on what to do and how to do it.


The distinction between exploitation and creation was first drawn by Hedlund and Ridderstråle (1992), but the idea originated with Hedlund and Rolander (1990), who referred to creation and experimentation. However, a number of other scholars have used similar concepts. March (1991) mentions exploitation and exploration, and Moss Kanter (1989) discusses action in terms of "mainstream" and "newstream". Our notion of creation is closely related to and influenced by the enactment process as described by Weick (1969: 64): "the human creates the environment to which the system then adapts. The human actor does not react to an environment, he enacts it." Also see Berger and Luckman (1966) for a discussion about the social construction of reality.

The seminal references are Burenstam Linder (1961), and Vernon (1966).

Taking a closer look at the Swedish case, we can note that some 75% of all R&D efforts is concentrated in the 20 largest MNCs (see Håkanson, 1980, 1989, and Swedenborg et al 1988).

For a more thorough discussion on the two classic approaches to innovation in the MNC, see Bartlett and Ghoshal (1989, 1990), and Ghoshal and Bartlett (1988).

The distinction between ethnocentrism and polycentrism can be found in the pioneering work of Perlmutter (1969). Also see our discussion in Chapter 3.

As argued by Bartlett and Ghoshal (1989), a number of steps can be taken to make the traditional development approaches work better. In the central innovation process the organization has to secure; a) subsidiary input by use of multiple linkages, b) the link of development to needs by use of internal market mechanisms, and c) responsibility transfer by managing personnel flows. The local innovation processes increases the need for: a) the ability to empower local management, b) creating linkages to the corporate decision-making process, and c) integrating the technical and marketing functions within each subsidiary.

The empirical examples of different industry requirements and innovation processes are borrowed from Bartlett and Ghoshal (1989).
Bartlett and Ghoshal (1989) mention a third requirement/capability in addition to the basic ones of efficiency and responsiveness: transfer of knowledge. However, while the dichotomy between efficiency and responsiveness is clear, in our view the addition of knowledge transfer is more of a step toward resolving the dilemma, than a category of capabilities and requirements separate from the others.

Fayerweather (1978) was one of the first to acknowledge explicitly the importance of the fact that the MNC faces many different environments.

For a discussion of converging customer preferences, see Levitt (1983). An argument for that psychic distance is diminishing can be found in Nordström (1991).

Scholars arguing that the world cannot be regarded as one large, homogeneous market include Douglas and Wind (1987), Hedlund (1986), and Bartlett and Ghoshal (1989).

A number of authors have argued that the advantages of multinationality shift over time, and gradually become more systemic. Johansson and Vahlne (1977) refer to advantage cycles, Vernon (1979) discusses the concept of a global scanner, Kogut (1983, 1990) focuses on the sequential process of foreign direct investments, and Nonaka (1990) characterizes globalization as a process of self-renewal. Further, several of the more recent models of the MNC echo similar ideas - see below and our discussion of ASEAI/ABB and Electrolux in Chapter 3.

The essence of the new models of the MNC will be discussed continuously throughout the text. At this point it should suffice to provide the seminal references. For a discussion of heterarchies, see Hedlund (1986). The characteristics of the transnational are outlined in Bartlett and Ghoshal (1989). Multifocal MNCs are described by Doz (1986). Finally, a portrayal of the horizontal multinational can be found in White and Poynter (1990).

The most daring conception of a new type of parent-subsidiary relationship is perhaps the one in Hagström (1991), where the author introduces the idea of 'auxiliaries' (the word literally means 'helper') rather than treating the two as separate categories.

For a discussion of the concept of 'multi-technology', see Granstrand and Sjölander (1989).

Baba and Imai (1991) refer to systemic innovation arguing that it is essential to build networks within as well as outside the organization because of the increased complexity of innovation.

Von Hippel (1986) underscores the importance of involving lead users in the development effort. Lead users represent strong needs that will become general in the marketplace months or years into the future. Porter (1990) emphasizes the importance of a local cluster of demanding and sophisticated buyers in forcing (and helping) companies to create competitive products.

For a recent discussion on the impact of information systems in the modern MNC, see Hagström (1991, 1992).

In the Swedish case, Hörnell and Vahlne (1986) note that by the 1970s, multinationals had almost abandoned their historical preference for growth by green-field investments (also see Swedenborg et al., 1988).

Descriptions of the organizational development of Swedish MNCs can be found in Hedlund and Åhman (1983), Hedlund (1984), and in the work of Forsgren (1990). As for multinationals from other countries, see Bartlett and Ghoshal (1989), and Prahalad and Doz (1987).


The clearest argument that the MNC is still heavily dependent on the home-market conditions can be found in Porter (1990). This line of reasoning was later developed into a model of the home-based MNC, and extended into the multiple home-base, see Sölvell and Zander (1995) and Zander (1994).

In addition to the example briefly summarized here (see Fortune, June 28, 1993: 72-75) we have found a few other descriptions of IIPs. Further, the level of detail has generally been relatively low. Bartlett and Ghoshal (1989), for instance, provide abbreviated descriptions of Ericsson's development of the AXE-system, P&G's development of a new liquid detergent, and IIP attempts in NEC. Also see Nonaka and Takeuchi (1995) for an outline of how Nissan developed the Primera car.

An earlier version of this model was presented in Ridderstråle and Nobel (1993).

Empirical data, and a discussion of the internationalization of R&D, as well as a summary of previous literature and studies in the area, can be found in Nobel (forthcoming).

See Bartlett and Ghoshal (1989).


See Katzenbach and Smith (1993) for a recent attempt to describe high-performance teams.

A number of studies summarizing the research on innovation management have inspired our classification of the literature. The most influential references are Tushman and Moore (1988), Van de Ven et al (1989), Adler (1989), and Wolfe (1994).

It may seem trivial to distinguish between innovation and invention, but as pointed out by Martin (1984: 2-3) the distinction is central to an understanding of the differences in organization and management methods needed.

This classification can be found in Ghoshal and Bartlett (1988), who argue that Zaltman et al (1973: 7) represent the former definition, and Myers and Marquis (1969: 1) the latter.

Our definition is consistent with the one adopted by Twiss (1986), referring to the US Department of Commerce (1967).

For examples of other phase-models, see Wheelwright and Clark (1992), Brodin (1976), and Twiss (1986), among others. Also, see Wolfe (1994) for a review of some other models.

A more thorough description of the content of the different phases can be found in Wheelwright and Clark (1992).


For a discussion of ways, or dimensions, in which to describe national cultures and people from different countries see Hofstede (1980). For a review of the literature, consult Zander (forthcoming).

For an early discussion of the entrepreneur, see Schumpeter (1911/1934).

A discussion of the critical roles in innovation processes can be found in Roberts (1977), and in Roberts and Fusfeld (1981). Martin (1984) links these roles to six critical functions needed to ensure commercially successful innovations. Allen (1977) provides additional empirical evidence of the importance of gatekeepers in innovation processes.

See Wheelwright and Clark (1992), and Katzenbach and Smith (1993).

A discussion of the risks associated with group homogeneity can be found in Pelz and Andrews (1966), and in Janis (1982).

See Bavelas and Barett (1951) for an experimental approach to assessing the merits of different structures.

In general, these early contributions to the so called contingency school focused their attention on the intersection between the organization and its environment. They argued that the type of environment an organization faced determined the most appropriate structure to adopt. One of the better known classifications of the environment can be found in Emery and Trist (1965). Lawrence and Lorsch (1967) later extended the analysis by suggesting that different parts of the organization face different sub-environments. Development activities, here merely represented by the R&D function, in general face high uncertainty and thus need to adopt more organic structures. Another line of research emphasizes the importance of the company's technology (or task system in a wider sense) - see Woodward (1965), Thompson (1967), and Perrow (1967).

The four principles underlying the organic organization can be found in Schoonhoven and Eisenhardt (1985 11-12), who in turn refer to Burns and Stalker (1961).


For a discussion of loosely coupled systems, see Weick (1976), and Orton and Weick (1990).

See Wolfe (1994) for an overview of factors included in the organizational context affecting innovative behavior, and the emphasis by different scholars on varying sets of factors.

The seminal reference is Porter (1980), but see also Porter (1983, 1985) for a sharper focus on the proactive creation of advantages, rather than the building of barriers.

See Adler (1989) for an overview of the literature.

For research on co-operation with suppliers, see Axelsson (1987), and Clark and Fujimoto (1991). The seminal references on customer co-operation include the work by Von Hippel (1976, 1977, 1978, 1982, and 1986). Examples of successful co-operation with competitors may be found in Hamel et al (1989), as well as in the extensive literature on strategic alliances and joint-ventures (see Contractor and Lorange, 1988; and Roos, 1989, for a review of the literature).


Discussions concerning the mix of various types of R&D can be found in Maidique and Patch (1988), Burgelman and Maidique (1988), and Ansoff and Stewart (1967). Katz (1982) studied the co-ordination of R&D laboratories, and Allen (1977) the impact of different work premises.


Support for our view can be found in Simon (1991: 130), where the author argues; "A successful product must satisfy a whole range of constraints, the knowledge of which may originate in many parts of the organization. Among these are the constraints on product characteristics determined by end users and markets, constraints determined by manufacturing considerations, and constraints determined by natural laws over and above those involved in the nuclear concept".

Hamel and Prahalad (1991) use the terms 'corporate imagination' and 'expeditionary marketing'.

This line of reasoning is further developed by Abernathy and Utterback (1978) in their description of the strategic requirements posed by product- and process innovation, respectively.
International innovation processes, like all other organizational processes, can be described from a power perspective (see Lindblom, 1959; Pfeffer, 1981, 1992; Mintzberg, 1983; and Quinn, 1988). There are almost as many specific definitions of power as there are scholars within this field of research. However, most definitions hold some commonality. A central notion is that of influence over people's behavior and decision outcomes. Thus, power is relative, in that any actor has a unique power position in relation to each of the various external parties. Moreover, power is situational or domain specific, since the specific task or process in question may limit the power of some actors while others become more powerful than generally is the case. Neither is power always exercised, and it is consequently only potential until activated. However, different interpretations of power dependencies may still exist in the minds of people, i.e., they are socially constructed or enacted by each single individual (see Berger and Luckman, 1966; and Weick, 1969/1979).

For the detailed argument, see Weick and Van Orden (1990).

See Weick (1969/1979), and Pfeffer and Salancik (1978).

Support for our multi-level approach can be found in the recent studies by Van de Ven et al (1989), Jelinek and Schonhooven (1990), and Wheelwright and Clark (1992).

For criticism of the main body of research, see Gold (1979), and Teubal (1979), referred to in Häkansson (1987).

See Tichy (1990), for a similar idea.
CHAPTER 2

RESEARCH DESIGN AND SETTING

Introduction

In this chapter we will link the purpose of the study to the theories that will be applied, and to the empirical studies on which we will base our findings. Four questions were essential to confront in designing the study. First, given the purpose, what design would best help us to find the answers to our questions? Second, given the choice of design, how did we select the companies and cases included in our study? Third, more specifically, how did we apply our research approach? Fourth, how can the results of our research be judged or valued? After having tried to answer these questions we will move on to introduce the reader to the four cases that constitute the main empirical basis of our research findings.

Searching for an appropriate design

Generally, the choice of a suitable research design is dependent on two variables: a) how much we know about the phenomenon being studied, i.e., how mature the theory of the research area is, and b) what we want to know, i.e., how we formulate our research purpose. The more mature a theoretical framework, and the more specific a purpose (especially when hypotheses are to be derived from existing theory), the more quantitatively oriented the approach that can be used. On the other hand, if the theory is recent, or can be characterized as pre-paradigmatic\(^1\), and when the purpose is more directed toward generating hypotheses and conceptual/theoretical development, a more qualitative research approach is better.\(^2\) In view of our focus on the latter aspects, i.e., the development of theory rather than the testing of theory, a qualitative design seemed to fit our objectives.
Arguments for a qualitative design

We believe that five other important arguments can be made for using a more qualitatively oriented approach, at least initially. First, as suggested in Chapter 1, our knowledge of the innovation process is fairly rich, but rather fragmented. Some scholars even argue that relatively little is known about how innovations emerge and develop over time, and that few process-oriented theories satisfactorily explain the sequence of events in the processes concerned. This statement is particularly true in an international context. Second, theories on the organization and management of the MNC are not mature in the sense that an obvious and uncontested view of how the modern multinational operates (or should operate) exists. The clearest example is perhaps the ongoing debate between the heterarchical/transnational model, emphasizing the importance of the international network, and the home-based one, highlighting the prominence of the company’s home country. Third, we are examining innovation processes involving interaction between individuals. The subtlety of these processes makes them hard to interpret without confronting the people taking part; that is, to be able to interpret the processual aspects of knowledge creation and innovation, we believe it is essential to interview the persons involved in the ventures. Fourth, IIPs have not been studied thoroughly before. Consequently, we do not know precisely what to look for in terms of problems and underlying sources of difficulty. We can not be sure if they work like extended local innovation processes, or if they are distinctly different. Fifth, since these processes have not been thoroughly researched before, we see one of the strengths of a qualitative approach as allowing us to document the processes in some detail. The descriptive value of such a design is thus significant.

Accordingly, in our view, theoretical arguments (it was difficult to specify an integrated set of testable and meaningful hypotheses before the research project was launched), as well as more empirical ones (little is known about the specific phenomenon), can be made for the choice of a qualitative research design. Given the purpose of this study, we believe it would have been a mistake to adopt a more quantitatively oriented approach from the start, although we seriously considered the alternative even initially. However, it should be evident from our discussion in Chapter 1 that we increasingly perceived a need also to collect more quantitative data from other companies. As will be described in more detail later in this
chapter, we did so, though not primarily as an effort to test hypotheses derived from the qualitative study, but rather to complement our case-based interpretation of IIPs. Even though this study will mainly rely on qualitative data, we believe it is possible to move beyond description. The importance of particular factors can be estimated and interpreted in terms other than purely numerical.

Given the limited research and theory on innovation processes in the MNC, and the nature of our purpose, we first decided to adopt a qualitatively oriented approach, more specifically the multiple-case study methodology. As will become evident later, it is also worth noting that this approach in itself does not exclude the use of quantitative measures. We felt that the choice of a qualitative design would better enable us to interpret the nature of the international innovation process in an interaction between theory and empirical observations. Several authors also argue that this tradition is associated with the development of theory. The suggestions and findings which we present should be seen as a first step toward a framework that can be used to interpret innovation processes in the multinational company, and possibly also in other organizations.

Case studies

Case studies involve investigations of one or several social systems, e.g., organizations. The empirical research in a case is characterized by intense study of the object in focus, and from several different aspects. A number of approaches to case-study research are evident in the literature. One can work with either single or multiple cases, and numerous levels of analysis. Usually, several methods of data collection are used, i.e., archives, interviews, questionnaires, and observations. Thus, evidence may be qualitative as well as quantitative. This combination can be highly synergetic. Furthermore, case studies may have a number of different objectives, to test and to generate theory.

In designing a case study, one makes a choice that will have great effect on the research project as a whole. Variations in the two variables: a) number of cases (single or multiple), and b) units of analysis (holistic or embedded), give rise to different case-study designs.
When to apply one or the other depends on the phenomenon being studied. We were interested in studying several ‘representative’ innovation projects, so as to be able to analyze differences between companies as well as projects, rather than one ‘rare’ or ‘critical’ case. Further, in our conceptual framework we argued for the importance of considering different units of analysis, although a focus has been put on the project (and as it turned out also on the organizational level). The research design which we chose is best described as a multiple-case approach, with multiple units of analysis. Evidence from multiple-case studies is often considered more compelling than results from single cases, and thus the design as more robust.

Selecting the sample

An important question in case-study research is how to select the sample. The concept of population is crucial as it sets the boundaries for selection, and controls for external variation. Moreover, it helps the researcher in defining limits for generalization. In contrast to the statistical-sampling technique traditionally used in hypotheses-testing studies, case study research generally relies on theoretical sampling. The object in theoretical sampling is to select cases which are likely to replicate, or extend, the emergent theory. We will start by describing our theoretical sampling of companies and cases, and then move on to outlining how we approached the organizations more practically. However, we will first delineate more specifically why we decided to study product innovation processes.

Why innovation projects?

In addition to the arguments outlined in Chapter 1, concerning the vital importance for any firm of ensuring a steady state of renewal and innovation, a number of other reasons led us to focus on these types of development projects. First, by studying processes, as opposed to taking only a snap-shot look at a phenomenon, we hoped to capture the more interesting and intricate aspect of managing across borders of different kinds. A large body of recent literature also emphasizes the importance of studying processes, in which real action takes place, in more depth. Second, compared to many other processes, those involving product
development provided an opportunity to identify "a beginning and an end", thus making it
easier to relate our results to some measure of performance. Third, and as noted earlier, these
processes, at least potentially and according to contemporary scholarly research, involve more
than one department of the firm, and in our cases also more than one country. We thereby
hoped to capture human interaction covering large areas of the company's body of
knowledge. Fourth, and as argued in the first chapter, we hoped that our choice of these more
creation related processes would represent a true "acid" test of the new and more speculative
models of the MNC.

What kinds of innovation projects?

In addition to the three requirements of 'internationalism' described in Chapter 1, one more
delimitation guided us in the search for a number of 'representative' cases. As we see it,
there is reason to believe that the nature or characteristics of the product offering, i.e., the
uncertainty associated with the new task, will have an effect on the management of the
innovation project. A product offering that requires substantial creation of new knowledge,
as it transcends the boundaries of knowledge within and/or outside the firm, may call for
different modes of organizing and co-ordinating than a product that is largely based on the
existing knowledge of the firm. The requirements of knowledge creation posed by a new
product concept in reality have at least two aspects. The first relates to the novelty of the core
technologies and application; the second to the novelty of the target customers and
geographical market(s). Both dimensions, however, should be related to some measure of
company/customer experience, rather than to an objective scale of novelty. A certain task
may pose different requirements depending on what the firms have done before; this last
point will be discussed in more depth in Chapter 6.

As regards the technical aspects, innovations are generally classified into the categories of
revolutionary and evolutionary, sometimes also called radical and incremental, innovations.
In our view, it is best to imagine a continuum with revolutionary innovations at one end, and
evolutionary innovations at the other. Revolutionary innovations represent major product or
process breakthroughs that either change a mature industry or give rise to a new industry.
Evolutionary innovations, in turn, are more incremental changes or improvements in products
or processes. The innovations studied in this dissertation can be placed in the middle of the ‘revolutionary-evolutionary continuum’. We chose not to study either simple face-lift innovation processes or the most pioneering innovations. Revolutionary innovations are rare, and often take place over a long period of time. Accordingly, we decided that a study of these innovations would be less meaningful and relevant than one focused on the more frequent mid-range innovations, which really constitute the “bread and butter” for the future survival of the firm. Moreover, given that most Swedish MNCs operate in mature industries, we expected to find many of these ‘average’ types of innovations. As for simple face-lift innovations, they generally do not require the subtle management and organization mechanisms which we were interested in studying, and we also suspected that many of these “improvements” would be carried out locally. Therefore, we excluded merely incremental innovations, although one might argue that they are not entirely uncomplicated to manage.

In terms of market coverage, our initial criterion requires that the product be intended for an international market. There may or may not be some minor modifications. Thus, the product offering could include some novel elements if the firm has developed earlier generations for national markets, either locally or centrally. On the other hand, it could also mean “business as usual”, in case the firm is used to developing products for the global marketplace. Each project is unique in this respect, although, as we shall see later, the IIPs which we studied in depth often extended the pre-existing geographical coverage. The second aspect of market novelty relates to whether the product is aimed for a new customer group. In many cases, one of the consequences of developing a new product is that the company will attract new customers. Here, we tried to find projects that were related to the existing knowledge base and operations of the firm, so as to reduce the number of variables to control. Nevertheless, the two Electrolux IIPs can be regarded as containing more ”market novelty”, than the ABB projects.

To summarize, we decided to study international product-innovation projects that were neither the most revolutionary nor the most evolutionary. At the same time, we still wanted a sufficient degree of heterogeneity in the sample, so as to be able to make interesting comparisons. Earlier, we proposed that the nature of the product, in terms of core technologies, technological combination, market focus, etc., could affect the organization and
management of the innovation process. We admit that from this perspective it might seem contradictory to exclude the most evolutionary or revolutionary innovations. However, as we have outlined above, the reason for eliminating these innovations relates to the managerial aspects associated with the nature of the processes.

Although our cases can be placed in the middle of the incremental-radical continuum, they were still different enough to allow for comparisons also from the ‘novelty-of-the-task’ aspect (see Chapter 6). This latter point is particularly valid in view of the fact that our cases, while seemingly less revolutionary than the development of a new super-computer, were definitely more than simple face-lifts for Electrolux and ABB.

**Why ABB and Electrolux?**

A number of other choices guided us in selecting the companies. First, we wanted to study IIPs in more than one MNC. Second, we wanted more than one project at each firm so that we could search for different types of requirements and approaches to co-ordination within the same organization. Third, we considered it critical to talk to a variety of people in different positions, representing different countries and functions, to obtain multiple views on how project activities proceeded over time.

Rather than selecting all projects at a single MNC, we decided to study two companies: Electrolux and ABB. We were thus able to make comparisons between MNCs that differ in a number of respects, as will be further discussed in Chapter 3. At this point it suffices to say that the main parameters in which we sought variation were related to the different administrative structures utilized to manage the companies. However, these two firms also share a number of characteristics. They are both fundamentally Swedish. Although ABB is a 50/50 owned Swedish/Swiss multinational, the managerial logic followed by the firm is primarily Swedish, more particularly that of ASEA.\(^\text{19}\) Focusing only on Swedish multinationals may of course be seen as a weakness of the study, but it also has a number of practical merits.\(^\text{20}\) In any study, some variables must be held constant so as to allow fruitful comparison of others. Swedish MNCs, in general, may be expected to share characteristics favoring the likelihood of finding IIPs there. They originate from a country whose economy
is small and open. Partly as a consequence, Swedish multinationals generally have a long history of doing business in the international arena. However, we do admit that an international comparison of European, North American, and Japanese firms would have been interesting from both a practical and a theoretical point of view.

As with the cases, we used the three criteria of ‘internationalism’, described in Chapter 1 when selecting the companies to be studied. The companies which we chose responded positively when we approached them, and they agreed to help us with access to critical data. In terms of asset internationalism, in 1990, the year before this study commenced, some 82% of Electrolux’s 150,000 employees were located outside Sweden, and in ABB approximately 78% of 215,000 persons were employed in countries other than Sweden or Switzerland. Both companies were also highly international in terms of sales. Electrolux generated 85% of sales in countries other than Sweden, and ABB, some 84% of revenues outside Sweden and Switzerland. Finally, as for administrative internationalism, we wanted to avoid studying companies with substantially unco-ordinated international assets. From past experience we knew that Electrolux was moving toward a more internationally integrated network, and ABB in the late 1980s and early 1990s was already becoming renowned for its global matrix organization. Both firms had strong strategic centers outside of Sweden and Sweden/Switzerland, respectively. Admittedly, from this perspective our sample is biased; not all multinationals are as strategically dispersed as these two firms. Another factor in our decision to contact these two companies was that they are global industrial leaders. Hopefully, ABB and Electrolux would represent the forefront of modern multinational management.

The choice of companies from two different industries was made out of practical necessity. It was easy to see the merits of a study that would have included a number of companies in the same industry; it would then have been possible to compare strategic action given almost identical environmental conditions. However, our decision to study firms in two different industries, in addition to permitting an investigation of the impact of varying competitive conditions, was heavily influenced by our fear that comparing companies in the same industry would have made it difficult to get access to critical in-depth data; we believed that management would be reluctant to disclose this type of often confidential information to
researchers who were also in contact with major competitors. Moreover, we anticipated that we would encounter difficult ethical considerations that might limit our freedom to work with the empirical material.

**Approaching ABB and Electrolux**

When selecting the projects, we contacted Electrolux and ABB with a general inquiry about their interest in a study of international innovation projects. We had certain critical objectives in mind when initially approaching the companies. First, in outlining our interest, definitions, and limitations, we started by contacting individuals highly placed in the organization so as to let people with an overall view propose potential projects to study. Furthermore, by obtaining proper backing from the top, we hoped to establish legitimacy with the people more directly involved in the projects; in some cases, top managers or project leaders even wrote introduction letters to the people we were to interview.

Second, we wanted to study the projects in real time. From the start, we felt that our focus on the process necessitated a longitudinal research approach.\(^{25}\) A direct connection with the project offered both advantages and disadvantages. Our primary concern was to limit the dangers of lavish post-rationalizations, the risk of ending up with stories in which the details had been "put right". We also felt that by following the processes while they were under way, we would gain a sense of how events evolved over time. On the negative side, a hazard of our research strategy was that we did not know if or when the products would reach the market. We tried to limit this risk by asking senior managers to suggest projects which were proceeding as anticipated and which were planned for market introduction in 1993/1994. Admittedly, there was a danger that our sample would be biased in the sense that we would end up with less problem-ridden projects than the typical IIPs at the two firms.

Moreover, as will become evident later, the "Alliance" project at Electrolux was just ready for market introduction when we decided to conclude our data collection. Further, the "3rd-tap" project, the other Electrolux case, never really became an IIP as we had defined these projects, although it was planned as an international venture. This turn of events was regrettable, but we still believe our approach was preferable to a more retrospective one. Data
collection was not stopped until we were confident that we knew enough about the innovation processes to meet the requirements of the study. (For a brief outline of the four projects, see the introduction to the cases at the end of this chapter.) While we could have waited another year before writing this dissertation, we did feel that the empirical material evident at this point was rich and interesting enough to yield interpretations pertaining to our objectives. Moreover, we have planned for a follow-up research project in which we will continue to study the progress of the four IIPs, in terms of market performance and impact, but also in a wider sense, covering additional issues of organizational learning.

Finally, as regards the individual level, we used a "snow-ball" method of selection, by which we first let the project leader propose which people we should interview. However, to obtain as complete a representation of project members as possible, we looked for suggestions of individuals from a variety of functions and countries. Moreover, in one of the cases we moved further down in the company by also asking people on the factory floor for their opinions. However, as our main focus was on the managerial and organizational aspects of innovation, our sample was largely restricted to managers and experts at various levels, although we admit that people further down the hierarchy may also have an influence on and a relevant interpretation of how the processes under study evolve over time. In view of the delicate nature of the matters discussed, all individuals were promised anonymity. Thus, we will not link quotations to particular persons; in most cases we will not even reveal the names and positions of people interviewed. The case material was also cleared by the management of the two companies before it was published in this volume.

Defining the objectives of the study

It is generally regarded as important to define the research questions or purpose of the study as early as possible, at least in broad terms, as a lack of research focus may easily result in information/data overload. A clear purpose may also help in shaping the initial design of the study.26 Case studies are most appropriate when the research questions are of a how-, why-, (or what-, when asked as part of an exploratory study) type.27 However, it is crucial to keep the initial questions/purpose preliminary and tentative, so as to allow the questions to change
over time, as the researcher sees fit. In our case, we raised our level of ambition. Initially, our focus was largely restricted to studying how the IIPs were actually managed and organized. Gradually, we added questions relating to the identification of the problems that occurred, and of their underlying sources.

Handling preconceptions

A number of authors underscore the importance of starting the research process as 'free from theory' as possible. However, this group of scholars is definitely not unchallenged, and the question of starting with or without a body of theory is extensively discussed in the literature. In a way, we are facing a dilemma. On the one hand, it is argued that rigid theoretical assumptions may bias the study and lead the researcher to seek only what he/she wants to find, so that the study may become a self-fulfilling prophecy. On the other hand, by not studying the literature, one clearly risks missing important aspects that in retrospect could have proven valuable if kept in mind right from the start.

In our opinion, it is not so much a question of being 'theory-free', but rather one of an open mind to the empirical world. Before commencing the empirical part of the research project, we made a survey of the literature in the three primary theoretical veins mentioned in Chapter 1. On the basis of this survey and additional theoretical readings, we defined a preliminary purpose of learning more about the organization and management of international innovation projects. As the theoretical frame of reference of the thesis is relatively broad, and since we are not attempting to favor any particular theoretical paradigm, we cannot see that this choice limited us with preconceptions of what to look for, how to interpret the material, and what would be 'preferable' to find. If anything, once we had initiated the empirical study, these observations assisted us by guiding our theoretical search, rather than limiting it. Thus, we set out to study an empirical phenomenon with a number of conceptual ideas, derived from existing theories, that would help us to interpret what factors had influenced the organization and management of the projects. Therefore, our tentative suggestions and theoretical findings are more empirically based than the result of hypothesis testing.
Data collection

As suggested above, one of the main strengths of case studies is that they permit us to use multiple sources of data and evidence. In our study, we primarily utilized data from the following four sources, the first two providing us with secondary data and the latter two with primary data: 1) documentation, 2) archival records, 3) interviews, and 4) observation.

First, by using documents, we gained access to a large variety of data: formal documents, such as annual reports, academic articles and books, newspaper clips, and internal business plans, project proposals, minutes of meetings, letters, etc. Second, archival records were used to corroborate and augment evidence from other sources, and to collect information on the industry level as well as about the two firms. As regards both documents and archival records, we took great care in checking pieces of evidence against each other, and we forced ourselves to remember that most of what we were reviewing had been written with a specific purpose in mind.

The interviews

Finally, and most importantly, we interviewed people directly or indirectly involved in the IIPs. The interviews can be classified into two groups, relating to the organizational levels in which we were interested: a) people taking part in one of the projects, and b) top- and middle managers on the organizational level. The latter interviews were conducted only at Electrolux. In connection with the interviews, we also benefited from taking part in four internal executive-education programs at Electrolux, as directs observer and as teachers in the subjects related to this study. Thus, we could both listen in on lengthy internal discussions concerning topics relevant to our study, and obtain feedback on the preliminary concepts which we had developed during the course of this research project. The number of interviews carried out within each category and project is shown in the table below, which also shows the number of country units visited:
<table>
<thead>
<tr>
<th>Company/project</th>
<th>No of interviews</th>
<th>No of countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolux</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Management&quot;</td>
<td>30</td>
<td>7</td>
</tr>
<tr>
<td>&quot;Alliance&quot;</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>&quot;3rd tap&quot;</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ABB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;Holger&quot;</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>&quot;M2000&quot;</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 2.1: Number of interviews carried out during the study of IPs in ABB and Electrolux

We came to focus more on Electrolux than on ABB, in terms of number of individuals interviewed. The main reasons were that we had started by studying this company, and also that we had done additional work in a related project on the management of innovation in more general terms. To prevent this fact from affecting our results negatively, in the sense that data from the two firms would not be comparable, we made an effort to collect additional and complementary secondary data on ABB, especially on the organizational level, where we felt we had a better understanding of Electrolux initially. Before concluding this dissertation, we also approached the four project leaders, (or the equivalent) to up-date ourselves on recent developments.

We chose not to interview people outside Electrolux and ABB to any substantial extent. In a study which had also focused more actively on the management of innovation projects across inter-organizational borders, it would of course have been appropriate to interview other individuals. Even for our study, we believe that such interviews would have made a positive contribution to our findings. However, for practical reasons we had to limit ourselves; in view of the purpose of our study it seemed acceptable to forego interviews with "outsiders". Nevertheless, we still believe that our findings are also relevant to inter-organizational issues, since they reflect the perception of problematic areas from an actor participating in the venture. The only exception to our focus on interviewing people in the two case companies is represented by the five persons whom we met at the EPA (Environmental Protection Agency)
in Washington, DC, USA. Our interviews with these individuals were conducted in connection with the Electrolux “Alliance” case.

In the interviews, semi-structured and open-ended questions were used (see Appendix 1 for the interview guide). Not all questions were posed to all respondents, and usually the questions were followed up by more detailed remarks during the course of the interviews. By discussing the answers, we also gave the respondents a chance to consider and correct their responses. The interviews lasted between one and three hours, with an approximate average of one and a half hours. The first interviews were held in May, 1992, and the last ones in November, 1994, except for the late “check-ups”. During all but 10 interviews, two researchers were present. Finally, all but three interviews took place at the offices of the respondents.

Because of the delicate nature of the matters discussed, no tape recorder was used. This procedure, too, had its advantages and disadvantages. We thought it crucial to minimize the risk that the respondent would not feel free to say what he/she really believed. Indeed, some individuals even told us that they would not have taken part if a tape recorder had been used. On the other hand, there is a risk that we may have missed important details. However, as two interviewers were present during the majority of the interviews, this potential drawback was limited; one interviewer primarily took the role of listener and note-taker, while the other was more active, asking questions and discussing the answers with the respondents. After the interviews, our notes were transferred to tapes, which were later transcribed. In our judgment, this procedure compensates for any loss of accuracy caused by not using a tape recorder. We also think that the additional advantage of being able to discuss the empirical findings between colleagues directly after the interviews enhanced the quality of the research.

One of the main sources of error in interviews is usually labeled ‘interviewer bias’. This term refers to attempts - conscious and unconscious - by the interviewer to direct the answers of the respondent toward some pre-specified explanation which he or she would like to obtain. Moreover, respondents sometimes give answers which they anticipate as desired. The so called ‘Hawthorne-effect’ is one aspect of this tendency, in that persons tend to change behavior when studied. In addition to not having precise theoretical preconceptions, there
appears to be no other way out of this dilemma than for the researcher to be highly conscious of the problems involved.  

**Parallel collection and analysis**

A notable feature of the case study technique is that data collection and analysis take place in parallel. The researcher thus obtains a head start in analysis and is allowed flexibility in data collection. In our research project, we started to analyze the cases as soon as we had sat down after the interviews to compare notes and impressions. Clearly, this parallel procedure has its risks. Once a researcher has analyzed the data and given it a first interpretation, he may find it difficult to change his/her view, in spite of the data. Given the risk of being blocked by first impressions, we tried to avoid drawing rigid conclusions too early in the research process. We would like to characterize our approach as a search for several possible interpretations and new ideas to pursue.

**Letting theories and empirical data interact**

The core of building models and generating hypotheses from case research is embodied in the data analysis. However, this part of the process is also the most difficult. Two key aspects of analysis are identified in the literature: a) within-case analysis, when there is an enormous volume of data, and b) the search for cross-case patterns, to force investigators to go beyond initial impressions. For us, the process of analysis was highly iterative. Bringing our body of theoretical ideas and concepts to bear, we started empirical-data collection with the 3rd-tap case (Electrolux). To a certain extent, this project functioned as a pilot study in that the first six interviews were held with people involved in this venture. With this input, our questionnaire was refined and improved, and data collection for the other three cases was initiated. However, these first interviews did not give rise to any of the major conceptual ideas present in this volume; thus, the notion of a pilot case, from this more theoretical vantage point, is perhaps slightly misleading.

Once we thought that a more clear view of the actual empirical material was beginning to emerge, we wrote a report on each individual case, analyzing them one at a time and
attempting to extract ‘themes’ related to our purpose and questions. We then compared the themes derived from the different cases and sought to relate them primarily to differences at the project- and organizational level. Our next step was to compare the emerging structure(s) with the data from each case. This process too, was one of constant comparison of data with the framework that was gradually evolving. The process is quite similar to traditional hypotheses-testing research, with the exception that case-study research is probably more judgmental. In parallel with the analysis of the cases, we did additional reading in a search for leads that would aid us in interpreting the phenomenon under study. We entered new theoretical fields, such as that of managerial decision-making, which had not been included in our initial survey of the literature. Thus, over time we subjected the empirical data to additional theory in the analysis of our cases. Once again, we would emphasize that our interpretations of the empirical data guided our theoretical search, rather than the other way around. During this process, the fundamental concept of “architectural dependence” gradually evolved as a reoccurring theme.

In deciding when to terminate the analysis, we faced two important questions: a) when to stop adding cases and data, and b) when to stop iterating between theory and data. As for the first, we had opted four IIPs right from the start. We stopped adding data on these projects when it appeared that only incremental learning was possible. Consequently, and as noted above, we ended data collection before all products had been on the market for any extended period of time. As to the second question, saturation was again the major criterion. Iteration stopped when the likelihood of further improvement on our theoretical and practical interpretations of IIPs could be regarded as negligible.

Criteria for judging the quality of research

As outlined above, the use of cases is regarded as highly subjective by a number of researchers. To a certain extent, case-study research is dependent on the individual interpretations of the researcher. Accordingly, we tried to take certain steps to avoid the potential pitfalls. In the literature four tests stand out as important.
1) **Construct validity**: constructing operational measures for the concepts being measured.

2) **Internal validity**: (for explanatory or causal studies) establishing causal relationships which show that certain conditions lead to certain effects.

3) **External validity**: establishing the domain of generalization.

4) **Reliability**: demonstrating that the results would be the same if repeating the procedure.

We followed certain tactics to meet the requirements of these tests.\textsuperscript{42} First, construct validity was improved by using multiple sources of evidence, and we attempted to establish chains of evidence. Furthermore, we had informants review draft case study reports. Second, internal validity was enhanced by trying to match patterns, to find explanations, and to eliminate the possibility that conditions other than those studied would affect the variable(s) in question. Third, there were the measures taken to improve reliability, some of which have already been mentioned: the interview guide, original notes, and transcriptions of interviews. Also, the informants were given an opportunity to correct possible errors or misinterpretations during the interviews, and in a few cases afterwards as well. Moreover, given our conclusions on the influence of the organizational architecture, we believe that another factor contributing to satisfactory reliability lies in the internal consistency between the pairs of cases concerning ABB and Electrolux, respectively. If factors other than the organizational architecture, such as project size, number of countries and functions involved, the novelty of the task, etc., had had a more significant impact on project activities, the consistency between the cases involving ABB and Electrolux, respectively, would not have been as great.

Finally, external validity, or generalizability, was improved by replicating the studies in four different settings and at two companies. However, some qualifications are needed. Our findings and conceptual ideas are interpretations of an empirical phenomenon, and they are based on the subjective interpretations of individuals taking part in these ventures. Naturally, to a certain extent our interpretations are colored both by our own subjectivity and by the sample we selected for study. Thus, the question of finding an absolute 'truth', or 'good' theoretical constructs is ambiguous. Rather, it is the generalizability of our interpretations that should be judged.
Nevertheless, our study, like any other, has its limitations. In addition to those delineated earlier, some preliminary qualifications are worth mentioning at this point. First, and as noted above, since Electrolux and ASEA/ABB originated in Sweden, a small and open economy, they were forced to internationalize their operations early on. Like a number of other Swedish firms, they actually became more dispersed than most other multinationals, such as those of the USA or Japan. Therefore, one would expect IIPs to be more common in Swedish MNCs than in companies originating from these much larger countries. Second, both firms grew mostly by acquisitions or mergers, thus probably ending up with more overlapping asset structures than companies that had expanded more organically. As a consequence, some IIPs that were set up primarily because of resource duplication could a) be more common in these former types of multinationals, and b) pose somewhat different problems than those involving co-operation that was promoted more by other factors. Third, in none of our cases did Asian units play a significant role; in effect, we do not know what kind of cultural problems could arise in collaboration between these and Western units. Fourth, we deliberately chose not to study pure joint-venture efforts. Accordingly, we can say relatively little about the specific problems and issues encountered in these inter-organizational ventures.

Enhancing the quality of research

We recognize that our findings are not generalizable to all MNCs and all IIPs, especially not to the most radical and large-scale innovation efforts. However, reaching this kind of inclusive generalizability was never our intention. Rather, in our discussion of the cases we seek to identify variables which are important in that they can be interpreted as affecting the conditions for the effective management of international innovation processes, and thus also IIP performance. Naturally, depending on how companies are structured in these critical dimensions, their situations and basis of action may differ significantly. In our view, however, the level of abstraction in our overall framework for “architectural dependence” (see Chapter 8) is such that the idea is also applicable in cases other than Electrolux and ABB.

Although we have fulfilled the formal requirements governing case-study research, we acknowledge that this research, if not highly arbitrary, is at least partly subject to the
discretion of the individual researcher. How then can the reader be sure of our reasons for reaching a certain interpretation? To further increase the quality of our research, we applied two additional criteria during the process.

First, it was important for us to present our empirical findings and our analysis in a way that would enable the reader to follow our line of reasoning throughout the process, and to form an opinion as to whether our arguments and interpretations were well-founded. This consideration led us to give our thesis a somewhat unorthodox structure. In general, the sequence of reasoning in scholarly work follows three phases: 'theory - empirical observations - analysis'. Since we sought a closer link between these elements, we decided to use the phases of the innovation process as the primary principle of structuration. Thus, while the following chapters each comprise 'micro-versions' of the three-phased logic, they are differently sequenced to a certain extent. We hope that this presentation will facilitate comprehension of our reasoning, contribute to the understanding of our cross-case and cross-level comparisons, and improve the general readability of the dissertation. Further, for the sake of clarity we have indented all text containing what we consider to be empirical data, in which our own analysis and interpretations are excluded as much as possible. The drawbacks of the resulting fragmentation we have sought to counter by providing the reader with a brief summary of the four cases (see below), and by focusing on processual issues covering the entire life of the IIPs in Chapters 8 and 9.

Second, the criterion of 'plausibility' guided us when we formulated and specified our findings. This point is significant in two respects. In developing our framework, we sometimes encountered situations in which we had to weigh the explanatory power of two contesting ideas against one another. In these cases, we favored the idea that seemed the most plausible in light of our interpretation of the phenomenon under study. The other important respect relates to the opinions of our readers, academics as well as practitioners. As for the former group, the criterion should perhaps be applied more to our arguments and foundations on which these are based, rather than to the specific theoretical suggestions. The decisive test in regard to the latter group is whether our findings are sound, logical, and useful to managers and other practitioners.
The survey

As noted in Chapter 1, and at the beginning of this chapter, later on in the research process we decided to supplement our four in-depth cases with a quantitative survey. We took this step to get additional data, and to a certain extent further to develop our interpretations and ideas in the light of a larger sample. The primary aims of this survey were to:

1. Describe the characteristics of IIPs in terms of variables such as magnitude, objectives, reasons, communication patterns, and profiles of project leaders.
2. Identify the problems perceived to be most important and most difficult to solve.
3. Identify the perceived advantages and disadvantages of using IIPs.
4. Assess the perceived success of IIPs, in terms of meeting expectations concerning cost, time, market acceptance, etc.

A dilemma confronted us in that we wanted a broad study of more than a few cases involving a limited number of companies, but the intricacies of covering several phases, levels, and aspects required a high degree of co-operation and trust from respondent firms and individuals. We decided to contact 20 firms, in the hope of obtaining information on 2-6 projects at each. We first approached the corporate R&D director or an executive with an equivalent function. (In multi-product firms several people were contacted.) We asked him or her to identify some interesting IIPs, answer some general questions and to send another, more detailed questionnaire to the leaders of the projects so identified. Ideally, both successful and less successful projects were to be included. (The survey can be found in Appendix 2).

We turned to the largest and most international of the MNCs headquartered in Sweden but did not bias the selection in favor of firms we already knew well. Questionnaires were sent out and collected by two research assistants. The last responses were received late in the summer of 1994. Usable responses were received from 11 MNCs, with data on 32 IIPs in total. The number of IIPs per company varied between one and five. Unfortunately, not more than four projects proposed were openly admitted to be “less successful”. Therefore, we had to rely primarily on project managers’ answers in assessing the success of the project. For a
description of the sample of firms and IIPs, see Appendices 3 and 4. Of those 25 R&D managers who clearly stated their reasons for not participating in the study, 12 claimed that the firm did not have any IIPs, and 13 referred to lack of time.

Since we will use the survey data for descriptive purposes and conceptual development, rather than for hypothesis testing, we see little need for an exhaustive methodological discussion at this point. As examples from the questionnaire appear in the text, and in those cases in which more advanced statistical techniques were used, we will describe our procedure more thoroughly. Furthermore, weaknesses inherent in our design, and in specific questions posed, will also be dealt with continuously. Finally, some of the limitations pertaining to the four cases are of course also valid in this larger sample, such as the fact that all companies in the survey were Swedish, and thus to varying extent shared the same heritage as Electrolux and ABB.

An introduction to the cases

Since our somewhat non-traditional way of structuring the text forces the reader to digest a large number of pages and concepts before being presented with the ‘total picture’, we find it appropriate at this stage to present brief summaries of the four international innovation projects which we studied in depth. Our hope is that the reader will then find it easier to link our analysis to the evolution of the projects in Chapters 4-7, as well as to the more general descriptions of the companies in the following chapter. We start by summarizing the Electrolux projects: “the 3rd tap” and “Alliance”, we then present the two ABB cases: “Holger” and “M2000”.

The 3rd tap

The 3rd-tap effort was initiated in combination with the development of a new product area at Electrolux - Home Comfort (HC) - centered around the concept of clean air and clean water. Clean-air products comprised air conditioners, dehumidifiers, and air cleaners; clean-water items were restricted to water purifiers. The idea of the “third tap” concept had been born
elsewhere in the company in the mid 1980s. The company had only one water cleaner in its product line and a new one under development. However, neither of these were based on the most sophisticated technology, reversed osmosis. After HC had been formed and management had realized the increased demand for clean water, primarily in the USA, while simultaneously the Research & Innovation and New Products departments were beginning to consider new technologies for water purification, the new project was initiated. It was decided to divide efforts between New Products, which would supply the technical know-how, and Home Comfort, which would focus on the business aspects.

Conception and planning started by the technical project leader’s investigating the technologies available. Almost immediately he concluded that the only viable solution had to be based upon the reversed-osmosis concept, a technology not used by Electrolux prior to this effort. After six months he was able to present a working prototype, and in early 1989 a decision to proceed with development was taken. The technical project leader was to be assisted by two engineers from the Research & Innovation department. Home Comfort drafted some general goals and specifications for the development team. The water purifier was to be designed for a global consumer market; i.e., it was to purify any kind of water quality, and it was to be produced in Spain, where excess manufacturing capacity existed. Since the technical project leader did not want a time schedule, none was prepared. The product should: a) produce one gallon of clean water per minute, b) fit under the kitchen sink (300X350 mm), and c) cost no more than 200 US dollars.

From an organizational point of view, the project basically consisted of one technical and one commercial team. According to some of the team members, these two units seldom co-operated, and inter-unit co-ordination was regarded as weak. Moreover, the technical project leader, who did not want the commercial personnel to interfere, attempted to "protect" his team members by isolating them. Gradually, the cost target was dropped, and the development team focused on attaining as low a price as possible, given the technical requirements. Toward the end of the development phase, managers began to feel unsure about whether to go through with the decision to transfer product design to Spain.

Before commercialization, the anticipated manufacturing location was changed. Management did not believe the Spanish unit had the proper skills, and as part of an overall effort to restructure the firm, they were also planning to close down this unit. A new possibility was considered: placing manufacturing with a Swedish dishwasher unit belonging
to the Wet product division. However, since water purification was not at the core of that division's business, it was difficult to secure sufficient resources for the technology transfer. After it had become clear that Electrolux would acquire AEG, and that the future dishwasher center would be located in Germany, the staff of the Swedish unit seemed more committed, and the pace of the commercialization process picked up. The resulting product met the performance targets set, but it was much more expensive than originally planned. The project was also seriously delayed.

**Alliance**

The Alliance project grew out of a situation in which Electrolux management, after the acquisition of White Consolidated Inc. (WCI) in North America, perceived the European horizontal-axis technology as superior to the vertical-axis technology prevalent on the US and Canadian washing-machine markets. However, the North American market differed in a number of other respects as well. Washer manufacturers were weak in relation to detergent producers and retailers. Competition was focused on price rather than technical supremacy. Electrolux' market position was not very strong, with a combined market share of some 12%. To improve results, management first decided to initiate the “Z” project, a face-lift effort to improve the existing horizontal axis washer. Despite the lack of commitment in the US technical organization, the European management team decided to investigate the possibilities for a more challenging project aimed at the development of a new washer and a combination (combo) washer/dryer.

The Alliance project was set to develop a front-loaded washer and a combo washer/dryer for the North American market. Production was to be located in Canada. The project was initiated by top management in Sweden and Italy. The Italian subsidiary was to supply technical know-how; the Canadians, production/logistics, project management, and funding; the US organization, market input; and the Swedes, top-management backing and support. Product specifications were developed in the USA and Italy, though relatively independently of one another. The project team held the first official meeting in May 1989. The suggested retail price of the washer was 599 US dollars, compared to the average US washer priced at 400 US dollars, and 899 US dollars was to be charged for the combo version. The total investment was planned at 30 million US dollars, of which development
costs would account for some 6 million. Introduction of the new products was anticipated for January, 1993.

Technical development was conducted in Italy. Initially, few problems were encountered, except that a supplier network was lacking in North America. Marketing studies were undertaken in parallel by the US organization, but these efforts seldom seemed to have any impact on the washer or combo. The Canadians also had difficulty in filling the project-leader position. There was a succession of at least four "temporary" project leaders. Meetings were held regularly, but seldom did all of the critical people have time to take part. In the beginning of 1991, the Swedes and Italians concluded that the project was nearing completion. However, the other participants seemed less certain. Some time later, the North American organization went through a phase of restructuring, and the future manufacturing location was shifted to another Canadian factory, with no prior experience in the Wet area. Meanwhile, in response to new signals from Washington concerning the energy consumption of washers, the horizontal-axis concept began to be considered as the future technology, even by the US organization, which launched its own project.

Just before commercialization, and after the introduction of a new formal organizational structure at Electrolux, the Alliance project was transferred from Canada to the USA. Management feared that the Canadian organization, because of cash flow problems, lacked the assets needed to sustain the investment. They also argued that the Canadian factory would end up as a mixed Hot/Wet factory, in violation of company policy. After the project had been transferred, the company had difficulties in rebuilding a project organization, since few people seemed committed to Alliance. Some time later, a new project leader was found. She managed to design a new project organization, re-build the relationship with suppliers and the Italian unit, and push the project toward market introduction. However, quality problems made it necessary to postpone the future date of introduction further and further into the future. The resulting washer met performance targets, but was more costly. The combo machine had been dropped in the meantime, because of the financial resources needed to develop a dryer that matched the washer.
The Holger project was primarily an outgrowth of ABB's acquisition of the US company Combustion Engineering. Earlier, when ASEA and BBC had merged, the company had ended up with two distributed control systems; only one of them, the Swedish Master system, had survived. However, this time management decided to keep the North American MOD 300 system, since it was considered more complementary to the Master system than the former BBC system had been. Nevertheless, both Master and MOD 300 were in the late stages of the product life cycle, and development of a new system was called for. Consequently, ABB Process Automation formed several groups and committees to evaluate the possibilities for a future system.

The project was set up for a gradual merger of the two systems. Planning was done primarily by people from the two countries - Sweden and the USA - during the spring of 1990. It was important to attain full compatibility of the two systems, and not to lose any of the present advantages of either Mod or Master. As the Swedes were already one year into the planning of a new system, the Americans sometimes felt that their views were disregarded. Market research was essentially carried out in the USA, whereas the Swedes were responsible for the bulk of the technical studies. The project was planned as an evolutionary merger of the two systems, with annual new versions, each of which had to be flexible enough to adapt to any of the application segments. Concerns were raised about how to divide work during the development phase.

Responsibilities were allocated among the units in Sweden, the USA, Germany, and Switzerland (which later withdrew from the project), on the principle of technological specialization. Most responsibilities were with the Swedes, who were also to manufacture the system. Some Americans feared that their unit would sooner or later be stripped of all development resources; they felt like suppliers to the future owners of the system. The overall project was broken down into several sub-projects, which were all initiated according to the same rules and procedures. Steering committees, reference groups, etc., were set up on multiple levels, to ensure proper integration, and three project-leadership positions (two project managers and one technical project manager) were established. A large variety of management tools were used to co-ordinate the effort.
The transition to manufacturing went rather smoothly. However, the North American unit feared that their detachment from production would have negative consequences in the long run. Moreover, the technical problems in actually merging the two systems proved more intricate than initially anticipated, and the last step of the process had to be dropped. Consequently, the Holger project did not result in a truly common system. Apart from this fact, the technical specifications were met, although the project was somewhat delayed.

M2000

The M2000 venture, like the Holger project, was largely an effect of the ABB merger. When ASEA and BBC merged, management realized that the business area (BA) permitted only limited synergies and economies of scale, since there were at least three different designs of electrical motors - the ASEA, the Strömbergs, and the BBC designs. With six different manufacturing facilities scattered all over Western Europe, and anticipating increased industry concentration, management initiated a project to investigate the possibilities of a common design for large cast-iron motors. As the results were favorable, it was decided to extend the objective to cover motors of all sizes.

The overall objective of the project was stated to be the development of the world's best catalogue motor. In part, the effort was driven by the desire to avoid the trap of exaggerated adaptation, which would greatly reduce most economies of scale. Early in 1990, the units involved agreed that the design of the new generation was to be guided by a number of core principles. If needed, local adaptations were to be based on a common series. Among the company's aims were improvement of image, cross-national synergies, greater scale economies, and increased purchasing power. Inventories could be decreased by 40%, component variants by 50%, and suppliers by some 60%. The first motor was to be delivered in January, 1992, and total development costs were calculated at 33 million US dollars.

Development was distributed on the principle of product-range specialization. Small motors were to be developed by the Danish unit; the Swedes had primary responsibility for mid-size motors; the Finnish unit, where the project leader was located, would develop and manufacture the larger sizes. The German organization was not very interested in taking part, and the units in France and Spain were intended mainly to support their Nordic colleagues. Management roles and responsibilities, including the decision making process and inter-
project reporting relationships, were sharply defined. Just as in the Holger case, the development phase was dominated by people from the technical function, although there was some local co-operation with the manufacturing organization.

The project experienced some problems when transferring the new motor generation to manufacturing. The German unit suddenly demanded more influence over design. Moreover, the French unit was closed down, but employees at this site could not be informed in advance. The project also experienced problems at some production locations, where the complexities of the new manufacturing processes had been underestimated. Transfer of experience across geographical borders, in terms of manufacturing and marketing learning, was limited. The new generation of motors met the specifications in terms of the expected price/performance ratio decided on initially, but the project was delayed.

**Summary of the chapter**

In this chapter we have outlined the design of the study in an effort to link our purpose and theoretical framework to the empirical study undertaken. Since both our theoretical- and empirical knowledge of how IIPs are organized and managed is relatively limited, we decided to start our research process with a qualitatively oriented research design, more specifically in-depth case studies. Case-study research opens up a great variety of possibilities, including multiple cases and levels of analysis, as well as the use of quantitative measures.

In selecting the sample, we applied the three requirements of 'internationalism', discussed in Chapter 1, on both the organizational- and the project level. Further, we were interested in studying several 'representative' innovation projects rather than one or more 'rare' ones; therefore we chose four product concepts that could placed in the middle of a 'radical-incremental' continuum. The two multinationals Electrolux and ABB met our requirements. In addition, both companies are successful industry leaders and can be argued to represent the forefront of modern multinational management. We wanted to study two projects at each firm, longitudinally and in real time, so as to capture the essentials of the innovation processes. This design would also enable us to make cross-project and cross-company analyses. By applying a snow-ball selection mechanism, we gained access to individuals
involved in the projects, as well as a number of persons representing the companies as such, and conducted some 85 interviews. In addition, we also utilized data from a large variety of documents and archival records, as well as direct observation in the Electrolux case.

While we were collecting the data, we started analyzing the cases, one at a time, and later moved on to make cross-case and cross-company comparisons. Simultaneously, we scanned additional theoretical fields for concepts which would help us in further interpreting the empirical data. In the third phase of our analysis we focused on developing the frameworks presented in the last three chapters of this dissertation, by continuous interaction of the data and our general ideas. Data collection and analysis were brought to a close when saturation was reached, i.e., when only minor improvements were considered possible. A number of steps were also taken to enhance the quality of research, and to meet the requirements posed by measures of validity and reliability.

Later on in the research process, we decided to broaden our sample by sending a survey to 20 other Swedish multinationals, asking for information on 2-6 IIPs. In all, we received responses from 11 firms, and reports on 32 international projects. Our questionnaire was focused on; a) descriptive data, b) problems, c) advantages and disadvantages, and finally d) perceived success. Survey data will be used continuously throughout the remaining chapters as a complement to our qualitative interpretations, rather than for testing hypotheses.

We concluded the chapter with brief summaries of the four in-depth case IIPs included in the study. In Electrolux, "the 3rd-tap" case portrays the development of a new and more advanced "global" water purifier, and the "Alliance" project represents an effort to develop a new washer and a combination washer/dryer for the North American market based upon European technology. The two ABB projects, "Holger" and "M2000", describe the development of a new platform for a distributed control system, and a new generation of electrical motors, respectively. The former product was aimed for the world market, whereas the new electrical-motor generation was primarily designed for European customers.
Notes to Chapter 2

1 See Kuhn (1970) for a discussion of scientific paradigms.

2 The choice between a quantitative or a qualitative approach is often related to the distinction between the positivistic and the hermeneutic ideal. The differences between the two approaches are primarily epistemological. In positivistic studies the main objective is to test hypotheses so as to be able to verify or falsify them, in order to generalize the results. The hermeneutic tradition is more focused on interpreting the phenomenon being studied.


4 For a discussion of the two models, see Sölvell and Zander (1995), and Ridderstråle and Nobel (1993).

5 Yin (1989: 25) warns us not to confuse qualitative research in general with case studies. “The essence of qualitative research consists of two conditions: (a) the use of close-up, detailed observation of the natural world by the investigator, and (b) the attempt to avoid prior commitment to any theoretical model.” This type of research does not always produce cases, nor are case studies always limited to these two conditions.

6 For instance, see Lindblom (1979).

7 Authors like Glaser and Strauss (1967) have focused on continuous comparison of data with theory in developing the grounded theory, while a scholar like Yin (1981, 1989) has described the design of case study research. Still other researchers have developed specific techniques for analyzing qualitative data.

8 See Eisenhardt (1989).

9 See Yin (1989).

10 Ibid.

11 Ibid.


13 Our focus on product innovations, as opposed to process innovations, can be seen as another delimitation, since scholars generally make a distinction between these. Abernathy and Utterback (1978), in an often cited article, outline the relationship between product and process innovations over time. As indicated earlier, we will study product innovations solely. However, it is important to note that the two forms of innovation are interwoven in that one may give rise to the other.


15 See Roberts and Berry (1985).

16 Abernathy and Clark (1985), by applying a transilience-map analysis, extend the types of innovation to include four generic forms: niche creation, architectural, regular, and revolutionary.

17 For instance, Takeuchi and Nonaka (1986) argue that the more revolutionary or large-scale innovation projects are harder to manage in a business sense.

18 Problems that could occur in a face-lift innovation process may relate to the fact that one subsidiary is allowed to make minor changes, while others are not. As a result, there could be hard feeling between different units within the MNC.

19 See Leppänen (1994).
The present study is a part of a larger research project in which the Swedish research team, also including professor Gunnar Hedlund and Acting Professor Örjan Sölvell, has collaborated with Professor Eleanor Westney at MIT, and Professor Ikujiro Nonaka at Hitotsubashi University. The larger study will provide comparisons between companies from all parts of the "Triad", as well as additional Swedish cases.

Two other Swedish MNCs were contacted in an attempt to investigate the possibilities for in-depth cases studies on IIPs. One of these firms reported that it no longer had any international projects since the coordination problems were considered too cumbersome. Management of the other company stated that it had three types of IIPs: a) face-lifts, b) new generations, and c) breakthroughs. The company claimed that the first type of project was not interesting to study, that people in the second type of venture had too much to do, and that what went on in the final type of project was secret.

For specific figures per country or region, see Electrolux and ABB Annual Reports 1990.

Ibid.

For a discussion of this argument, see Hägg and Hedlund (1978).

Support for this view can be found in the literature. For instance, see Pettigrew (1985)


See Yin (1989), and Pettigrew (1985).

See Yin (1989).


See Yin (1989).

This project was conducted together with Professor Gunnar Hedlund, in connection with the interviews covering the specific IIPs. The interviews were held during the spring of 1993, after Electrolux had recently been reorganized (see Chapter 7). During these interviews, three primary questions were asked. 1) Is Electrolux good at product development - why, why not? 2) Compared to the former structure, how well does the present one support product-development activities? 3) What can be done to improve product development within the company? These questions were followed up by more detailed comments.

The interview technique used in this research project is an application of the reflective interview technique developed by Carl Rogers and others. The technique focuses on the person being interviewed. It is the task of the interviewer to understand the interviewees from their standpoint. Thus, it is central to be an active listener and not to control or guide the interviews in a certain direction. Yin (1989) recommends that "yes and no" questions should be avoided and replaced by questions of a "why and how" type. Furthermore, Rogers and Roethlisberger (1952) argue that the dropping of defensiveness by one party may lead to additional dropping of defensiveness by the other party, and that truth is thus approached. Although our intentions were not to arrive at some objective "truth", but rather to obtain the respondents' interpretations of events, we tried to follow the advice of ensuring a situation characterized by mutual communication.

These 10 interviews were conducted in one of the later stages of our research process, when we felt confident that one person could manage the situation on his own. Furthermore, one of the interviews in the "Holger" case was held by Associate Professor Lars Håkanson. The majority of the other interviews were carried out together with Professor Gunnar Hedlund, with whom the author has also written several articles on the management of IIPs. This dissertation, however, was written by the author alone.

See Roethlisberger and Dickson (1939) for the original reference.


37 Yin (1989: 106) argues that what is most important is to have a general analytical strategy: "The ultimate goal is to treat the evidence fairly, to produce compelling analytical conclusions, and to rule out alternative interpretations. The role of the general strategy is to help an investigator to choose among different techniques and to complete the analytic phase of the research successfully."

38 See Eisenhardt (1989).


40 See the methodological discussion in Schoomaker and Jelinek (1989) for examples of criticism of case research as subjective.

41 See Yin (1989).

42 These tactics are proposed by Yin (1989).

43 The 'plausibility' criterion has been suggested by Weick (1989).

44 The survey was designed by the author and Professor Gunnar Hedlund, together with two research assistants who later handled the administrative aspects and coded the data.
CHAPTER 3

THE HISTORICAL EVOLUTION OF ABB AND ELECTROLUX

- Cases in the Rise of the Modern MNC

Introduction

This chapter treats the evolution of the modern MNC. As outlined in Chapter 1, the organizational development and the present architecture of the firm is important in a study primarily focused on the management of international innovation projects, since one of our general concepts is that of "architectural dependence," i.e., that all organizations are captives of their accumulated structural heritage. Consequently, it is critical to grasp how the companies have reached their present organizational architecture, and to understand their characteristics of today.

Thus, the main objective of this chapter is to discuss three aspects of the multinational company: a) company and industry evolution, b) strategic heritage as well as present thrust, and c) organizational evolution. In utilizing theoretical insights from a variety of fields, we hope to deepen the reader's knowledge of how ABB and Electrolux function and do business, currently as well as historically. We will conclude the chapter by more specifically outlining the organizational architectures of the two companies.

The birth of the multinational company

In a historical context, multinational companies are a relatively new phenomenon, and so are the theories explaining why they exist, their growth patterns, and how they are or should be managed. Yet nations have been trading for centuries. Mostly, countries tended to trade with
their closest neighbors, although the silk road to China and India provided an important exception as early as the 13th and 14th century. Over time, with the colonization of the African and American continents, trade flows began to cover larger geographical areas. However, the firms involved in international business during this period were essentially trading companies without any real resources outside their home countries. This situation began to change in the latter half of the 19th century.

The industrialization of formerly agrarian societies opened the way for fundamentally different and greater economies of scale. Accordingly, the advantages of volume production proved an influential force in driving firms to expand. The other important change that occurred relates to developments in the area of transportation. Sail vessels were replaced by steamboats, railroads were built, and later the automobile was introduced. The invention of wireless telegraphy, and radio transmission in general, permitted much more rapid transfer of information across geographical distances. Consequently, the geographical dimension was opened up for expansion of operations. Nevertheless, the road to internationalization, and the building of a global network, proved a long and winding one for most firms, which, like ASEA and Electrolux had started out as small, local companies around the turn of the century.

The introduction of electricity into the industrial arena during the late 19th century gave rise to many new possibilities for the entrepreneurs of that time. Like most other companies originating in this period, ASEA was founded (1883) on the basis of innovations. In the 1880s and 1890s, the DC systems of one Jonas Wenström provided the company with a solid base. The three-phase motors became increasingly important during the 1890s, and the company grew rapidly before the turn of the century. Because of speculation and strategic mistakes, ASEA ran into financial problems but was reconstructed by Stockholms Enskilda Bank (a bank controlled by the Wallenberg family). Consequently, top management had to leave, and J. Sigfrid Edström was appointed CEO of the company in 1903.
Electrolux was founded in 1901 when Lux AB started to produce lightbulbs (for gas). Seven years later, the firm moved to new facilities at Lilla Essingen, Stockholm (where Electrolux' present headquarters has been located since 1967). Axel Wenner-Gren, a salesman at Separator (now Alfa-Laval/TetraLaval) working in Berlin and Vienna, had noticed the tremendous success of vacuum cleaners in Germany and Austria-Hungary. His observations led him to develop a Swedish vacuum cleaner and sell it by the direct-sales method which he had learned earlier in the USA. In 1912 he founded Elektromekaniska AB and started co-operating with Lux. A year later, the first vacuum cleaner, Lux I, was put into production. The two firms continued their co-operation, and toward the end of the decade (1919) they merged to form Elektrolux. (The original name of the company was changed to Electrolux in 1957.)

Early internationalization efforts

Both ASEA and Electrolux became international firms early on. This fact is hardly surprising, since early internationalization is one of the hallmarks of Swedish MNCs in general. These firms often saw themselves forced by the limited size of the home-market to look abroad for new customers. The possibilities for diversification provided by a large home-market like North America did not exist for the Swedish firms. It is also important to note that the Swedish MNCs usually turned abroad in search of customers, rather than cheap labor or inexpensive raw materials. In many cases, these firms were founded on the basis of radical innovations, designed primarily for an industrial market. The company and the invention could be said to have gone hand in hand. For instance, SKF benefited from its ball-bearing patents, and Alfa-Laval from the development of the separator. The unique know-how embodied in these innovations constituted the firm-specific advantage necessary to move from being a local company to becoming a successful competitor in the international marketplace.
Even before 1903, ASEA exported to the other Scandinavian countries, Great Britain, and Russia. Then, Mr. Edström thought it was time to look for new markets. However, because of severe trade restrictions, most European countries, as well as the US market, were more or less closed. The countries in the British Empire, however, were open to foreign investment, and in 1910 ASEA set up an English subsidiary. By 1914, annual exports amounted to some 6 million SEK (approximately 27% of total sales), and management had established sales subsidiaries on a number of foreign markets; Spain (1912), Denmark and Finland (1913), and Russia (1914). In Norway, which had become one of the principal export markets, a manufacturing subsidiary was started around 1913-1914. A year later, a factory was opened outside London to supply the English, Canadian, and Australian markets. Despite a drop at the end of WWI, annual exports soon stabilized at some 14 million SEK during the period 1919-1923. Additional sales subsidiaries followed in Belgium and France (1920-21), and efforts were made to enter new markets in Latin America as well as in Eastern Europe.

The innovation that initiated Electrolux' advancement to its present position was the revolutionary discovery in 1922 by two Swedish engineers, Baltzar von Platen and Carl Munters, of a machine that could transform heat into cold. Together, they founded two companies, AB Artic and Platen-Munters Refrigeration Systems, which Electrolux later acquired. With the invention as the base, the company started to manufacture refrigerators and launched the first model in 1925. Right from the start, Electrolux became an international company. After WW I, the firm contracted sales agents in Germany, England, and France. In 1926, the first foreign manufacturing facility for vacuum cleaners was started in Berlin. A year later, the international expansion was followed by investments in factories in England and France. The primary purpose was to produce vacuum cleaners, but as time passed refrigerators were added to the program. By 1928, the firm had annual sales of SEK 70 million, five operating factories, some 20 subsidiaries, and 350 offices throughout the world. As the 1930s approached, the firm entered the large North American market, and in 1931 a manufacturing facility for vacuum cleaners was completed in Connecticut. Although WW II slowed down the rate of expansion, Electrolux managed to establish additional factories in New Zealand and Australia in the early 1940s.
Naturally, ASEA and Electrolux were not the only firms in their industries to internationalize. The fact that both companies originated in such a small country proved a disadvantage in that competitors from countries like Germany and the USA were usually much stronger. By satisfying local demand alone, they produced much larger volumes than the Swedish companies, thus gaining greater economies of scale. A further restriction placed on the Swedish multinationals relates to the fact that it was often extremely difficult to enter the large (and often prosperous) markets of their major competitors. The case of ASEA, which by 1916 already enjoyed a virtual monopoly position in Sweden after having acquired its major rival NFEA, illustrates this oligopolistic ‘action-reaction’ type of behavior very clearly.6

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The electric-power industry was characterized by a large number of cartels. Until the mid and late 1920s, most of these cartels were local or regional, but with the spread of international competition, new patterns began to form. A few strong and technologically sophisticated companies such as General Electric (GE), Westinghouse, Siemens, AEG, and Brown Boveri (BBC) held most of the western world market for power-industry products.7 ASEA, though not nearly as big as the companies mentioned, was also clearly present. Some years later, GE made the first transatlantic move in the industry by trying to gain control over the European companies. After having acquired majority or control positions in the most important British and French companies, as well as in AEG, they set their sights on the remaining competitors. Late summer 1929, during a trip to the USA, Sigfrid Edström and Marcus Wallenberg, Jr., were approached by Owen D. Young, chairman of GE. In essence, the American company wanted to buy 25% of the shares, and ASEA was to take part in the market-, technical-, and price agreements of the GE group. A few months later, someone - guesses pointed in the direction of GE - started to acquire large quantities of ASEA shares, but the Wallenberg family intervened and stopped the take-over. The Americans finally lost interest, and in 1931 they sold their holdings to the Wallenbergs. From that time on, the family had substantial financial interests in ASEA.
The road to global industrial leadership - reshaping industry structures

WWII naturally slowed down the geographical expansion of business and MNCs. The boom that followed the war took many of the companies by surprise. To a large extent, the early internationalization efforts of ASEA and Electrolux had proceeded in a fairly linear fashion, although foreign manufacturing activities were still quite marginal compared to resources located in the Swedish home base. However, both companies would soon be facing serious problems, and their patterns of internationalization were to change dramatically.

ASEA suffered from a capacity shortage. Although the company gradually began to invest more heavily, it lacked production capacity as well as skilled people throughout the 1940s. By the early 1950s, the gap was almost filled, only for management to realize that most of their products needed to be modernized to remain competitive in a marketplace that with the liberalization of trade restrictions was becoming increasingly international. Further, the British subsidiary, ASEA Electric, had run into grave financial problems as the end of the war approached and the Empire began to stagger. Despite efforts to reorganize the unit, results did not improve, and in 1957 it was divested. From then on, the Swedish parent company handled the Commonwealth markets. As these traditionally strong markets started to lose importance, the company turned to the East for expansion. Major contracts in the Soviet Union and the acquisition of a Polish factory for production of electrical motors reflected the growing significance of these markets. As for Western Europe, most notable was perhaps the absence of manufacturing facilities, with the exception of France. Latin America also became more important during this period. Sales companies were set up in Peru as well as in Chile, and in 1950 a subsidiary was established in Sao Paolo, Brazil. Five years later, large-scale manufacturing started. ASEA also tried to enter the vast North American market. However, GE pressured the firm into giving up those plans.

Electrolux, too, continued expanding geographically as well as in size and product range. In 1956, the founder, Axel Wenner-Gren, sold his Electrolux stocks to the Wallenberg group, and a new era for the firm began. It took until 1962 before Electrolux took the next
major step toward the future; it acquired Elektro Helios, a major Swedish white-goods firm, for SEK 36 million, adding some 2500 employees and new manufacturing facilities. Merging the two firms proved very difficult. Five years of constant quarrels and lost market shares passed. In that situation, Mr. Hans Werthen, the second man at Ericsson (the Swedish leader in telecommunications, also with Wallenberg ties), was offered the position of CEO at Electrolux. The company was financially troubled and far from technologically sophisticated. Many considered its overall position as difficult.

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So far, international competition in both industries had largely been multidomestic, i.e., competition in one country was essentially independent of competition in other countries. In other words, the international industries were basically collections of domestic industries. In the case of ASEA, this situation was perhaps slightly artificial as the cartelization of the industry dictated where the different companies could do business. The historical reasons for the multidomestic nature of competition were many. However, the basic conditions affecting the global industrial structure were beginning to change.

First, trade barriers were falling, enabling the companies to use facilities in one country to export to other markets. Second, transportation costs were decreasing, making centralized production, combined with shipping to local markets, more feasible. Third, new technologies, mainly electronics and in ASEA's case the emergence of nuclear power technologies, enabled greater economies of scale. Fourth, partly as a consequence of increased international integration and communication, national preferences were gradually becoming more homogeneous. Naturally, the greater possibilities for economies of scale reinforced this trend as large-scale producers could offer less expensive, but standardized, products. Formerly protected markets were now open, and competition was becoming more global. However, these environmental changes would have had little impact if companies had not altered their behavior (or indeed created some of the changes). The two firms illustrate somewhat divergent strategic reactions, partly contingent on the differences in industry structure and history.

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From the late 1950s and onward, continuous discussions about co-operation, acquisitions, specialization etc., went on between the major European companies in the electric-power industry. ASEA management appears to have taken an active part. In 1963, ASEA contacted Siemens and BBC. ASEA top executives felt that the industry suffered from over-capacity and excessively low prices. The European companies were too small, in relation to larger firms in the USA (and the Soviet Union) and low-cost producers in Japan, to be competitive and to undertake the extensive R&D investments necessary. Therefore, they concluded that the European power industry was headed for structural change. Production would be specialized along the lines of comparative advantage. However, the Swedish plan won no support from the Swiss or Germans, who blamed ASEA for the competitive situation that had arisen. To increase its bargaining power, ASEA reinforced its presence on the German market by acquiring a transformer manufacturer one year later.

In 1967, ASEA initiated negotiations with BBC concerning wider and deeper co-operation in a third constellation which would take up competition with GE and AEG-Siemens. An agreement in principle was reached in 1969, but some years later little remained of these ambitious plans. ASEA management then concluded that the co-operative arrangement was no longer in effect, and ASEA turned its attention toward establishing relationships with Weinstock and GEC in Great Britain. Once again, however, it failed to formalize an actual contract. Since these co-operative arrangements did not thrive, ASEA had to expand on its own. The foreign share of the company’s total manufacturing did not grow to any substantial extent, however. In 1956 this figure was 8%, and by the late 1970s it had increased only to some 10-11%. During this period, ASEA added subsidiaries in Mexico, India, and Spain, with the objective of strengthening market positions, and of circumventing trade barriers that still favored local production. New units were also acquired or set up in Brazil, Belgium, Greece, Great Britain, Canada, the USA, Malaysia, and Denmark. The foreign entities showed positive results, with the exception of the West-German subsidiary, but the Swedish units were even more profitable.

If ASEA’s reaction to the changing competitive situation was largely one of trying to find suitable partners, Electrolux, from the very beginning, focused much more on growth by
acquisition. As noted above, the white-goods industry was not as cartelized as the power industry. Given that most of the products were designed for consumers, demand patterns were often less homogeneous from country to country. In effect, economies of scale were not as important in white-goods as in the electric-power industry. Differences in the technologies used accentuated the advantages of scale in the power industry. These differences allowed Electrolux to follow a more incremental and step-by-step growth strategy. The company acquired some 300 companies between 1967 and 1982. However, the transition from multidomestic competition to a more global industry structure was not rapid.

The white-goods industry in the mid-1960s consisted of a few giants and a large number of small, local companies. Germany had AEG, Siemens, and Bosch, and Holland had Philips. France was dominated by Thomson and Arthur Martin. In Italy, Zanussi and Indesit, among others, produced refrigerators and washing machines. Electrolux had a beachhead in England, but the firm was small in comparison with GEC, Hotpoint, Philips, Tricity, and Hoover. Mr. Werthen soon realized that the firm was not large enough to compete with the large firms; yet they seemed too large to focus on a niche. Electrolux gradually reached a decision to confront the giants, and the company embarked on an intense period of acquisitions. Starting small and close to the home market in 1967, Electrolux bought the Electra stove factory in Norway, and later that year the Danish refrigerator manufacturer Atlas. To obtain capital, Hans Werthen decided to divest Electrolux' interest in the American company, Electrolux Corp., selling it to Consolidated Food for SEK 300 million. Some years later, this company tried to take over the entire Electrolux Group, and the Wallenbergs were tempted to sell. However, the Swedish Minister of Finance, Mr. Gunnar Sträng, vetoed that acquisition to keep ownership of Electrolux within the country.\textsuperscript{11}

Most of the acquisitions that followed during the 1970s seemed logical in the light of the race to become one of the leading white-goods manufacturers. However, two acquisitions might appear incongruous - those of Facit, an office-equipment manufacturer, in 1973, and Gränges, a conglomerate involved in the steel industry, in 1980. Nevertheless, Electrolux proved that it had learned from the previous acquisitions. The firm knew how to acquire a
company and to earn a profit from the acquisition. Surplus assets were sold off successively, in transactions which improved the financial state of the firm.

Entering the 1980s, both industries were still far from global, or even regional, although the international networks of the major competitors had been evolving gradually. At this point, few industry experts would have expected ASEA and Electrolux to be global industrial leaders only a decade later. However, they were both to act as international 'change agents' in their respective industries, completely changing the "rules of the game" in a matter of a few years.12

The internationalization of the firm is generally described as a slow and gradual learning process, in which firms start close to home and over time adopt more deeply committing forms of investment. The typical internationalization process starts with exports and ends with wholly-owned manufacturing subsidiaries.13 The basic assumption underlying the argument is that firms and management try to reduce uncertainty by taking one small step at a time.14 To some extent, this description fits Electrolux and ASEA, although their early international efforts often also seemed prompted by trade-restrictions and location of major competitors. Both companies established strong positions on the Swedish market before turning to the other Scandinavian countries. What sets them apart, however, is the speed with which they were transformed from regional companies to major global competitors.

By the end of the 1970s, Electrolux had built up a relatively solid position in the white-goods industry. Among other steps taken, the firm had re-entered the US market by acquiring Eureka and Tappan. According to Mr. Werthen, the thought of becoming the world leader was emerging. To realize this objective quickly, the company needed to buy one or several of the major competitors. Electrolux first tried to take over AEG, but failed. The Italian firm Zanussi had lost SEK 700 million during the previous year, and as a last resort its creditors turned to Electrolux for help. The acquisition process became a protracted drama
with many competing actors. In 1984, the transaction was finalized, and the Swedish company took over. The acquisition of the American company White Consolidated in 1986 (at that time the largest foreign acquisition ever by a Swedish company), on the other hand, was planned in more detail and secrecy. Mr. Anders Scharp, CEO of Electrolux, and Mr. Werthen, now chairman of the board of directors, flew to Cleveland without previously contacting White and took the American company by surprise. Approaching the 1990s, Electrolux was one of the leading firms in the household appliance industry. During the 20 years that had passed since Mr. Werthen took over, the firm had doubled its sales approximately every third or fourth year. In 1989, the Electrolux Group operated through some 500 subsidiaries in 50 countries, employing around 150,000 people.

For ASEA, the 1970s were a decade of unfortunate events and unsatisfactory results. The oil crisis in 1973/74 had decreased the worldwide consumption of electricity by 50% and left the industry in a state of devastating over-capacity. It was foreseen that a number of the companies in the industry would not exist in ten years. ASEA generated some 50% of its sales in Sweden, where demand was slumping.

In June, 1980, Mr. Percy Barnevik became CEO at ASEA and immediately launched a program to increase profitability. Two years later, the company was ready for international expansion. During the following year, international expansion proceeded, and by then Mr. Barnevik predicted that acquisitions would become necessary as a complement to internal expansion in the effort to improve growth and profitability. The following year, the first major step was taken in an upcoming succession of acquisitions. ASEA acquired its Finnish competitor Strömbbergs, adding some 7,000 employees and SEK 2.4 billion in annual sales. Excluding Sweden, the company by now had approximately 15,000 employees in the Nordic countries, compared to only 2500 six years earlier. The year 1987 marked the end of one era, but also the beginning of a new one; it was to be the most sensational year so far in the history of ASEA. On August 10 of that year, management announced the agreement between the boards of ASEA and Brown Boveri to merge the electrotechnical businesses of the two companies. The new company, ABB, would employ some 180,000 people around the world, and have annual sales of some 110 billion SEK. After several minor take-overs, in 1989 ABB took another large step. The acquisition of Westinghouse T&D and Combustion Engineering in the USA added 40,000 new employees and some six to seven billion US dollars in annual
sales. The US market now represented almost one quarter of the ABB Group’s annual business.

**Strategic thrust**

It is evident from our brief historical exposé of Electrolux and ASEA/ABB that their principal strategic response to the new conditions that came to characterize the electric-power and white-goods industries, respectively, was one of international growth to attain critical size and to benefit from economies of scale. It is commonly held that the chain of events in organizational change processes is one of environment-strategy-structure. The so called ‘strategy-structure’ paradigm holds that strategic changes in reaction to new environmental conditions also force the firm to adapt the organizational structure. However, since both companies can be considered as change agents, it is perhaps more appropriate to regard their behavior as proactive rather than reactive. We will consider four primary areas when analyzing the companies from a strategic point of view: a) generic strategies, b) growth pattern, c) primary capabilities and competencies, and d) the strategy process.

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In principle, prior to the acquisition of Elektro Helios in 1962, Electrolux was a single product company. In 1967, 125% of the profits came from the vacuum-cleaner business. The acquisition of Elektro Helios gave the company a solid base for expansion in the white-goods industry, but the profitability of these products was unsatisfactory. According to Mr. Gösta Bystedt, second in charge at the company in the 1980s, no investigations were necessary to show that volumes were too small, production costs too high, and simple measures to improve efficiency would not suffice to secure sustainable profitability. The company even considered divesting its interests in the white-goods industry, but no buyer was available.

Despite all these difficulties, Mr. Werthen took on the challenge, although he admits that he did not have much of a strategy. He tried to cut costs, and he moved the head office to Lilla Essingen in Stockholm. Three simple words seemed to capture much of what was done: it should be practical, logical, and cheap. Mr. Werthen concedes that in 1967 the company’s
strategy was less than clear. According to Mr. Anders Scharp, a member of the so called management ‘troika’ together with Mr. Werthen and Mr. Bystedt, a new approach evolved over time; it was no longer sufficient to develop and manufacture products as efficiently as possible - the company had to take on the task of restructuring the industry as well. Nevertheless, Mr. Scharp pointed out that this necessity was not at all clear to him from the start - the pattern became evident later on. Mr. Werthen emphasized three key points:

1) A profitable white-goods company is one of the three largest on its market.

2) A company must be able to offer a complete range of products on every market.

3) Products are becoming more international.

Electrolux acquired white-goods competitors, but also a number of firms active in unrelated businesses. By restructuring these firms and selling off excess assets, the company was able to earn a profit on many of these unrelated acquisitions. In turn, the cash generated could be used for further expansion in the white-goods area. Moreover, some of these acquisitions also aimed at diversifying risk in what management believed to be a cyclical core business. As the firm attained critical mass in chain-saws, seat-belts etc., these were added as new product lines, and Electrolux was more or less turning into a conglomerate.

The main advantage associated with becoming the international leader was naturally the opportunity to achieve economies of scale, especially as management anticipated that demand patterns were becoming more homogeneous. By the mid-1980s, this trend was most clearly distinguishable in the microwave-oven area, but the anticipated homogenization was also expected to affect other household-appliance products. A few years earlier, the diversification pattern had changed. Unrelated businesses, like Facit and parts of Gränges, were divested, and the absolute majority of acquisitions were aimed at improving the position within the white-goods industry.

Management saw it as critical to integrate both Zanussi and White rapidly once they had been acquired. It was also considered essential to cut costs, raise productivity through more efficient organization, investments, and co-ordination of production to obtain longer series. By now, production technology, in addition to the well documented skill in acquiring companies, had become one of the major strengths of Electrolux. Furthermore, as a consequence of all acquisitions, the company had ended up with a large number of brands.
Since many of these were strong on local markets and in special segments, management decided to keep them, rather than to add the Electrolux and Zanussi labels, or just to discontinue these products. The brands were grouped into four families; Alpha, Beta, Gamma, and Delta, depending on design, positioning (high-end/low-end) and market coverage (European/National).

Although the acquisitions had given Electrolux a competitive volume and expanded its geographical coverage, management felt that they had also led to a need for restructuring and large investments in product lines and plants. The next step would be to concentrate on product renewal and marketing. According to Mr. Leif Johansson, head of household appliances, a shift from growing by acquisition toward organic growth was necessary. As the 1990s were approaching, management sketched three trends that would affect future development efforts considerably. First, it was believed that the internationalization of markets would continue. The needs and consumption patterns of different geographical markets were seen as becoming increasingly similar, resulting in the future in global lifestyles and products. Management also anticipated that firms around the globe would reinforce and promote this trend as they strove for increased economies of scale. Second, it was becoming even more important to respond quickly to new trends and demand. This requirement would entail a greater emphasis on an increased number of new products with shorter development cycles, as well as call for a more flexible production structure. Third, management believed it essential to integrate development efforts over countries and regions in terms of standardized design, components, and marketing, to a greater extent than before.

As has become apparent in our previous discussion of the two firms, they share many traits and characteristics. However, the historical strategies followed by ASEA/ABB also display a number of differences as compared to the one(s) adopted by Electrolux.

When Mr. Edström took over office, improving efficiency in manufacturing was at the heart of the ASEA’s strategy. Drawing on experience from the North American electrical-
engineering industry, the company put a strong focus on standardization. This emphasis, combined with the internationalization efforts outlined earlier, characterized ASEA throughout the first half of the century. The company established a strong manufacturing-process orientation, and it strengthened the R&D aspects of its culture. Nevertheless, the mid-1950s were a time of unrest and upheaval for the company. It seemed clear to management that the years to come would force the company to adjust its strategy in relation to the changes foreseen in the environment. Although never specifically formulated, the arguments for further emphasizing volume were based on this view. This strategy was to be implemented primarily through heavy R&D investments, expanded manufacturing capacity, and increased internationalization. Management reasoned as follows:

1. Increased R&D expenditures demand larger volumes.
2. Increased labor costs demand larger volume to sustain profitability.
3. Increased unit sizes in the heavy equipment areas demand volume to balance risk.
4. Without a full product range it is impossible to build volume, attain economies of scope (synergies between different products), and balance risk.

Two other features came to play an important role in the evolution of ASEA during the 1960s and 1970s: cost cutting and effective utilization of capital. The arrival of Mr. Barnevik in the early 1980s also meant the introduction of a new element of strategy - time consciousness. Having spent half a year studying the industry and the company before taking over office, Mr. Barnevik had a clear strategy right from the start: rapid international growth. The company was going to decide the new "rules of the game", rather than merely react to steps taken by the more powerful competitors. In the short run, this strategy required raising margins by ensuring a better product mix, higher prices, and avoiding low-margin business. In the long run, the most important strategic move was to divest the company's interests in unprofitable businesses and to invest heavily in profitable segments. During the first two years that followed, some 20 units were closed down or sold, and 4,000 employees had to leave the firm. On the other hand, 6,000 new employees were added through expansion and acquisitions. An increased emphasis on R&D would mean a higher rate of innovation, and it was expected that in only a few years as much as 50% of sales would be affected by new products. Simultaneously, R&D work was decentralized to the divisional level.
Another important part of the new strategy was the emphasis on marketing, primarily in regard to foreign markets. ASEA managed to increase foreign sales from 52% in 1979 to 59% three years later, and the goal for 1988 was set at 75%. Part of this strategy was also to increase local production on important markets. Further, management stressed the danger of becoming "stuck in the middle" - not large enough to compete with the major companies, and not focused enough to capture one or several profitable niches. It was anticipated that increased volumes, profits, and development efforts would accompany each other. The Group's financial state was strong, with excellent liquidity, and the devaluations of the Swedish krona in 1982 had put the company in an exceptionally favorable cost position.

The emphasis on the international dimension and the prime importance of time, early on led Mr. Barnevik to conclude that acquisitions would become necessary. ASEA management believed that the Swedish company would have a good chance to survive on its own, but a merger was regarded as a way to a faster and more powerful rise in profits. Seeing dangers in a time-consuming merger, top management took great pains to speed-up the process. In January, 1988, 250 managers met to review the goals, strategies, and policies of ABB. A number of vital decisions were taken:

- Central staff should be kept to a minimum and responsibility decentralized to profit units so as to achieve as flat an organization as possible.
- Entire companies, overlapping factories, and distribution channels should be merged.
- R&D and manufacturing sites should be specialized, and the latter should seek to exchange products.
- Businesses in which no profits could be anticipated should be divested.
- Throughout the Group, a focus was to be put on more efficient use of financial and physical assets, as well as on freeing land and facilities for other purposes.

Mr. Barnevik emphasized that the company needed to grow simultaneously in terms of markets and products. It was necessary in his view to develop new businesses on growing geographical markets, and to focus on establishing solid positions in high-growth global niches. He anticipated that by using new advantages of scale to lower costs, ABB would be able to gain market shares. All measures were aimed at positioning the company as the low-cost producer of the industry, while simultaneously it would be the technological leader.
Generic strategies

Basically, two roads to sustainable profitability are identified in the literature on strategic management: to offer the consumer products that are either cheaper or better in some respect(s). These two generic strategies are often called ‘low-cost’ and ‘differentiation’, respectively. A low-cost strategy builds on volume production, whereas differentiation is based on other ways of adding value for the customer, in terms of design, service, superior performance, etc.

It is evident that both companies focused more on the former type of strategy than on the latter. However, reality appears more complex than suggested by the two theoretical archetypes. Lately, volume has also been used for differentiation purposes. In the Electrolux case, for instance, sharing components between different brands enables high-end products to benefit from the volumes created by low-end brands. Further, to judge from the ASEA/ABB case, it appears as if focusing on one strategy or the other no longer suffices; to be competitive in the global marketplace, firms may have to be better and cheaper.

In the international context, it is also logical to discuss firm strategy in terms of ‘local adaptation - global standardization’. In this respect, it seems as if both companies have moved from an emphasis on the former to a more genuine focus on the latter, as time has passed. However, ASEA from the beginning had more of a standardization focus than Electrolux, which did not start to emphasize global standardization heavily until the 1980s. Thus, the strategic patterns of the companies have shifted historically. Electrolux started out by selling high-performance vacuum cleaners, using new sales methods, and thereby managed to survive for more than 40 years on what could be argued to represent a strategy of differentiation. This strategy led to large volumes over time. ASEA also started out with sophisticated products that later enabled the company to internationalize. Finally, it is worth noting that any effort to describe the current strategies of the two companies would be superficial. Product lines differ in significant respects; even within the same product line, different brands may be managed along different strategic lines. Therefore, in the chapters to come, we will focus on the strategies for the particular units that contained the four IIPs, and we will describe the specific situations in these product or business areas in more detail.
Growth pattern

The second aspect of strategy relates to growth patterns. A company can grow in at least two dimensions: geographically and in terms of products (and of course also in terms of vertical integration). As regards the product, a distinction is generally made between related and unrelated diversification. We have already discussed the first dimension and concluded that the main way for both companies to attain the critical volumes necessary for economies of scale was to internationalize. The principal method used initially was green-field investments, but during and after the late 1960s, acquisitions, and in the case of ASEA also mergers, became totally predominant.

The primary difference between the companies relates to the distinction between related and unrelated diversification. Although both companies emphasized the importance of building a full range of products for the core business, ASEA/ABB focused largely on growth within their original line(s) of business, whereas Electrolux was much more open to other opportunities as they appeared. The core business was also questioned to a greater extent at Electrolux, at least until the expansion in household-appliance products started in the late 1960s and early 1970s. Consequently, the Electrolux product portfolio, particularly during the early 1980s, had spread out much more than that of ASEA, although in recent years there had been more of a concentration on the core.

Primary capabilities and competencies

We now turn to the question of primary capabilities or competencies. Electrolux' greatest strengths are to be found in its 'deal-making' capability, and in the area of manufacturing. Management over time learned to find the right companies, and was skillful in developing them and creating value. Further, the company proved very capable at integrating acquired units. As for manufacturing competence, it includes having the resources and skills to take the investments necessary to reshape and to create an efficient organization out of the fragmented structure that resulted from the acquisitions. The ASEA case shows many similarities, including a clear focus on manufacturing efficiency and capability in acquiring and merging companies. The principal difference between the two companies lies in their divergent
approaches to R&D. Whereas Electrolux had primarily devoted its efforts to manufacturing process improvements, ASEA/ABB also paid attention to product development and improvements. At both companies the capabilities also became geographically distributed, partly as a consequence of growth by mergers and acquisitions.

The strategy process

The fourth aspect of strategy relates to the strategy process. Here, a distinction may be made between those scholars who regard strategy largely as a ‘formation process’, and those who generally consider it to contain elements of ‘formulation and implementation’. At least on the corporate level, the strategy process in ASEA/ABB seems much more oriented toward action preceded by thorough planning, whereas the Electrolux approach displays more opportunistic features. At ASEA/ABB, goals and objectives are set first; then action is initiated to meet them. In contrast, goals and objectives at Electrolux seem to evolve and form over time, and management claims that the strategy is only clearly distinguishable after the fact. The table below attempts to summarize the similarities and differences between the two companies from the point of view of strategy.

<table>
<thead>
<tr>
<th>Company</th>
<th>ASEA/ABB</th>
<th>Electrolux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic strategy</td>
<td>Differentiation/Low-cost</td>
<td>Differentiation/Low-cost</td>
</tr>
<tr>
<td>Growth pattern</td>
<td>Internationalization</td>
<td>Internationalization</td>
</tr>
<tr>
<td></td>
<td>Related diversification</td>
<td>(Un-)related diversification</td>
</tr>
<tr>
<td>Primary capabilities</td>
<td>Product development</td>
<td>“Deal-making”</td>
</tr>
<tr>
<td></td>
<td>Process development</td>
<td>Process development</td>
</tr>
<tr>
<td>Strategy process</td>
<td>Formulation-implementation</td>
<td>Formation</td>
</tr>
</tbody>
</table>

Table 3.1: Strategic characteristics of ASEA/ABB and Electrolux

Organizational responses

A strategy is never better than the actions in which it results. Other administrative structures can enable but also hinder the effective formation and implementation of strategies. To understand the organizational evolution of Electrolux and ASEA, it is necessary to consider a
number of different aspects. Naturally, in the case of the multinational company, the organizational context is further complicated by the fact that the geographical dimension must be addressed in one way or another. At the same time, the classical organizational dimensions, such as functions and products, still remain, as do the problems which they involve.

**Traditional modes of organizing the MNC**

In Chapter 1 we briefly discussed the two classical ways of doing business in the international arena. Companies were either strategically concentrated or dispersed, in the latter case as a collection of units without systematic co-ordination to any substantial extent. We concluded that these solutions had been successful in industries with distinctively different characteristics. The concentrated MNC had prospered in industries with relatively homogeneous world-wide demand patterns which favored standardized, large-scale production, while the dispersed multinational dominated in industries in which customer preferences varied considerably across geographical space, so that local adaptation became critical.

Generally, strategic concentration worked better in global industries, whereas strategic dispersion was more successful in multidomestic industries. However, it is also easy to find examples of companies that organized or allocated their strategic resources in less than "optimal" ways. In our view, management’s enactment of the competitive environment is by no means simply a reaction to obvious and objectively clear signals. Rather, it seems as if managers gradually develop an orientation toward doing business internationally as they interpret industry conditions. While managers develop their attitudes over time as individuals, the context in which the managers operate, i.e., the company and national cultures, is also influential.

Two typical orientations are identified in the literature on the MNC: ethnocentrism and polycentrism. Slightly exaggerated, the basic assumption held by ethnocentric managers is that their ability to internationalize emanates from the home country, where people know better, are more qualified to develop the right new products, and can form the appropriate
strategies. The polycentric attitude, on the other hand, is based on the belief that nations and people are so different that no one can truly understand them all. To do business in a specific cultural setting, one needs to be an insider and each local unit must be managed differently.

These two archetypal attitudes typically influenced organization of the MNC. An ethnocentric view led to concentration of strategic resources to the home-country; polycentrism, by contrast, resulted in strategic dispersion, on the assumption that any effort to co-ordinate activities would be almost futile, since each specific national environment held so little in common with the others. The network configurations, and resource allocation patterns related to these attitudes have been termed ‘the centralized hub’ (in the case of ethnocentrism) and ‘the decentralized federation’ (in the case of polycentrism). In turn, these configurations were generally manifested in one of two formal structural solutions. In the centralized hub, international activities were separately placed in an international division (or, later, international product divisions). In the decentralized federation, the dominant structural solution was of a "mother-daughter" type (parent-subsidiary). To avoid confusing the reader with too many concepts at one time, we summarize our reasoning in the table below.

<table>
<thead>
<tr>
<th>Competition</th>
<th>Global</th>
<th>Multidomestic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>Ethnocentric</td>
<td>Polycentric</td>
</tr>
<tr>
<td>Asset structure</td>
<td>Geographically concentrated</td>
<td>Geographically dispersed</td>
</tr>
<tr>
<td>Configuration</td>
<td>Centralized hub</td>
<td>Decentralized federation</td>
</tr>
<tr>
<td></td>
<td>International (product) division(s)</td>
<td>&quot;Mother-daughter&quot;</td>
</tr>
<tr>
<td>Locus of authority</td>
<td>Centralized to headquarters</td>
<td>Decentralized to subsidiaries</td>
</tr>
</tbody>
</table>

Table 3.2: Traditional modes of organizing the multinational company

In addition to the impact of industry characteristics, the type of structure adopted by a particular MNC was dependent primarily on two factors: a) timing of the internationalization process, and b) country of origin. The early multinationals generally kept their strategic resources at home. Yet some companies, such as those which internationalized during the protectionist period of the 1920s and 30s, were later forced to disperse their strategic capabilities. The home country of the firm mattered, since international activities in relation to business in the country of origin could range from nonessential to critically important. Generally, companies from countries with a large domestic market, like the USA and Japan,
tended to regard foreign business as marginal, and in most cases established international divisions. In regard to Swedish multinationals, like Electrolux and ASEA, it has been argued that they generally exhibit strong similarity. The typical features of the so called “Swedish model included: a) foreign subsidiaries reporting directly to headquarters, and b) relatively autonomous foreign subsidiaries. 

Accordingly, most Swedish MNCs historically displayed more similarities with the geographically dispersed and decentralized network, than with the other traditional archetype. This pattern is hardly surprising, in view of their limited home-market as well as the typically intense and often early commencement of their international development. Neither Electrolux nor ASEA diverge much from this general tendency, and as will be described later, Electrolux is perhaps the prime Swedish example of a polycentric organization.

Organizational aspects of the MNC

Interesting differences between the two companies become more evident when we add other structural dimensions and mechanisms used to co-ordinate the firm. The question of how to structure a firm is extensively discussed in writings on organization theory. However, in our view, the impact of the geographical dimension has often been down-played, or even neglected, in these discussions, which have mostly focused on division of labor among the various departments of the firm.

In observance of the hierarchical principle of decomposition, which favors specialization, learning, and advantages of scale, most firms around the turn of the century were organized along functional lines. The principle was represented in an archetypal firm sometimes referred to as the unitary form (U-form). However, as firms expanded, in sheer size and in terms of diversification into other product areas, management began to lose control over an increasingly complex structure. In the 1920s, this tendency led some pioneering companies in the USA to form what has been described as the multidivisional form (M-form). It has been argued that the transition from the U-form to the M-form was a consequence of managers’ bounded rationality and the opportunistic behavior of people further down in the organization. This shift meant that the functions were split up among divisions, which in
turn were generally organized along product lines. The resultant multidivisional type of firm might as well have been called the multiunitary company, however, since each division in many senses was a smaller replica of the old functional organization. Basically, specialization had been and still was functional. The difference that did exist was more evident from a top management point of view than from that of people working further down in the organization.

As pointed out in Chapter 1, organizational design revolves principally around the concepts of specialization and then integration of what has been separated. The traditional Swedish "mother-daughter" structure meant specialization of country organizations according to the dictates of the local market. Each foreign subsidiary could be thought of as a U-form organization, although initially not fully-fledged, since manufacturing and R&D were not included. By specializing along the country dimension and differentiating geographically in regard to organization and strategy, these companies were able to adapt to local demand conditions; at the same time they were unable to benefit from cross-border standardization synergies that would have produced economies of scale. However, the environmental changes toward more global competition during the 1960s and 1970s, also led most European multinationals to adopt some type of divisional structure, with more of a focus on the product dimension.

Contrary to many large companies of the 1920s and 1930s, ASEA did not reorganize into product divisions, although some of the subsidiaries in reality operated as such and corporate management seriously considered that alternative. The main rationale for this position was that the technical areas within the company rarely coincided with its markets and customer base. Moving from a functional to a product-division type of organization would complicate relations with some of the major customers, who demanded a variety of products and consequently would have had to deal with several divisions rather than one general sales unit.

No substantial changes occurred until the 1960s, when much of the company's efforts were turned to reorganizing. During the previous decade, a growing opinion for some kind of decentralization or divisionalization had developed. However, changing from a basically
horizontal to a vertical structure would not be easy. The company believed that it lacked enough skilled managers, and it was not easy to determine the appropriate principle for divisionalization and decentralization, especially since manufacturing and market areas did not correspond. After numerous discussions and different proposals, as well as changes in the top-management team - Mr. Curt Nicolin became CEO - a major reorganization was undertaken in 1961 for the purpose of improving efficiency. The parent company was given a 'double-divisional' structure, in accordance with the two principles. Design and manufacturing for particular products or product groups were brought together in a 'sector' under common management. In most cases, this sector was also responsible for sales of standard products. Direct customer contacts, however, were still handled by the sales units or by foreign subsidiaries, each reporting in parallel with the sectors. There was also a major redistribution of manufacturing capacity within and among the Swedish units to increase focus and further to concentrate production.

Traditionally, the most notable hallmark of the Electrolux organization had been the principle of decentralization. Top managers even used to describe the company as "hundreds of independent villages" or a set of "player pianos". Until the introduction of the product-line structure in the early 1980s, country managers had total responsibility for their territory and reported directly to headquarters. International co-ordination had been achieved through extensive social contacts among top management, and by tight financial control of subsidiary results. However, during the latter 1980s, a change from decentralization to more centralized integration of strategic decisions occurred.

Moving toward more globally integrated structures

Not until the early 1980s did Electrolux and ASEA begin to depart substantially from the "mother-daughter" structure. So far, our discussion of international configurations has been restricted mainly to two archetypes - the international division, and the parent-subsidiary structure. However, as time passed, two new structures gained ground - international product divisions, and the matrix. As regards the former, it operates very much like the traditional M-form. By down-playing the importance of local customer needs, and emphasizing the importance of focus and standardization, it generally favors global economies of scale. The
product/geography matrix is designed to resolve the tension between global efficiency and local adaptation by achieving both. To a large extent, however, the strain between product- and local management is not relieved by the formal structure but must be faced by the managers involved in each specific case. Still, most international firms, even those globally organized along the product dimension, bear certain features of matrix management, although these are not always evident in the formal organizational structure.

Organizationally, ASEA underwent significant changes after the arrival of Mr. Banevik. During the first three years of the decade, the former sectors were regrouped into formal divisions, in which the sales function was added to construction and manufacturing. Within the divisions, a number of subdivisions with profit responsibility were established. In some foreign countries, e.g., Norway, West-Germany, Spain, and Canada, sales and manufacturing companies were merged. The divisions of the parent company corresponded to some 20 global business areas, and an international matrix organization was introduced in 1981. A consequence of this structure was that the divisions of the parent company had global responsibility for the profits of their respective business area, whereas the foreign subsidiaries were still responsible for profits on their local markets. Furthermore, management wanted to distribute global product responsibility among the different countries, and thus increase exports from each one, by utilizing the international marketing and distribution channels.

Central staff was also dramatically reduced and began to operate more as service units to the divisional, subsidiary, and global business-area headquarters, where actual power and initiative now rested. A further step toward decentralization was taken when management decided that the divisions were to report their own balance sheets, effective from 1985. Concurrently, the cutback of central staff continued. The structural development efforts that had started in 1980 were brought to a (temporary) close in 1985, when four of the divisions were transformed into separate legal entities (effective from 1986). Also several of the foreign units on large markets were converted into separate companies.

The configuration of ABB came to bear close resemblance to the matrix structure introduced in ASEA during early 1980s. Geographically, the company was divided into five regions (Western Europe - EC, Western Europe - EFTA, North America, Asia and
Australasia, and Other Regions). The second dimension of the matrix included the following eight business segments, within which the 60 or so business areas were grouped: Power Plants, Power Transmission, Power Distribution, Industry, Transportation, Environmental Control, Financial Services, and Various Activities. The figure below is intended to outline the basic properties of the formal organizational structure.

![Organizational structure and reporting relationships at ABB in 1990](image)

**Figure 3.1a: Organizational structure and reporting relationships at ABB in 1990**

The business areas, covering products ranging from "superglobal" to "superlocal"\(^49\) were co-ordinated world-wide by business-area managers. Each local country manager had profit responsibility for all operations. Reporting was complex but followed certain general principles. Local companies in the Various Activities segment and all local companies in the seven other segments, except for the units located in Sweden, Switzerland, West Germany, and the USA, were organized as in the figure above. For instance, the manager of the Danish unit of the ABB Motors business area (belonging to Various Activities) would report to the business-area manager, in this case located in Switzerland, and to the country manager in his home-country. In turn, the business-area manager would report to the segment manager of Various Activities and to the Swiss country manager. The two country managers would report to the regional manager of Western Europe-EC and EFTA, respectively. The market region managers, and the business-segment manager, reported to Group Management, to which they usually belonged.
However, local companies in the four major countries mentioned above that did not belong to the Various Activities segment reported to regional segment management instead of country management. Thus, the local company manager in the Process Automation business area, West Germany, would report to the business-area manager in the USA, and to the regional-segment manager of all Industry business areas in West Germany. The business-area manager in the USA would report to management of the business segment, as well as to regional-segment management in his/her country. Finally, the regional segment managers would report to business segment management and to the respective country managers, who in turn would report to their market region managers. As in the case of ABB Motors, the market-region managers, and their business-segment colleagues, would answer directly to Group management. The complexity was slightly reduced by the fact that in many cases the country managers of the four major countries were also either market-region or business-segment managers, and often belonged to Group management. This structure, and the reporting relationships used, are displayed below.

![Organizational structure and reporting relationships at ABB](image)

**Figure 3.1b:** Organizational structure and reporting relationships at ABB

Mr. Barnevik described the company as "multidomestic". The term designated a group of strong national companies with local manufacturing and a knowledge base adapted to the specific environment - "a federation of national companies". It was important to be an "insider, not an invader". At the same time, the local companies were supposed to export
those products for which they had international comparative advantages. The expression "think globally and act locally", expresses much of the basic organizational philosophy of ABB.\textsuperscript{53} It was essential to combine the strength of the relatively self-governing local units with a high degree of integration through co-operation and trade across borders, so as not to miss the potential advantages of scale and scope. At the same time, ABB had established more than 3500 profit centers to ensure decentralization, and Mr. Barnevik traveled extensively to spread the new message. As he himself put it; "You don't inform, you overinform".\textsuperscript{54}

At the end of the 1980s, the operations of the Electrolux Group were organized into five product lines; Household Appliances, Commercial Appliances, Outdoor Products, Industrial Products, and Commercial Services. Still, the mother-daughter structure prevailed, and multi-product-line subsidiaries reported primarily to headquarters, whereas single-product-line companies reported to product line management. In Household Appliances, the primary sector of operations was related to white goods, which accounted for 75\% of product-line sales. The structure of the product line had been influenced by the acquisitions made during the 1980s. It had been introduced gradually, most recently in Italy and the USA. While any description would show only a static picture, a "snapshot"; it may be useful to consider the principal features, which are outlined below.

![Figure 3.2: Organizational structure and reporting relationships at Electrolux in 1989](image-url)
Product divisions, i.e., the local manufacturing units, as well as the marketing and sales units in a specific country reported to the local country manager, who was directly subordinate to the head of Household Appliances. However, the manufacturing units within the product areas - Wet (dishers, washers, and dryers), Hot (kitchen ranges), and Cold (freezers and refrigerators) - were also co-ordinated internationally by product-area managers (PAMs). The national marketing and sales units reported to Marketing Europe, located in Italy, and Marketing Overseas, respectively. These managers, in turn, reported to headquarters in Sweden.

In addition, the company was also divided into an industrial and a commercial sector. All product-area managers reported to the head of the industrial sector, whereas the marketing units reported to the president of marketing. These two individuals, finally, were responsible to the general manager of the product line. Mr. Leif Johansson, one of the architects and general manager of Household Appliances, had described the arrangement as “a quite impossible structure, but the only one that will work”. He had also added that “if you ask me who takes the decisions, it’s not at all clear... the organization only works provided the people involved want it to”. As pointed out by Mr. Johansson, the structure created at least four kinds of tension, between:

- marketing companies and product divisions
- these two types of units and the country manager
- the country manager and the product-area manager
- country managers and those co-ordinating marketing activities internationally.

The various product areas, subject as they were to quite different external conditions, differed with respect to geographical distribution. Hot was most widely dispersed; because of quite diverse customer needs and different cooking habits, the manufacturing units were scattered throughout Europe. The Wet area illustrated the opposite situation; here it was becoming increasingly clear that the Italian subsidiary was the center of strategic activities, although the unit in France acted as a strong satellite. The Cold area could be placed somewhere in between, with one strong center in Sweden and one in Italy. As of yet, the household-appliance product line had no major global centers in the USA.
The organizational properties of ABB and Electrolux

Naturally, the formal configurative structures do not fully represent the company organization. In both cases, the more complete the description of these structures and reporting relationships, the more complex and the less comprehensible the organization appears. Electrolux management, for instance, must consider at least four important dimensions: functions, countries, products, and brands. It is difficult to conceive a formal organizational structure that could reflect all these dimensions at any one time. The structure adopted by Electrolux, for the household-appliance line in the late 1980s, was primarily a functional one, since the manufacturing units were separated from the marketing and sales units. However, as both primary functions reported to country managers, the structure still displays elements of the former mother-daughter configuration. The product and brand dimensions; finally, were co-ordinated by other bodies; PAMs integrated product areas across geographical space, while Marketing Europe served the same function primarily for brands, though only within Europe. Other markets were the responsibility of Marketing Overseas. The ABB structure at that time was a much more clear-cut matrix comprising the product and geographical dimensions; functions co-ordinated at the local unit and/or business-area level.

Our interpretation of the Electrolux structure is that of a mutated matrix or an organization 'in-between', moving from a parent-subsidiary to a different one. Formal authority appears to be drifting between countries and products, while historically in the hands of the country managers. As noted by Mr. Johansson, the company is heavily dependent on its employees and on informal personal networks, as well as on subtle management processes. ABB displays some similarities, and the formal structure of the firm does not clearly locate formal authority in a single type of unit. The structure does not solve problems, but rather generates ones that must be worked out jointly by people from the product and country dimensions.

The main disadvantage generally associated with the matrix is that it is extremely burdensome to manage, as it easily becomes infested with political power battles and everlasting disputes about who has the right to take decisions. Rumor has it that this problem was partly solved at ABB by Mr. Barnevik telling managers that if they come to him once he would resolve their argument. However, if they came to him a second time, they
would both be fired. Though the veracity of this story is debatable, it is widely spread at the company, and it illustrates the general emphasis of ABB to delegate decisions to people further down in the organization. In addition, to ensure a productive and co-operative climate, management has stressed the importance of a common purpose. The use of catch-phrases, such as "multidomestic" and "think globally, act locally", combined with the desire to overinform people about the corporate mission and vision, all contributed in spreading the new message throughout the organization, geographically and hierarchically.

One of the principal differences between the structures of the two companies relates to the organizational level at which the technical and the commercial side meet. At ABB, with its stronger focus on products, as opposed to countries, the basic meeting ground between functions had already been removed from the corporate level during the ASEA period. Now functions meet at a relatively low level, such as the business area, or even in the local unit. (Units in countries where only marketing and sales activities are located could be driven by a more local functional logic rather than a global business area one). A further consequence of the decentralization efforts, and linking of functions, is evident in that profit responsibility has been established at lower levels of the organization. The creation of some 3500 profit centers by the late 1980s meant that the average profit center at ABB employed approximately 60 people.

In terms of co-ordination mechanisms, the two companies shared many of the traits generally associated with European multinationals. A strong reliance on socialization among top managers as a cohesive force among the geographically dispersed, combined with tight financial control, characterized integration efforts across geographical borders. As will be outlined below, however, ABB differed to some extent in that it also used formalization and planning more actively, thus being slightly more "American" in its approach to international co-ordination.

As for the more informal networks, these were naturally heavily influenced by their reliance on acquisitions as the primary means for growth. The informal organization is dependent on more personalized relationships; it is often a function of the individual characteristics and patterns of interaction over time. However, the formal organization of the past greatly
influences the informal one of the present. By designating the official lines of authority and reporting, and by separating people belonging to different functions, countries, etc., it greatly affects the establishment of more informal relationships. Changes in the formal structure take time to influence the informal networks. The informal networks, in turn, may inhibit the efficient introduction of new formal structures. Thus, during the rapid international expansion of Electrolux and ABB, the informal networks remained largely restricted to people with the same company background, and the further down in the hierarchy, the more functionally and nationally oriented the network.

Also, the organizational cultures of the two firms in the late 1980s were strongly affected by their limited history as corporate groups with their existing composition. In effect, a substantial diversity of cultures across geographical space remained after the recent mergers and acquisitions. Nevertheless, indications of the values and belief systems in ABB and Electrolux can be found in the historical cultures of the two firms.

Electrolux had started out as a company of salesmen knocking doors and offering vacuum cleaners. Due to their often aggressive sales methods, they were sometimes viewed as peddlers. This business orientation, as opposed to a more technical attitude, still prevailed at the company later on. The focus on "deal-making" in the 1960s and 1970s further strengthened the financial orientation. As regards the technical aspects of the company's operations, Mr. Werthen stated rather bluntly: "We are a sophisticated producer of unsophisticated products... (A mix of efficient production and) distribution is the key to success". Another element of the culture began to form during the late 1960s, a climate marked by hard work, speed, and an open mind. Other features included market orientation and cost awareness. A further quotation from Mr. Werthen, well known for his shrewd comments, is illustrative; "It is better to visit the customer than to take some course... Here (at Electrolux) we don't have any fancy systems or complicated calculation methods; we rely on common sense."
The historical culture of ASEA was distinctively different, although it of course shared traits generally associated with Sweden and Swedes. The firm was known as a company of administrators. It is argued that ASEA went further than any other Swedish company in formalizing control by use of written instructions. There was also extensive planning of operations. The company was characterized by a technological and innovative imperative, although more recently there was a shift of emphasis toward more marketing. Compared to most other major Swedish MNCs, perhaps especially Electrolux, ASEA was truly a company of engineers.

From a cultural perspective the companies are rather different. Whereas ASEA traditionally has had more of an engineering focus, Electrolux is characterized by a strong business orientation. The other major difference relates to the emphasis on formalization and planning at ASEA, compared to the more informal and somewhat opportunistic management style of Electrolux. Our analysis of the two companies from an administrative perspective is summarized in the table below.

<table>
<thead>
<tr>
<th>Administrative structures / Company</th>
<th>ABB</th>
<th>Electrolux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Matrix (product/geography)</td>
<td>Mix (functions/countries/products)</td>
</tr>
<tr>
<td>Co-ordination</td>
<td>Formalization Engineering culture</td>
<td>Socialization Business culture</td>
</tr>
</tbody>
</table>

Table 3.3: Administrative structures of ASEA/ABB and Electrolux

Describing the organizational architectures of ABB and Electrolux

To summarize the discussion in this chapter on the evolution of the modern multinational company, we will briefly recapitulate our interpretations of ABB and Electrolux from an organizational-architecture vantage point. Apparent from our discussion, and the previous analysis, is that compared to the two traditional archetypes of the MNC, both companies display a number of differences when approaching the 1990s. We have argued that over time the two companies have become increasingly dispersed geographically in terms of their asset
structures, mainly as a result of their preference for acquisitions and/or mergers as the primary growth strategy during the last decades. However, depending on the business area at ABB or product area at Electrolux, the two companies vary considerably in this dimension.

The administrative structures of the two companies differ in that Electrolux historically has allocated more authority to the country level, as the main principle for horizontal differentiation of tasks and roles. However, in recent years, a more mixed structure has evolved, with stronger international product area managers. Historically, the different functions, i.e., the industrial and the commercial sectors, have been separated in the formal configuration of the firm. At ABB, the recently adopted matrix utilizes the product as well as the geographical dimension in horizontally grouping tasks. However, for a long time, the functional dimension dominated as the structuring principle. Moreover, the foreign subsidiaries of this firm, too, had in reality often been fairly autonomous. Both organizations have moved over time toward increasingly flatter configurations.

Much financial control has historically remained centrally, particularly at Electrolux. This factor and intense socialization across borders among the top managers have been the principal co-ordinative structures in use on an overall company level. Strategic processes have tended to form organically over time, on the basis of mutual adjustment and communication in the top management team. The integrative structures in place at ABB have had much more of a focus on extensive formalization and planning. In recent years, much of decision-making had been decentralized to the business areas, and socialization across borders had become more extensive. Traditionally, these co-ordinative structures had led to a more planned and programmed approach, in which strategy processes tended to evolve in more of a formulation-implementation manner. From the point of view of culture, or of the more informal networks, both companies can be characterized as diverse, at least across geographical space, as a result of recent growth patterns. However, the content of the traditional cultures differ in that ABB has been marked by more formal engineering values, while Electrolux has had more of an emphasis on less formal and more business-oriented values. Our reasoning is outlined in the table below.
Table 3.4: The organizational architectures of ABB and Electrolux

The task of managing the companies seems one of managing paradoxes. To borrow the words of Mr. Barnevik, the firm must be local and global, centralized and decentralized, large and small, simultaneously. It seems as if Electrolux and ABB are trying to build competitiveness through creating an organizational network that is dispersed and specialized, but also coordinated internationally. The question, however, is whether this new ‘geocentric’ orientation will result in an organization that combines the best of both features, or whether it will end up less efficient and less adaptive than its historical predecessors? In the following chapters we will focus our attention on analyzing the impact of the organizational architecture on the international innovation processes. We will also outline in more depth the specific architectural characteristics of the business and product areas, respectively, to which the case IIPs belonged.

Summary of the chapter

In this chapter we have described the evolution of the modern MNC, focusing our attention on the cases of Electrolux and ASEA/ABB. Both companies started out small and local
around the turn of the century, but because of the limited size of the home market they internationalized their operations early on. Approaching the 1970s, ASEA and Electrolux were still fairly small competitors, but the years to come would mean dramatic changes as they both were to act as change agents, rewriting the rules of their respective industries. A number of factors contributed in making competition more global, and the two Swedish multinationals worked actively, primarily by initiating massive merger and acquisition efforts, to become industry leaders. After Electrolux had acquired Zanussi in 1984, as well as White Consolidated two years later, and ASEA had merged with Brown Boveri in 1987, and two years later had also taken the transatlantic step of acquiring Westinghouse T&D and Combustion Engineering, both firms had become global front runners.

Strategically, both companies have focused on establishing a low-cost position to attain volume, but in addition differentiated their offerings to capture other segments as well. The firms also differ in a number of respects. Historically, Electrolux has grown more unrelatedly than ASEA, acquiring some companies primarily for financial gain, from later divesting parts of them. ASEA/ABB has had more of a focus on product development, but both companies have basically centered their attention on process improvements. Finally, the strategy process at Electrolux shows more signs of formation over time, whereas the ASEA/ABB process is more of a formulation-implementation type.

Organizationally, both firms historically display a polycentric orientation toward international business, resulting in a mother-daughter (parent-subsidiary) type of formal organization, in which the foreign subsidiaries were given a great degree of freedom. However, during the 1980s, Electrolux tried to centralize to a larger extent than before. With the addition of new integrating devices to co-ordinate internationally among products and brands, the power of the local subsidiary manager was gradually reduced. The resulting structure can be characterized as a mutated matrix, in which the industrial sector was fundamentally separated from the commercial one. The formal ABB structure is a more clear-cut matrix, comprising the product and the geographical dimensions, and assigning much formal authority to business areas and some 3500 profit centers. It was originally introduced during the ASEA period. In terms of overall co-ordination, the two companies shared a European heritage of relying on socialization among top management. However, particularly Electrolux also
focused on strict financial control of subsidiaries, whereas ASEA was known for extensive formalization and planning. The more informal networks of both companies were affected by the rapid growth through acquisitions, and by the 1990s they were largely fragmented and localized at the level of the companies that now constituted the two corporate groups. The firms also differed in that ASEA/ABB could be described as a company of engineers, whereas the Electrolux culture was marked by its informality and business orientation.

We concluded the chapter by suggesting that the organizational solutions of ABB and Electrolux are moving in a direction distinctively different from the traditional archetypes of the MNC. Strategic capabilities are geographically dispersed, and units more systematically specialized, though also co-ordinated internationally to an unprecedented extent. The main differences in the architectural heritage of the two firms can be found in the nature of their administrative structures. Historically, the configuration in Electrolux had allocated more decision-making authority to the local subsidiaries, whereas the matrix organization of ABB used both products and geography as mechanisms for horizontal grouping of tasks. In terms of co-ordinative structures, Electrolux relied more on socialization, while ABB focused on extensive formalization. ABB was also characterized as a company of engineers, in contrast with the more business-oriented values of Electrolux. However, as a consequence of all the acquisitions and mergers of the 1980s, the cultures of both companies were interpreted as diverse across geographical space. Our analysis of the architectures of ABB and Electrolux will be used in the following chapters, as an aid in interpreting the nature of the international innovation processes.
Notes to Chapter 3

1 The description of ASEA until 1980 owes much to the work of Glete (1983), and the historical description of Electrolux is largely based on "Electrolux - Två epoker som format en världskoncern" (1988).

2 Neoclassical economics failed to explain the existence of the MNC. By relaxing some of the assumptions concerning perfect markets and information, and by using an industrial-organization (IO) framework, Hymer (1960/1976) reached a satisfactory explanation (also see Kindleberger, 1969). Since the international firm suffered from an information handicap, it needed a compensating advantage. By internalizing these assets, rather than selling them, for instance by licensing out technology, the unique advantages could be sustained over time (see Buckley and Casson, 1985, building their internalization model primarily on the transaction-cost approach, as outlined by Coase, 1937, and Williamson, 1975). The direction of foreign direct investments (FDIs), has been given several explanations. Burenstam Linder (1961) asserts that trade is most extensive among countries with similar demand structures, and Vernon (1966) stresses the importance of interaction between firm-specific advantages and location-specific advantages over the span of the product life cycle. For a discussion of the internationalization process and managerially oriented theories of the MNC, see below.


4 For an argument for internationalization as an effect of growth, see Penrose (1963).

5 See Vernon (1966) and Dunning (1979) for a discussion of firm-specific advantages. One might add that in addition to unique know-how, advantages can also be based, for instance, on access to raw materials or capital. Moreover, the firm may also internationalize in a search for less expensive input goods, such as raw materials or labor.


7 These companies continued to dominate the industry throughout the century, but their position was contested by Japanese firms such as Hitachi, Toshiba, and Mitsubishi Electric from the 1950s and onwards.

8 See Porter (1986) for a discussion of competition in multidomestic and global industries. Also see Sölvell (1987) for a more detailed discussion of historical patterns of competition in the white-goods and electric-power industries.

9 Ibid.

10 The following assessment of how ASEA management perceived the situation in the industry is based on an internal company document referred to in Glete (1983: 242-243).


12 For a more thorough treatment of international change agents, see Sölvell (1987).

13 For a discussion of the internationalization processes of Swedish MNCs, see the ‘Uppsala school’ for which the seminal references are Hörnell et al (1973), Johanson and Wiedersheim-Paul (1974), and Johanson and Vahlne (1977). Their framework was later extended by Nordström (1991), who added variables from the industrial organization paradigm; he showed that the internationalization process of Swedish MNCs in general had become more rapid than before. Also, see Sölvell (1987) for the impact of industry structure on international behavior. The description of internationalization processes as ones of slow and gradual learning processes is by no means restricted to Swedish MNCs. For a number of studies of companies originating from other countries, see Nordström (1991: 23-24).

14 In theoretical terms, the seminal reference on such uncertainty reduction is Cyert and March (1963).


See Chandler (1962) for the original outline of the strategy-structure paradigm. Structure is used here in a more narrow, configurational, and informational sense than in our outline of an organizational architecture.


Ibid.

Ibid.

Veckans Affärer nr 45, 6 November 1986.

Interview with Anders Scharp. Veckans Affärer nr 16, 17 April 1986.


See Porter (1980).

For a recent discussion of global strategy, see Yip (1994).

See Ansoff (1967).

The concept of core competencies was outlined by Hamel and Prahalad (1990), but the seminal reference is perhaps Wernerfelt (1984), who characterizes the firm as a unique bundle of tangible and intangible resources. This 'resource-based' view of the firm has lately won considerable attention in the fields of strategic management and organization theory. Whether the focus is on competence, capability, knowledge, or assets, the basic idea is similar in its emphasis on the internal aspects of the firm, rather than the search for openings in the competitive market place as suggested by the industrial organization paradigm (see Porter, 1980). For other references on competence and capability see Barney (1990), Teece et al (1990), Leonard-Barton (1992, 1995), and Quinn (1992).

The view of the strategy process as consisting of 'formulation and implementation', is generally referred to as the planning school. For an outline of this approach, see Mintzberg, 1978. Scholars who may be considered as proponents of this view include Chandler (1962), Ansoff (1967) and Porter (1980). Those regarding it as a formation process are sometimes referred to as belonging to the incrementalist school (see Johnsson, 1987). Strategy is seen as a process that evolves over time; it is not always clear to management from the beginning why specific actions are taken. Strategy is realized only afterwards as a pattern within a stream of actions (Mintzberg, 1978). For some scholars adhering to this school, see Mintzberg and Waters (1982, 1985), and Pettigrew (1985). A more detailed discussion of the different perspectives can be found in Stein (1993).

See Porter (1986), and Bartlett and Ghoshal (1989).

See Bartlett and Ghoshal (1989) for a discussion of how and why some MNCs used other strategies than those which would seem natural in view of their specific industry environment.

See Weick (1969/1979), and Pfeffer and Salancik (1978) for a discussion of the enactment concept.
Perlmutter (1969) originally made the distinction between these attitudes toward international business operations, including also a third - geocentrism - which is discussed in note 65 below.

Ibid.

See Bartlett (1986).

For definitions, see Stopford and Wells (1972). Also see Martinez and Jarillo (1989), Hedlund (1993a), and Ghoshal and Westney (1993) for a summary of research on the organizational development of the MNC.

See Stopford and Wells (1972), and Franko (1976).


See Williamson (1975).

Ibid.

For a discussion of how DuPont and General Motors developed the M-form during the 1920s, see Chandler (1962).

See March and Simon (1958), and Cyert and March (1963), for the concept of bounded rationality. Williamson (1975) discusses the shift from the U-form to the M-form.

See Lawrence and Lorsch (1967) for a discussion of 'differentiation-integration', and Prahalad (1975) for an application of this framework on the multinational company.


Ibid.

Ibid.

Ibid.


See Davis and Lawrence (1977).


Ibid.

Veckans Affärer nr 2, 10 January, 1985.


Veckans Affärer nr 2, 10 January, 1985.

Glete (1983: 78-79) mentions the detailed instructions sent to foreign subsidiaries.

64 This observation is consistent with the new and more speculative models of the MNC. Bartlett and Ghoshal (1989) specifically refer to the transnational as an integrated network characterized by dispersion, specialization, and interdependence. Hedlund (1986) characterizes the heterarchy as multi-centered, and emphasizes the increased reliance on foreign subsidiaries, and the variety of their strategic roles.

65 Geocentrism was Perlmutter's (1969) third attitude toward international business, in addition to ethnocentrism and polycentrism. In the geocentric multinational, the organization was increasingly complex and characterized by interdependence. Decision-making was based on a collaborative approach between headquarters and subsidiaries. It was seen as important to find standards for control and evaluation that applied both nationally and globally, and thus executives could be rewarded for reaching local as well as world wide objectives. Communication flowed throughout the entire system, and chief executives of subsidiaries were part of the top-management team. The company was truly international, but it still identified with national interests, and it developed the best person anywhere for critical positions everywhere in the world.
CHAPTER 4

MANAGING THE STIMULUS PHASE

Introduction

In this chapter we will focus our attention on describing and analyzing the stimulus phase of the innovation process. It is our intention to describe where the IIPs were created, organizationally and geographically, and to analyze the logic or reasons behind it. We will seek to answer four general questions. First, why did the firms start searching for or run into the new concepts, i.e., what was the origin of the new product? Second, where did they look and what factors guided or restricted them in their search? Third, how was the process conducted? Fourth, who were promoting the IIPs? The impact of the organizational architecture will be discussed throughout the chapter.

We will save for the following chapter the question of why the companies decided to form international projects. Thus, the main objective of this section is to understand how and why the idea underlying the IIP arose at all. Before turning to the different stimuli behind the four international innovation projects included in the study, we also need to describe the milieu in which they were formed. Since we have previously considered only the general and overall aspects of ABB and Electrolux, it is appropriate at this point to describe the more detailed background and organization of the individual units to which the different projects belonged.

Background and Stimulus

Alliance

Soon after Electrolux had acquired the US household-appliance firm White Consolidated Inc. (WCI), it became obvious to management that the differences between the
US and the European markets were substantial. In general, price and brand name had been the leading competitive weapons on the North American market, while quality and superior performance had been secondary, at least by European standards. This statement is especially true of "wet products" (dish washers, washing machines, and dryers), particularly washing machines (washers). In Europe, the horizontal axis (horizontal tub/drum) technology was most common; some 75% of all machines were so called "front-loaders", whereas the remaining 25% were "top-loaders", which dominated the French market. In North America and South East Asia, however, the vertical axis (vertical tub/drum) technology held some 98% of the market, all these washing machines were "top-loaders". The different technologies are illustrated below.

![Fig. 4.1: Washing machine technologies](image)

The two basic concepts for washing machines had been developed in parallel in the USA during the 1930s. Previously, most laundry had been done manually or in hand-driven machines. The horizontal-axis technique had been developed by White, on the basis of patents acquired from Westinghouse and Bendix, whereas the much larger companies General Electric and Whirlpool were the principal users of the vertical-axis technology. Gradually, White had patented its technology to an extent that made it almost impossible for their competitors to copy the horizontal concept. As a result, a competitive war had broken out between White and General Electric/Whirlpool. White lost the fight over the North American washer market but continued to manufacture the front loader in small quantities.
White also sold some of its patents to the Italian car manufacturer FIAT after the Second World War.

In 1958, Zanussi obtained these patents from FIAT and began developing the horizontal-axis machine that later would become the dominant design on most European markets. On this continent, the fight between the two technologies had been a national or regional one rather than a Pan-European battle. It had taken some time before the horizontal axis washer overshadowed the vertical-axis machine in terms of overall European market share. Moreover, in Europe a new type of machine had begun to gain market share - a so called washer/dryer. In this combo-machine, which originally had been developed by German companies in the 1970s, it was possible to wash as well as dry the clothes without touching the wet laundry in between. The dryer, however, could merely handle half as much laundry as the washer. This combination was only feasible with the horizontal-axis technology, since drying requires tumbling, and the agitation of the vertical-axis machine does not suffice. A final difference between the two continents was the sheer size of the washer. In general, the European machine was smaller, in terms of volume, water fill, and maximum load size, than the North American one. However, in terms of actual load size, the difference between the laundry habits of the average North American and European consumer was almost negligible.

In addition to the disparate basic technological solutions and related variations, three other noteworthy differences existed between North America and Europe. First, it was a well known fact that in the USA detergent producers were far more powerful than the household appliance companies. The opposite can be said about the situation in Europe. Affected by massive TV-advertising, people in North America had been led to believe that the most important factor in getting their laundry really clean was the detergent, not the washing machine. Therefore, the detergent producers received all the complaints when the laundry was not clean enough, and all the good-will when results were satisfactory. Consequently, there had been little pressure on the North American household-appliance manufacturers to refine their technologies. They believed that any improvements would be associated with detergent producers, and accordingly that people would not be willing to pay premium prices for more sophisticated, high-performance washing machines.

Second, the household-appliance companies were weak not only in relation to detergent manufacturers, but also in comparison with wholesalers and retailers. Distribution and sales of household appliances were relatively fragmented in Europe, with the exception
of the United Kingdom, France, and Germany, where chain stores like Quelle had started to become more powerful. The North American situation was completely different. Particularly in the USA, the market was far more concentrated. As can be seen in the figure below, Sears was the dominant actor and naturally had considerable bargaining power in relation to the washing-machine producers. Since access to the mass market was important, the company often had a substantial influence on specifications not only for their private, low-price brands, but also for other machines.

![Figure 4.2: Market shares of distribution outlets for washers in the US](image)

Third, washers were much cheaper in the USA than in Europe. US prices had hardly increased at all during the 1980s. The CPI (consumer price index) rose by 24% between 1983 (computed as an average of 1982-84 prices) and 1989, whereas laundry equipment prices merely increased by 5.9%. The difference in price levels between the two continents was due more to the competitive situation than to technological differences. At the same production volumes, horizontal-axis washers were not more expensive to manufacture than the vertical-axis ones. In fact, the horizontal-axis “front-load” machine would be the least costly to produce, as less material and fewer components were required.

Nevertheless, from the table below it can be estimated that the average US purchaser of a new washer in 1989 spent 408 dollars. In Europe, the average purchaser spent a sum ranging from 600 to 850 dollars (in 1989 prices), depending on nationality, Sweden and Germany being high-end markets and countries like France and Italy having more of a low-
end focus. As one Swedish Electrolux top manager put it; “In the development of a new washing machine for the US market, three parameters are important - Cost, Cost, and Cost!”

![Figure 4.3: Level of prices for laundry washers in the US in 1989](image)

When Electrolux took over White Consolidated Inc. in 1986, the latter’s position on the North American washing-machine market was not very strong. Management realized that the company was not making any money because it was too small in relation to the competitors and did not have the volumes to reach economies of scale in production, marketing etc. WCI had never fully recovered from the fight it had lost 40 years previously. The company produced some 20,000 front-loaders in Mansfield, Ohio, the only front-loaders that were manufactured in the USA. However, according to Electrolux’ Italian experts, these washers were “machines of the past”.

Like all other US producers, White’s focus was clearly on top-loaders. Large-volume products were produced in Webster City, Iowa, and small-volume products in Mansfield. Furthermore, the multi-product Cambridge plant near Toronto, Canada, where refrigerators were also manufactured, produced some 60,000 top-loaders (approximately 1/10 of total WCI USA washing-machine production). There were also wet-area operations at Kinston, North Carolina, and Connersville, Indiana, where dish-washers were manufactured. The market was still dominated by Whirlpool, General Electric, and Maytag. Electrolux products were sold under four different brands (Frigidaire, White Westinghouse, Kelvinator, and Gibson). The
firm also reached some 3.5% of the market as suppliers to the dominating Sears brand (Kenmore). The market shares for washing machine producers in 1989 are presented below.

![Market share chart](image)

**Figure 4.4:** Market shares for washers in the USA in 1989 (Kelvinator and Gibson had market shares of 0.8% and 0.7%, respectively)

To improve results quickly on the North American market, Electrolux needed to take radical steps. Top management believed that the European washing technology, which had undergone continuous improvements during the last twenty years (e.g., recirculation "Jet-system", washer/dryer, and high spinning speeds), was superior in terms of most performance variables. An internal evaluation of the performance of the two technologies can be seen in Table 4.1 below.

In addition, in view of the increased environmental awareness in the USA, the horizontal-axis concept was better able to meet new government regulations that were anticipated in the near future. Thus, top management identified an opportunity to increase market share in North America by transferring technology from the Italian base in Pordenone to the USA. The problem was that the US market did not seem to reward technical supremacy. Managers from WCI USA argued that consumers wanted a big, low price machine, of a brand which they recognized. Despite rising concerns over water supply and consumer loyalty, supported by the advantage of space efficiency, sales of the existing front loaders had declined since 1980. The decrease was principally due to poor quality, price
resistance and the introduction of full-size top-load laundry centers (including a dryer built in above the washing machine). However, once people had bought a horizontal axis front-loader they generally continued to prefer this solution. The company even kept a file popularly called “letters from old ladies in love” where letters from satisfied customers were collected. Despite initial resistance, European top managers were convinced that the advantages of their technology were so great that they ought to enter the North American market with a high-performance horizontal-axis machine.

<table>
<thead>
<tr>
<th>Performance variable</th>
<th>Vertical tub</th>
<th>Horizontal tub</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washing characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Washing bath</td>
<td>Large quantity of water</td>
<td>Limited quantity of water</td>
</tr>
<tr>
<td></td>
<td>25/30 liters/kg</td>
<td>4/10 liters/kg</td>
</tr>
<tr>
<td>- Water/load ratio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Washing temperature</td>
<td>Up to 60°C (140°F)</td>
<td>Up to 90°C (200°F)</td>
</tr>
<tr>
<td>- Mechanical agitation</td>
<td>Strong</td>
<td>Gentle</td>
</tr>
<tr>
<td>- Detergent concentration</td>
<td>Low (0.1-0.2%)</td>
<td>High (0.5-1.0%)</td>
</tr>
<tr>
<td>- Manual pre/post treatment</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Washing results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Soil removal</td>
<td>0/+</td>
<td>++</td>
</tr>
<tr>
<td>- Uniformity of results</td>
<td>0</td>
<td>++</td>
</tr>
<tr>
<td>- Sand removal</td>
<td>Drum better than agitator</td>
<td>Drum better than agitator</td>
</tr>
<tr>
<td>- Whiteness retention</td>
<td>0</td>
<td>++</td>
</tr>
<tr>
<td>- Rinse efficiency</td>
<td>0</td>
<td>++</td>
</tr>
<tr>
<td>- Water removal</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>- Gentleness of action</td>
<td>0</td>
<td>++</td>
</tr>
<tr>
<td>- Tangle-free action</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Consumption/Duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Electricity (kW)</td>
<td>3.5 - 4.0</td>
<td>1.5 - 2.0</td>
</tr>
<tr>
<td>- Water (gallons)</td>
<td>40 - 50</td>
<td>25 - 30</td>
</tr>
<tr>
<td>- Detergent (grams)</td>
<td>100 - 120</td>
<td>40 - 50</td>
</tr>
<tr>
<td>- Program duration (min.)</td>
<td>35 - 45</td>
<td>50 - 55</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Balancing during spin</td>
<td>-/+</td>
<td>++</td>
</tr>
<tr>
<td>- Noise level</td>
<td>0/++</td>
<td>++</td>
</tr>
<tr>
<td>- Potential evolution</td>
<td>Limited</td>
<td>Greater</td>
</tr>
</tbody>
</table>

Table 4.1: Internal Electrolux comparison of washing techniques

In January 1987, Mr. Leif Johansson initiated the “Z” project (Z standing for Zanussi), in which the main goal was to improve the technique of the drive system of the front-loaded 27” washer, since it had become obsolete, by the existing standards of the European technique. Among other results, the drum of the old White horizontal axis washer would now
be able to rotate both ways, thus reducing the wrinkling of clothes. In many respects, this first effort to upgrade the WCI washing machine was a “face lift". The number of components were to be reduced, washing and rinsing performance improved, water consumption lowered from 120 to 90 liters, and detergent consumption from 70 to 45 grams. It was also believed important to reduce operational noise; this objective was attained by removing the mechanical transmission. Perhaps most important, energy consumption was improved by some 40-45% to 23 dollars (with electricity) and 10 dollars (with gas) per year for an average user. For top-loaders the best rated energy cost was 52 and 21 dollars, and the poorest rated cost 144 and 51 dollars, respectively. Personnel from the Italian subsidiary worked with US colleagues from Ohio. To a large extent, existing European suppliers were involved in the effort.

In late 1988, production of the “Z" washer was soon to start in Mansfield. By this time, a massive investment plan had been prepared for Webster City to take over all large-volume products (agitator washers, dryers, 27" laundry centers) and to transfer niche products to Mansfield. However, Mansfield was gradually becoming an inefficient plant, and Group management wanted to shift manufacturing of niche products, including the “Z-washer”, from the Mansfield facilities to Connersville. The Swedes and the Italians began to fear that the “Z-washer” would “die in exile”. Their apprehension was partly due to the fact that it had been put into production at the increasingly obsolete Mansfield plant, but also to the lack of commitment by US management to the horizontal-axis technique and to the “Z-washer”. The Americans still had difficulty understanding why they should employ a technology that had virtually gone out of use some 40 years ago, and that their domestic competitors apparently rejected. Therefore, although the "Z" project had turned out to be a success from a technical point of view (the goals in terms of time to market and performance improvements had been reached), the future of tumble washers was still unclear.

With the “Z-washer” almost ready for market introduction, but no solid backing established, it was necessary to look carefully at the next step. During a trip to the USA and Canada in 1988, three European top managers - Folke Andersson, Vice President R&D, the Italian subsidiary manager Aldo Burello, and the Wet product area manager Hans Stråberg - held discussions with the North Americans concerning the potential for tumble washing machines. Their joint conclusion was that a unique opportunity to rejuvenate the industry existed. The overall objective should be more than to double market share from 11.8% to 25% in the USA and from 6% to 15% in Canada by 1994/95. In the USA, the target for
tumble washers was set at 5-7%. With the present and planned investments at Webster City, it was considered realistic to aim for 18% of the US market in 1992. Top management asserted that the target could be attained without overly upsetting competitors. Using a “Pac-man” approach, the company planned to take a little piece of competitor business here and there. The campaign was launched under the concept “No 2 ’92” (behind Whirlpool). However, in addition to all the practical problems to be resolved, it was still uncertain whether the commitment of US management to the “No 2 ’92” concept could be obtained. To exceed these targets would mean a head-to-head confrontation with GE and Whirlpool; the latter had such a solid position (a 53% market share including sales through Sears, according to Electrolux people) that it would be unrealistic to hope to threaten them in this way. To be able to reach the targets set, management thought it crucial to capitalize on changes in three areas:

1. New consumer demands
2. Increasing market segmentation
3. New technologies in which a competitive advantage could be achieved

As much as 25% of the US population were living in areas where the use of phosphate was banned, and a considerable proportion was living in parts of the country where water supply was limited. The "National Plumbing Fixtures Efficiency Act", if approved, would specify maximum water-usage standards from 1992 on, and thus directly affect washers. At this time, Electrolux management believed that markets were becoming increasingly segmented, and that each niche would require products with different attributes. The challenge for Electrolux would be to create new segments without "cannibalizing" the present washing line. Consequently, in the preliminary plans for future development of a new tumble washer and a combo machine, these products should not be regarded as competitors to the agitators. Instead, they were to be seen as useful complements that would create new demand and open up new niches in the upper segments.
The idea behind a new product area at Electrolux, Home Comfort, had emerged by the end of 1988. Amron, an earlier copier of Electrolux washing machines, approached the company in late October that year with the idea of Electrolux selling Amron air;cleaners. Mr. Jerker Adeberg, who held a master's degree in business administration, had previously worked with water cleaning in the small appliances and was given the task of investigating how these products could fit the product portfolio of Electrolux. While the company never adopted any of Amron's products, Mr. Adeberg began to see a new concept centered around clean air and clean water. The increasing environmental awareness in Europe and the USA was believed to provide new and promising opportunities, and together the two continents would form a larger market that would justify the joint approach. In December of the same year, Mr. Adeberg approached Mr. Leif Johansson and Mr. Anders Scharp with a memo in which he presented the possibilities for the new approach. A number of products, initially, could be regarded as “environmental”:

- Water purifiers
- Air humidifier
- Air dehumidifiers
- Air cleaners
- Air conditioners
- Portable heaters
- Fans
- Disposers

Electrolux was knowledgeable on some of these products, whereas others, notably air dehumidifiers and humidifiers as well as air cleaners and, to a certain extent, water purifiers, demanded more research. Mr. Adeberg's proposal that the company continue investigating the market potential and feasibility of the Home Comfort concept was approved by top management.

Early 1989, Mr. Adeberg called a task-force meeting on the future of environmental products. Most participants were Swedes from related departments, but a representative from the Marketing Europe group was also invited. The main purpose was to discuss experience, evaluate feasibility (in terms of distribution- and product technology), and if necessary assign a task force for a deeper market study of environmental products. The overriding question was whether Electrolux should group these products together for a joint approach. The results of the meeting were positive, and it was followed by a new meeting with country managers, in which few negative points were also raised. The question was now; Environmental products - for what and for whom?
Mr. Adeberg decided to concentrate on the consumer's primary environment. At this time, a major industry analysis was undertaken as part of the EXEC-program, Electrolux’ management development program. Major market segments as well as distribution channels were studied so as to identify consumer patterns and sources of profitability. Market volumes and trends were estimated for the major geographical markets, and conclusions were drawn regarding market structure, products available, and competition.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Market structure</th>
<th>Products offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Air Cond.</td>
<td>Structured market</td>
<td>- Old products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- New portable units</td>
</tr>
<tr>
<td>2. Dehumidif.</td>
<td>Structured markets</td>
<td>- Few producers</td>
</tr>
<tr>
<td>3. Humidif.</td>
<td>Low Cost/Far East</td>
<td>- Structured</td>
</tr>
<tr>
<td>4. Air Clean.</td>
<td>Unstructured market</td>
<td>- Different methods</td>
</tr>
<tr>
<td>5. Water Pur.</td>
<td>Unstructured market</td>
<td>- New segments</td>
</tr>
<tr>
<td>6. Disposers</td>
<td>Structured market</td>
<td>- Few producers (US)</td>
</tr>
<tr>
<td>7. Water heaters</td>
<td>Unstructured global market</td>
<td>- Local business</td>
</tr>
</tbody>
</table>

Table 4.2: Market structure and competitive situation for selected home-comfort products

The general findings of the analysis suggested that Home Comfort represented a mix of products that no other firm was able to present. According to Mr. Adeberg, it was obvious that considerable structuring was required. The differences and synergies among the products were evident in the application segmentation as well as in the major division air/water. Other important differences could be found in the distribution structure, installation and service, phase in the life cycle etc. It was anticipated by management that the Home-Comfort area could become a success in the 1990s.

The proposed approach was to form a new product area for Home-Comfort products. The main aim was to focus on product and production technology, as well as the distribution and application aspects of marketing. It was emphasized that the “total approach” was extremely important in this new and unstructured market. Moreover, management believed that the firm was in a good position to concentrate production and know-how to a single solid base. The Castellbisbal factory in Spain, where excess manufacturing capacity existed, was
considered as this future base. However, so far the HC product area had no factories of its own. As for the product range and manufacturing in the different product areas, management proposed that new air conditioners and dehumidifiers be produced at the existing facilities in Edison, N.Y. However, it was also suggested that the Castellbisbal unit could further develop a European concept with technology from Sharp or elsewhere. Humidifiers were to be sourced externally, whereas production of air cleaners was to be transferred from Amal in Sweden to the Castellbisbal factory, with licensing from Sharp/Sanyo or sourcing. As for water purifiers, products in the small-appliance area were to be supplied by the factory in Stromstad, Sweden, but sites in Venezuela, the Philippines, and India were also considered. Castellbisbal was to become the new supplier once new products had been introduced by the end of 1990. The Anaheim manufacturing site in the USA was also anticipated as the base for new water cleaning products. Disposers were to stay in production in Anaheim, whereas the situation for water heaters, which were produced in Forbach and Castellbisbal, seemed uncertain.

Although the suggestions for the future were clear and straightforward in many respects, Mr. Adeberg still believed that some areas were worth exploring more thoroughly. First, it was essential to understand more about the endusers. For instance, how and where should they be able to buy the Home Comfort products? Where should distribution, production, and marketing start? What segments should be approached - how should the products be positioned? Second, what about the future distribution strategy? How should the products be installed and packaged? Third, what was the competitive situation in each specific local market? Fourth, how should the internal flows within Electrolux be managed? What was to be the structure of production, distribution, sales, and other operations? The business area was expected to develop from a limited range of products with sales of SEK 2.5 billion in 1990 to a full product range with SEK 5-10 billion in sales by the turn of the century. Finally, he believed that a more specific time schedule and plan were needed with regard to approach, costs, resources, etc.

In February, 1990, Group management decided to initiate a major project to evaluate the possibilities for entering the new market. While included in the original concept, water heaters had been dropped by this time. Clean Air encompassed air conditioners, dehumidifiers, and air cleaners. Clean Water was restricted to water purifiers. From March to May 1990, fact-finding research was conducted in six countries: Italy, Spain, France, Germany, the UK, and Sweden. Results were presented to Group management in May, 1990, and by July 1 the decision to enter the new product area had been formally taken.
Apart from annual budget meetings, three other major co-ordination vehicles were to be used to manage the new business: the Business Area Board (BAB), the Product Area Board (PAB), and the Product Council (PC). BAB was to meet once a year and comprised representatives of the different product areas and product divisions involved, as well as central marketing management and Home Comfort managers at the country level. This board was specific to HC, because of the special importance given to the total HC concept. Mr. Adeberg emphasized that it was vitally important to assure the commitment of all personnel involved. Commitment would be developed through discussions over product-line boundaries.

The PAB was to meet three times per year. Co-ordinated centrally from Stockholm, it would include personnel from the two product lines of water purification and air conditioning. In the case of water purification, participants would represent facilities in Spain, the Philippines, Venezuela, and the USA, whereas in air conditioning they would come from Spain and the USA.

The most elaborate co-ordinating device, the PC, was to meet three times a year, with a fixed agenda: one hour would be devoted to general market and market-share trends and competitor action, and one hour to product-division performance, such as volume, as well as to Group projects, financial results, etc. Finally, a one-hour factory visit was mandatory, in addition to discussions of two to four hours on product development, local and common projects, and future investments. The Product Councils were to consist of local product-division management, product-area management, central marketing management, and the central design department. Their main objective and their organizational responsibility were to evaluate new product development projects in terms of the overall strategy for the product line. Their responsibilities also covered the monitoring of ongoing projects for compliance with targets relating to: performance, investment, cost, time schedule, etc. The PC was also to decide on the three-year rolling R&D project plan.

In addition to these committees for overall co-ordination, a HC working group was formed. This group included Mr. Adeberg, Mr. Olof Sjöborg (marketing, HC), and Mr. Kari Gustafsson (R&D, HC) from Stockholm. HC responsibles from France, Italy, Spain, the UK, and the USA were also appointed, as was one representative from Marketing Europe.

At this time, Electrolux had only one product for water purification, the Aqua Guard, which had been acquired from a domestic firm in 1982. The product by no means represented the solid foundation necessary to provide one of the two pillars on which Home Comfort was to
stand in the future. However, almost all the existing products in the marketplace suffered from distinctive problems. In short, the cheaper models for households, using active carbon filters, anion/cation filters, distillation, ultraviolet light, ozone, or combinations of these technologies, produced too little water, and the quality of the water was unsatisfactory. On the other hand, the most effective technology, reversed osmosis, was mainly used in large industrial facilities (and in some commercial products on the North American market). Although the future of this technology appeared promising, many believed that commercialization for a consumer market would be difficult; the problems related to decreasing both size and price while maintaining a high performance capacity. Accordingly, there seemed to be opportunities for a firm that could provide a better machine.

The idea to develop a new water purifier was conceived in the small appliance department in the mid 1980s. One of the researchers, Mr. Per Markus, had been talking about a "third tap", a tap that always produced clean water. As noted earlier, in the 1980s the environmental awareness had been growing, and during a trip to the USA, Mr. Adeberg had noticed an increased demand for products that produced clean water. The major objection to drinking tap water was the bad taste and the smell of chlorine. In addition, consumption of bottled water was booming.

Meanwhile, Mr. Peter Hagquist at the Research & Innovation department (RI), a central research unit, was considering the opportunities which a new water purifier could provide for the firm. Mr. Hagquist had also heard of "the third tap" concept and had devoted some time analyzing the technologies available. Mr. Hagquist, who held a master of science degree in industrial economics, had been employed at Electrolux since 1987. He had previously met with Mr. Adeberg through their common involvement in the small-appliance area. At the same time, Mr. Hagquist was in charge of a project to develop another water purifier, the GW 130. However, this product was based on a more traditional filter technology and was primarily aimed at the middle- and low-end segments. The new product was planned for production in Spain and the Philippines.

The technology linked to the anticipated market trend became known to the firm almost by accident. One of the employees at RI had experienced problems with the quality of the water coming from the well at his summer house during his 1988 vacation. He approached a consultant, Mr. Åke Hellkvist, who solved the problems by using the reversed-osmosis technology. (Mr. Hellkvist was later retained by Electrolux as a full-time consultant. However,
he never joined the company.). Mr. Hagquist, who by now had moved to the New Products
department, a new central research unit focused on the development of new products, happened
to hear about this idea. Some time later, he met with Mr. Adeberg, who was now in charge of
the formation of HC. They decided to work together on developing a new water purifier.
However, Mr. Hagquist did not want to become a part of the HC organization, as he feared that
development efforts would be crushed in a line and staff type of organization. According to Mr.
Hagquist, the only possible type of organization for this type of activity was a relatively
autonomous and tightly knit project. They agreed that it was better to approach the task from
two angles, Mr. Hagquist would provide the technological contribution with the backup of New
Products, and Mr. Adeberg bring market know-how to bear, utilizing the resources of HC.

Holger

At the outset of the 1990s, ABB Process Automation was one of the world’s largest
suppliers of Distributed Control Systems (DCS), products, and services (systems for the control
of industrial processes). The business area, which belonged to the Industry segment of ABB,
designed, manufactured, and marketed/distributed control and information-management
systems, on-line measurement and control systems, weighing and force-measurement systems,
as well as flatness-control systems. They also offered application and engineering services.

When ASEA and Brown Boveri merged in the autumn of 1987 and formed ABB, the
new company found itself with two DC systems. For survival, management felt it necessary to
limit the company to only one system. The decision was taken to keep the Swedish “Master”
system, which was regarded as more complete and covered more markets. About two years
later, when ABB acquired the US company Combustion Engineering, the firm once again had
two DC systems. However, this time management considered the two systems more
complementary in terms of geographical market coverage and industrial-segment positioning.
Therefore, they decided to retain the American “MOD 300” system, which had been developed
by Taylor (a company which Combustion had acquired some years earlier).

In fact, very few Americans had ever heard of the ABB system, and the same was true
for the MOD system in Europe. Competition in the industry was regional. Taylor’s involvement
in process-automation development had traditionally been geared to the areas of chemistry and
industrial-process control. ABB, on the other hand, was basically an electrical-engineering
company and thus more focused on these applications. According to some, this difference was also reflected in the respective design, documentation, and terminology of MOD and Master. As noted above, the competitive situation in the industry for distributed control systems is best described as regional. European companies dominated their continent, US firms ruled in North America, and Japanese firms with small exceptions covered the Asian markets. However, the leader, the American company Honeywell, was as large as ABB Process Automation in Europe. The market shares for the leading firms are displayed below.

![Market shares for major competitors in the DCS industry](image)

**Figure 4.5:** Market shares for major competitors in the DCS industry

The world market for industrial-process-automation systems was estimated at some 6.6 billion dollars annually (the market includes hardware, software, project and maintenance services), and the annual growth rate was anticipated to be in the area of 5%. The geographical distribution of the major market regions is displayed below.

![Geographical distribution of the DCS market](image)

**Figure 4.6:** Geographical distribution of the DCS market
In North America, some 87% of the market was represented by the USA. A break-down of the European market, where Germany was dominant with a 37% share of the customers, by country and region is presented in the figure below.

Figure 4.7: The European DCS markets by country and region

The market for DC systems could also be described in major customer segment terms. The respective percentage represented by the largest customer groups in Europe and North America is outlined below. (A weighted average of the percentages of each continent is used. The main differences between the two continents was that in North America, Chemical and Pulp & Paper were larger customer segments than in Europe, where Power and Petroleum applications were more prevalent.)

Figure 4.8: The DCS industry by major customer segments in Europe and North America
In the late 1980s, the ABB business area was headquartered in Stamford, Connecticut, where people responsible for product strategy, manufacturing, finance, and marketing were located. However, the main manufacturing and development centers were located in Baden (Switzerland), Mannheim (Germany), Västerås (Sweden), and Rochester (USA). Each unit had its own development organization. Of the total number of researchers employed, some 50% were located in Sweden, 18% in Germany, 6% in Switzerland, and 26% in the USA. In addition to the development of DCS platforms, these units, with the exception of Mannheim, were responsible for application development. The basic organization of this business area (BA) is illustrated below.

<table>
<thead>
<tr>
<th>Business Area</th>
<th>Development Centers</th>
<th>DCS Platform Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPA</td>
<td>Baden Switzerland</td>
<td>Västerås Sweden</td>
</tr>
<tr>
<td>Industry Process Automation</td>
<td>Mannheim Germany</td>
<td>Rochester NY, USA</td>
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<tr>
<td>Product Strategy Manufacturing</td>
<td></td>
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<tr>
<td>Finance Marketing</td>
<td>Baden</td>
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</tr>
<tr>
<td>Stamford, CT</td>
<td>Västerås</td>
<td></td>
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</tbody>
</table>

Figure 4.9: Organization of ABB Process Automation

After ABB had acquired Combustion Engineering, it became clear to management that the company could not continue with two partly outdated systems. Master had been introduced in 1983, and MOD, two years later. According to the R&D managers, the product life cycle of a process-automation system is approximately ten years. Thus, it was time to develop a new system. In fact, the Swedes had already been developing a new one on their own for some time.

Several groups and committees within ABB, as well as external consultants, were assigned the task of evaluating the platforms and suggesting what could be done about a future system. People claimed that this work was facilitated by the fact that Master and MOD were at the same stage of the product life cycle. The Swedish and the US units were in desperate need of a new platform. One problem, however, was that consequently both parties had already
started planning for new systems on their own. In this respect the Swedes, whose plans were more specific, had an advantage compared to the Americans.

This time was not the first instance of co-operation between the former ASEA and Taylor units. In 1983, when MOD 300 and the Master system were under development, ASEA had tried to acquire Taylor, then a part of the Cibron company. At that point, the current president of platform development in the USA had spent much time with the ASEA people in Sweden, sharing ideas and testing different solutions. Eventually, ASEA did not acquire Taylor. However, some held that as a result of the co-operative development efforts, MOD and Master showed similarities in certain respects. Moreover, according to the US R&D manager, many of those with whom he had collaborated in 1983 were still working at ABB. On the other hand, others claimed that the similarities between the two systems were negligible.

**M2000**

Headquartered in Zurich, Switzerland, ABB Motors, a business area belonging to the Others segment, was one of the world’s leading manufacturers of low-voltage A.C. motors. These electrical motors are used in fans, pumps, compressors, lifting and transport equipment, as well as in mines, pulp-and-paper plants, steelworks, processing plants, and other heavy industries. Drawing on over a century of experience in the manufacturing of electrical motors, in 1990 this business area employed some 3750 people, and annual sales amounted to 370 million US dollars. At production facilities in Europe (Denmark, Finland, France, Germany, Spain, and Sweden), Asia (India and Indonesia), Latin America (Mexico and Venezuela), and Australia, ABB Motors manufactured a range catering to virtually all applications requiring outputs between 0.18 kW and 500 kW. The product range included:

- Three-phase motors
- Marine motors
- Single-phase motors
- Special designs
- Brake motors
- Safety motors

The world market for electrical motors in the range of 0.2-500 kW had experienced a steady annual growth of 1-2% in the OECD-markets in recent years. No real substitute products existed, and the market was highly competitive, with high entry and exit barriers. Further, the market in Europe was fragmented, and many believed that the years to come would bring
increased concentration because of new possibilities for economies of scale. The world market was estimated at some 8.7 billion US dollars, of which the West European markets accounted for approximately 25%. A breakdown of annual sales for the major West European markets can be seen in the figure below.

![Pie chart showing sales of electrical motors in Western Europe per country](image)

**Figure 4.10:** Sales of electrical motors in Western Europe per country

ABB was the largest electrical-motor manufacturer in Europe, and as shown in the figure below, all major competitors were also European companies. The reason was that standards for motors were totally different in the USA and Europe. Therefore, no firm had yet tried to utilize cross-Atlantic synergies.

![Pie chart showing European competition in the electrical motor industry](image)

**Figure 4.11:** European competition in the electrical motor industry
Of the total annual sales of ABB Motors, products manufactured in Finland accounted for some 25%, the former ASEA units (Sweden, Denmark, and Spain) for approximately 40%, and the former BBC units (France and Germany) for the remaining 35%. As can be seen below, the different units of ABB Motors historically had somewhat varying ranges of specialization in electrical motors. The scope of catalogue electrical motors, i.e., standardized motors, ranged from 63 to 400 IEC. Further, smaller and mid-range motors were of an aluminum type (Al), whereas the largest motors made of cast iron (Cl). Traditionally, the Nordic units were fairly specialized. Denmark had focused on small Al motors, Sweden on mid-range Al motors, and Finland on the larger Cl motors. The former Brown Boveri units and Spain were not equally specialized. Spain and France primarily produced small and mid-range motors, whereas Germany had a greater focus on larger sizes.

<table>
<thead>
<tr>
<th>IEC</th>
<th>Spain</th>
<th>France</th>
<th>Germany</th>
<th>Denmark</th>
<th>Sweden</th>
<th>Finland</th>
</tr>
</thead>
<tbody>
<tr>
<td>63</td>
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*Figure 4.12: Product range for the different units within ABB Motors*

It is also worth mentioning that the Nordic facilities were more modern in terms of production equipment. Moreover, these units were profitable. In terms of market shares in the different ranges, ABB Motors had 10% of the market for small Al motors and held a leading position in large Al motors, with some 20% of that market, as well as in Cl motors, in which the company estimated its market share at approximately 30%.

To gain market share, it was important to meet a number of critical market requirements. According to ABB Motors management, the following three were primary: a) on-time delivery (service level 100%), b) a competitive price, and c) high performance/efficiency - low noise
level. Virtually all purchasers of electrical motors belonged to four major market segments: original-equipment manufacturers (OEM customers), end-users, distributors, and service companies. Another way of viewing the market is to categorize the different motor types by degree of standardization. The following graph provides a rough illustration of the different motors and their market size in different ranges.

![Figure 4.13: Standardization in the electrical-motor market](image)

After the ABB merger, management realized that this business area suffered from working with three basic designs: the original ASEA design, the BBC design, and the Strömbergs design (the Finnish company that ASEA had acquired prior to the merger with BBC). However, there were also substantial differences in design even within the former ASEA and BBC units. As a consequence, it was more difficult to reach economies of scale in a number of areas. Furthermore, the manufacturing structure was not optimal; there was too much overlapping production within certain ranges. Also, most designs were in the late stages of the
product life cycle. In view of the anticipated consolidation of the industry, action had to be taken.

In this situation, the business-area manager decided to initiate a project as part of an internal ABB executive education program in 1989. The principal objective of this project was to evaluate the feasibility of developing a common design for cast-iron engines. After initial success, the objective was changed to finding a common design for all motors. The first subsequent analysis was favorable, and it was decided to intensify the effort to develop a common motor design.

**Market pull or Technology push or...**

The process by which a new product idea is created is generally described as a response to signals of "market pull" or by "technology push". The first type of stimulus is that of new customer demand, which induces the firm to start development, whereas the second type suggests that new technologies open the way for innovation. However, this view has been criticized for missing the important point that most innovations are the product of the interaction between market needs and technological opportunities. Even with this modification, however, we believe that the notions of pull and push, in this context, are far too rationalistic and simplistic as explanations for the emergence of new products.

For a number of reasons, neither the two Electrolux nor the two ABB cases easily lend themselves to a simple market-pull or technology-push description. First, we believe that the entire idea of a pull-push situation is somewhat misleading, in suggesting that the firm is surrounded by new and obvious signals from its environment. This approach largely neglects the fact many innovations are the result of proactive search and enactment of the environment. In fact, even the term "stimulus" is slightly dubious. It would perhaps be more appropriate to refer to the search, creation, or enactment phase.

Second, to judge from our cases, it also seems as if the stimulus phase is governed by a logic much more complex than the simple one of technology-market. The entire architecture of the company, in terms of administrative and asset structures, plays a critical role; in particular,
the location and utilization of the manufacturing units figure prominently in our study. It seems as if search or enactment is as much an effect of intra-organizational pressures as of changes in the environment - i.e., new customer needs or technological opportunities. (The two different approaches to explaining why and how innovations arise are outlined below.) Consequently, to explain the innovative behavior of a firm, we need to start with interpreting the structures that control its functioning. Our main findings can be summarized under the four headings outlined in the beginning of the chapter - why?, where?, how?, and who? In the reminder of this chapter we will address these questions one at a time.

<table>
<thead>
<tr>
<th>Traditional view of how innovations are born</th>
<th>Emerging view of how international innovations are born</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>Environment</td>
</tr>
<tr>
<td>Technology push signals</td>
<td>Firm’s organizational architecture</td>
</tr>
<tr>
<td>Firm as black box</td>
<td>Proactive search loops</td>
</tr>
<tr>
<td>Market pull signals</td>
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</tbody>
</table>

Figure 4.14: Two views on how innovations arise

**Why - Factory fill and Capacity close**

The underlying objectives of the search for new opportunities and ideas for innovation are basically to strengthen the competitiveness of the firm and to ensure future survival. This point may seem obvious. Less obvious, however, are the processes that trigger intensified search at a specific point in time. The global dispersion of the MNC provides many opportunities for obtaining ideas. Indeed, both Electrolux cases display features that remind us of the multinational’s ability to function as a global scanner. However, the new ideas created in these organizations do not necessarily spring from the marketplace. In our cases, they appear to be as much an effect of the international growth pattern of the firm.
As described earlier, both ABB and Electrolux had grown very rapidly by means of acquisitions and/or mergers. One consequence of this strategy was that the companies had ended up with asset structures in which geographical duplication of efforts was the rule rather than the exception. In particular, the manufacturing units were not ideally specialized. It is evident that the top-management teams in both companies even before all the take-overs realized the need to remedy this situation. Indeed, the opportunity to restructure the new units was one of the main tenets of strategy.

Facing the situation with a seemingly “oversized” (or perhaps more correctly “wrongsized”) physical-resource structure, the companies needed to find ways to “rightsize” their business. Here, innovation seems to have been used as a vehicle to permit the desired changes in intra-firm structure. This internally oriented logic is interesting in itself, but even more so in the light of the fact that the responses of ABB and Electrolux were almost totally opposite. In the ABB cases, and especially the M2000 project, managers candidly stated that the search for new opportunities had actually been initiated by the desire to achieve a more efficient operating structure. We call this innovative force “capacity close”. In creating a product-development project, management intended to use it to downsize the asset structure, i.e., to close down some of the manufacturing facilities.

If the tasks involved in the ABB projects were fundamentally within the traditional scope of the business areas, the Electrolux cases display another logic. After the firm had started to restructure its operations in the Wet, Hot, and Cold areas, and production had been shifted to fewer, more specialized factories, a number of manufacturing facilities still had excess capacity. Prompted by the profitability problems in the USA, and the fact that skills on one continent could be linked to anticipated needs on another, the Alliance idea began to form. As for the water purifier, the proactive detection of an anticipated environmental trend, combined with the possibility to rebundle and bring together a mix of existing products (albeit dispersed throughout the company), triggered the formation of Home Comfort.

The most important point, however, is that the Alliance and the 3rd-tap projects were in part created as “factory-fill” efforts. We believe that the slack resources available in factories which had once manufactured a multitude of products for local markets drove the firm to
intensify the search for new ideas. As we move further into the conception and planning of the four IIPs, the strong impact of the manufacturing structures will become even more evident. For now, however, we will focus more on the question of why the companies responded so differently under apparently similar external conditions.

Where - Country domination vs. Product orientation

We are well aware of the fact that the limited size of our sample makes it extremely difficult to draw any far reaching conclusions about the general innovative behavior of the two firms. Perhaps, more radical, purely national, or larger projects follow more of a “market-pull, technology-push” logic. Probably one could argue that over time product development at a company is a response either to market needs or to advances in technology, or both. At Electrolux we would also find innovations of a “capacity close” type, particularly when the firm streamlined the manufacturing structure in the three major product areas. Nevertheless, we still believe that primarily one factor made a company like Electrolux more prone than one like ABB to search for innovation of the “factory-fill” type. In our opinion, the present and historical configurative structures of the firm have a strong, and often neglected, impact on its search for, and creation of new ideas for innovation. Of special importance in the MNC seems to be the distribution of formal authority between products and countries, respectively.

As outlined in the previous chapter, historically Electrolux had granted considerable power and autonomy to the foreign subsidiaries. The reality of the “independent villages” or “player pianos” was often that the subsidiary manager was the “king of the country”. The strength of the national unit was manifest in the formal organization, although the recent introduction of product-area managers had removed some of the country managers’ formal authority. Still, in practice, it seems as if informally the traditional structure still dominated the perception of who really mattered. We believe that this bias toward the geographical side of the organization contributed in leading Electrolux to search for the “factory-fill” type of innovations.
When production had been shifted away from some of the manufacturing units, leaving excess capacity, top management could of course have decided to close down these sites. However, in view of the power of the country managers, who naturally wanted to protect their national organizations, it was easier to see the benefits of finding ways to fill these factories again. Thus, to a certain extent the search for new ideas seemed to follow 'the law of least resistance'. People at the company looked for ideas that were likely to win commitment. If the geographical dimension of the configuration is associated with as much authority as in the Electrolux case, capacity-close efforts are only introduced at the risk of considerable internal resistance and troublesome political battles.

Let us further examine our argument in light of ABB. The formal matrix of this company accorded even power to the product and geographical dimensions of the organization. However, since the early 1980s, and the appointment of Mr. Barnevik as CEO of ASEA, authority had been shifted from the once relatively self-sufficient foreign units to the business areas and industrial segments, which had product responsibility. In reality, it seems as if most authority rested with the global business areas, at least in the cases we studied. Probably, taking a look at the entire organization of ABB, we would find cases illustrating the entire spectrum, from superglobal businesses in which the business areas would dominate totally, to superlocal ones in which the country logic would be much more important.

Nevertheless, in our cases, it seems as if the product-oriented BAs were more of a driving force. What further strengthens our argument, is the fact that the initiation and formation of new international product-development projects lay with the business areas, not the countries. Thus, the propensity to follow a transnational-product logic appears to prevail over the inclination to protect local interests. In effect, it was more "rational" for business-area management to search for ideas that would increase global results within the existing scope of business, than to create projects that would secure the future survival of local units.
How - Garbage can vs. Business plan

Where companies look for new opportunities provides only a partial explanation. What also seems to matter is the process by which the new ideas are formed or formulated. In the previous chapter, we characterized the strategy process at Electrolux as emerging and formation-oriented, whereas at ABB (and ASEA) it seemed more of a formulation-implementation type. To a certain extent these two approaches were also mirrored in the growth of the IIPs included in our study. The formalized nature of co-ordination at ABB, and the reliance on socialization at Electrolux, produced different types of processes.

At Electrolux, the process was of a type that has been termed “garbage-can”. In the Alliance case, a few top managers in the company enacted the possibility of linking the technological solution of the European continent to anticipated and upcoming problems/opportunities in North America, where environmental awareness and legislation would probably make the vertical-axis technology obsolete. In the 3rd venture, anticipated environmental consciousness, primarily in the USA, was linked both to the formation of the new concept around clean air and clean water, and to technological opportunities emerging elsewhere in the firm. The multitude of stimuli were brought together in one common organizational entity - Home Comfort. One explanation for the seemingly disorganized process was that the products, at least in the latter case, were not traditionally parts of the product lines at Electrolux. Another reason, or perhaps symptom, may be that development appears to proceed from the initiatives and intuition of individual managers, rather than the entire organization’s going through a formal reasoning process. We will return to this question under the next heading, at this point we will restrict ourselves to contrasting the somewhat opportunistic/improvisational process at Electrolux with the more intentional one at ABB.

The Holger and M2000 projects followed a much more planned approach than did the Electrolux IIPs. While the explanation may lie in the fact that they were developed within the existing scope of the BAs we also believe that they illustrate the more programmed nature of new product development in this organization. Both processes were largely triggered by the “tolling of the innovation bell” for the units. By this term we refer to a situation in which the internal-belief system holds that the product life cycle is, for example, ten years, as was the
case in both projects. For this reason, the BAs seemed to “know” when it was time to innovate. It is our impression that the length of the product life cycles was set with little regard to new customer needs or to technological possibilities that had evolved over time. Rather, what once more seemed to have a strong impact was the manufacturing structure. This factor mattered since the pay-back time of previous investments in tools and other equipment affected the time at which the introduction of new products would make sense. Since this business recipe seemed to be industry-wide, the companies did not have to be overly concerned with the competitive impact of external changes. Shorter periods of more fundamental innovation every eight years or so had become usual in the business. Since norms had such a strong effect on when and how often to innovate, the innovation-stimuli phase in the two ABB cases progressed in an institutionalized “business-plan” type of fashion, rather than a more ad-hoc or “garbage-can” one. Both projects seemed to follow the prevailing company or business-area routines for generating new innovation projects. However, once again it is worth emphasizing the natural bias inherent in our limited sample. Innovations with more novelty might well break with existing routines.

Who - Top-management push vs. Organizational pull

Throughout our discussion, ideas of the MNC as a global scanner have surfaced. This type of behavior is perhaps more clearly distinguishable in the two Electrolux cases. However, inherent in the notion of a global scanner is the assumption that the multinational firm as such has a superior ability to sense needs in one market and to transfer the ideas to another part, probably the home base, where development takes place. The essence of this argument is that the MNC has a distinctive advantage in its exceptional “combinative capabilities” over geographical space. However, we would like to qualify this argument by determining who, if anyone, does the scanning.

As pointed out earlier, in the Alliance case as well as the 3rd-tap one, the initiatives of a few individual managers were crucial to the emergence of the original ideas for the projects. To us, these firms appear to have had several “global scanners”, i.e., the limited number of managers that travel extensively across geographical borders and communicate frequently
with the different parts of the organization. Only these individuals have a realistic chance to
enact and combine the links between needs in one part of the world and assets located
elsewhere. Personnel based in the local units do not usually have access to international
administrative structures, and are thus in a poor position to engage in global scanning. The
use of international executive education programs in the 3rd-tap case (and the M2000 project),
provided an interesting exception.

In the ABB cases, it also seems more appropriate to characterize the initiation of the
processes as a “top-management push” from the home base, rather than a more organic
“organizational pull”, in which local units express a wish to utilize assets, in terms of
knowledge and/or resources, located somewhere else. Although we have argued that the
geographical dispersion of the asset structure, and particularly the manufacturing one, is
critical in leading the company to look for new opportunities, the nature of the configurative
structures as well as the co-ordinative structures - in terms of access, geographical spread, and
control - are crucial not only in guiding the search (geography vs. product), but also in
combining “needs with seeds” and in initiating action.

The stimulus phase revisited

In the analysis of the stimulus phase, we have argued that the company does not initiate new
innovation projects in a vacuum. Time after time, we notice how Electrolux and ABB are
“captives of their organizational architectures”. Structures on the organizational level
influence the process of enacting new ideas, in terms of direction, nature of the process, and
organizational locus.

The influence of the organizational architecture

Of particular importance in triggering innovation/rationalization search loops seem to be the
geographical dispersion and duplication of assets that followed the rapid international growth
during the 1980s. Thus, the particular characteristics of the asset structure, such as
The geographical spread and degree of overlap, seem to have an impact on the innovative behavior of the firms.

The direction of search loops and the creation of new product ideas also seem heavily dependent on the administrative structures in place. The overall configurative structures of Electrolux and ABB appeared to guide search activities by assigning different levels of authority to product lines and countries, respectively, and the co-ordinative structure set the rules for who had access to information about geographically distributed problems and solutions.

Furthermore, the origin of cross-border initiatives in this idea phase appears to be concentrated to a handful of managers at the very top of the administrative hierarchy (with a home-country bias in terms of geographical location and/or country of origin). One reason may be that these individuals are the only ones with enough formal authority to move the concept beyond noncommittal discussion; another may be that they represent the few persons "global" enough, from an administrative point of view, to enact the potential linkages between internationally dispersed "needs and seeds". Our principal findings concerning architectural dependence in the stimulus phase are summarized in the table below.

<table>
<thead>
<tr>
<th>Type of structure</th>
<th>Variable</th>
<th>Influence on innovation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset structure</td>
<td>Duplication of assets</td>
<td>Triggers intensified search</td>
</tr>
<tr>
<td>Administrative structures</td>
<td>Configuration</td>
<td>Guides direction of search-loops</td>
</tr>
<tr>
<td></td>
<td>- Product based</td>
<td>- Capacity close</td>
</tr>
<tr>
<td></td>
<td>- Capacity close</td>
<td>- Factory fill</td>
</tr>
<tr>
<td></td>
<td>Co-ordination process</td>
<td>Impacts the nature of the process</td>
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<tr>
<td></td>
<td>- Programmed routines</td>
<td>- Business plan</td>
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<td></td>
<td>- Adhocratic process</td>
<td>- Garbage can</td>
</tr>
<tr>
<td></td>
<td>Configuration/Co-ordination</td>
<td>Affects the locus of the process</td>
</tr>
<tr>
<td></td>
<td>- Centralized/Local structure</td>
<td>- Top management push</td>
</tr>
<tr>
<td></td>
<td>- Decentralized/Global structure</td>
<td>- Organizational pull</td>
</tr>
</tbody>
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**Figure 4.15:** Structures influencing behavior in the ABB and Electrolux IIPs
Summary of the chapter

In this chapter, covering the first part of the international innovation process - the stimulus phase - we have outlined why, where, how, and by whom the four IIPs were initiated. We criticize the existing characterization of innovation stimuli as either a “market pull” or a “technology push”, for being too simplistic and “rationalistic”. In stead, in our view, the creation of innovation is contingent on search and enactment of both the internal and the external environment. The timing and direction of these “search loops” are in turn dependent on the firms’ organizational architecture.

Given the global dispersion and duplication of assets resulting from the rapid international expansion strategies of Electrolux and ABB during the 1980s, the manufacturing structures were the primary influence on the search for new ideas. Both ABB projects are characterized as “capacity-close” efforts in that their purpose was to improve the efficiency of the resource structures of the business areas. In contrast, the two Electrolux efforts were initiated in part as “factory-fill” attempts, to occupy the excess capacity created at some manufacturing facilities when production had been transferred to other locations in an effort to increase specialization.

We believe that one explanation for the preference at Electrolux for “factory fill” innovation is that more wide-reaching authority was given to the individual countries in the configurative structure. To some extent, the search for new innovations seemed to follow the law of least resistance. It was easier to find acceptance for these types of projects than for those of a “capacity close” orientation; the latter could arouse substantial local resistance. In the case of ABB, more power was given to the business areas, with global responsibilities in the matrix configuration. For these BA managers, it was primarily important to initiate projects that would improve global performance, rather than to protect the future survival of local units.

Also, the process by which the new ideas were created differed between the two companies, according to the variations in their administrative structures. In Electrolux it developed in a “garbage-can” manner, in which the initiative and intuition of individual managers seem critical. ABB was quite different, partly because these projects were initiated within the traditional scope of the BAs, but also because innovation appeared more intentional and
programmed at this firm. Both projects were largely triggered by the “tolling of the innovation bell”, i.e., the BAs thought it was time to innovate since the products were approaching the end of their life cycles. However, these life cycles seem to have been more determined by the pay-back time of investments in the manufacturing structure, than by new customer demands or technological opportunities. Thus, the innovation process proceeded in a more institutionalized “business-plan” type of fashion, based on the prevailing product-development routines of the firm.

The role of individual managers was important at both companies, also in the sense that the initiation of the projects is better described as a “top-management push”, than as an “organizational pull”, in which different units seek to utilize knowledge and resources located elsewhere in the firm. This finding is quite logical in that only a few individuals at the top of the administrative hierarchy can act as “global scanners”. They are the only ones with the power to move an idea from non-committal discussion, or mere search, to tangible action, and with access to international administrative structures enabling them to combine geographically dispersed “needs and seeds”.

We conclude the chapter by suggesting that the dispersed and overlapping asset structures of the firms, the result of past action patterns, contribute in driving the company to search for new ideas. The direction of the search loops seems greatly affected by the configurative structures, which assign different levels of authority to products and countries, respectively, and which together with the co-ordinative structures limit power and international mobility to a handful of global managers at the top.
Notes to Chapter 4

1 See Twiss (1986) for a discussion of market pull and technology push, respectively.

2 See Marquis (1988), Galbraith (1982), Twiss (1986), and Ridderstråle (1992) for an outline of the argument that technological possibilities and market preferences may need to be processed simultaneously.

3 See Weick (1969/1979) and Pfeffer and Salancik (1978) for a discussion of the enactment concept. For an outline of search routines, see Cyert and March (1963) and Nelson and Winter (1982). Also see our discussion in the following chapters of how and in what ways organizations seem to be captives of their past.

4 Naturally, the desire to ensure future survival is not the only conceivable logic which would explain the search for new innovations. More multi-rational reasons exist. One alternative explanation could be that different actors initiate search to strengthen their power base in relation to others.

5 See Vernon (1979) for an outline of the global-scanner concept.

6 See Cohen, March, and Olsen (1972) for a discussion of garbage-can processes.


8 For an overview of the literature on processes of institutionalization, see Scott et al (1994), and Sjöstrand ed. (1993).

9 For a discussion of the factors that influence the search pattern of a firm and its managers, and the manner of influence, see Cyert and March (1963).

10 See Schumpeter (1911/1934), and Kogut and Zander (1992) for a discussion of the concept of 'combinative capabilities'.
CHAPTER 5

MANAGING THE CONCEPTION AND PLANNING PHASE

Introduction

When the initial idea of the innovation project has been enacted, the process may or may not move into the conception and planning phase. Of course, this is more a drift into the new phase than a certain point in time where a sudden transformation can be spotted. In this chapter, we will continue our description and interpretation of how the four IIPs in Electrolux and ABB developed. Our attention will be focused on the following set of questions. First, why did the projects end up as international ventures? Second, how did the phase proceed; who took the lead in the conception and planning of activities, what goals or specifications were set, and how can this process be described? Third, what problems were encountered? We will not describe the organization (i.e., the division and co-ordination of responsibilities and tasks) of the efforts in more detail in this chapter, but save this question for the following chapter on the development phase.

Once more we will make use our framework from the first chapter on the relevant dimensions to consider in an international innovation context, and highlight issues related to the influence of asset-, and administrative structures. Throughout this chapter we will utilize data also from the more quantitatively oriented survey to complement our interpretations of the qualitative empirical material from the in-depth cases. However, let us first return to the four international projects.
Conception and planning - moving toward development

Alliance

Electrolux had long experience with tumble washers, and the combined sales of the Group world-wide would reach almost 2 million units in 1988. Moreover, as the only US manufacturer, White was knowledgeable in tumble machines. Management believed that no competitor would be as capable. Even though Whirlpool by now had access to the tumble washer and combination (washer/dryer) technologies through Philips, whose appliance activities had been acquired in 1987, the US parent company had no prior experience in the area. GE would have to acquire competence in Europe. The South-East Asian competitors had no competence in tumble washing, and although some European firms already marketed top loaders in North America, these were based on European specifications and sold only in small quantities. The new Electrolux tumble-washer plan for North America consisted of three main phases: a) the “Z-washer”, b) a new washer generation to be launched during 1991, and c) the introduction of the washer/dryer concept 1991/92.

Phase one could more or less be regarded as a survival strategy, the main aim having been to keep tumblers on the market. The next phase, while also showing some elements of a survival focus, was primarily intended to consolidate market position. The final phase was clearly directed at rejuvenation. Management believed that the washer/dryer would enable the company to capitalize on the changing customer needs. To exploit the opportunities thus presented it was essential a) to establish the overall strategy in the first half of 1989, b) to carry out phases one and two in line with the overall strategy, and finally c) to study product features in other parts of the Group for use with the agitator technology.

In an effort to prevent the “death in exile” syndrome and to initiate phase two and three of the action plan, top management in Sweden and Italy decided to launch a new project early in 1989. Although technical management at WCI USA had been hesitant about the horizontal-axis technique, and the Connersville personnel reluctant to have the “Z-washer” transferred to their plant from Mansfield, there was new trust for the possibilities of the front loader in WCI Canada and their Cambridge facilities. Management in Sweden and Italy were eager to exploit the vast (annual sales of 6.2 million units) North American market. The commitment of the Canadian subsidiary was a determining factor in management’s decision.
not to let this opportunity pass. The Canadians had always been regarded, by their US colleagues and by themselves, as the "junior partner". Canadian units were accustomed to reporting directly to "foreign headquarters" even before being acquired by Electrolux. They saw an opportunity to take part in an action significant for the entire North American market.

Like the "Z-project", the new venture was promoted by top management. It was favored by Mr. Leif Johansson and a number of other Swedish (and Italian) managers. The Italians were to supply technical know-how, the Canadians production/logistics, project management, and funding, the US organization market input, and the Swedes top-management backing and support. Naturally, the US unit could not be omitted, since it would be selling the product in the future. Therefore, it was critical for the Canadians to commit the US marketing and sales organization at an early stage. While US technical management had difficulty in understanding the advantages of the new technology and feared that the costs would be too high, it was easier for marketing to see the benefits - a new product with higher quality and superior performance, one that would differentiate the firm from competitors. A horizontal-axis top-loader with a single opening was their first choice, but as the Italians argued that such a machine would be too complex and costly to develop and produce, this option was dropped.

The concept of developing a completely new high-performance horizontal-axis front-loader for the North American market, and possibly also a washer/dryer, was described by Group management in internal documents as an opportunity to change the battlefield with a technology that better meets consumer needs and wishes. In addition to generally manifesting a more global mentality, establishing a more widespread use of common components, and improving international communication to profit from the Group's size and geographical coverage, several other advantages of the product were seen; a) flexibility, b) convenience, c) ecology, d) washability, e) clothes wear, f) tangling, g) space, and h) washer/dryer.

Moreover, the market for high-end products was projected to double over the next decade as "baby boomers" moved into their years of highest income, and the market for convenience products was expected to grow with the increase in dual-income families. Some time later, in the March (1989) issue of Consumer Reports, the influential US Consumer Union magazine, some of the washers on the US market, including the two front-loaders of White (one stackable with a dryer on the top) but not the new "Z-washer", were tested and rated with the following results.¹
<table>
<thead>
<tr>
<th>Brand and model</th>
<th>Sears 28831 (Top)</th>
<th>Whirlpool LA8800 XS (Top)</th>
<th>White LT250J (Front)</th>
<th>White LT800J (Front)</th>
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<tr>
<td>Parameters</td>
<td>- Price (USD)</td>
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<td></td>
<td>- Disadvantage</td>
<td>- Lid not open fully - Bad fabric soft. dispenser</td>
<td>- No lip on top top surface for minor spills</td>
<td>- No bleach/fabric soft. dispenser - Painted finish on top - Door leaked when unloading - More difficult to install</td>
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Table 5.1: Rating of top-loading and front-loading washers available on the US market

This magazine generally selected top-of-the-line models to evaluate most of their available features. According to the Consumer Union, washability had not been rated in the latest five years or so, as reader mail had not indicated washability problems. CU expressed its opinion very candidly; “Judging by our experience in past tests, all washing machines wash clothes about equally well.” Still, the overall rating of the two front-loaders was favorable. The magazine concluded that these washers used less water per unit volume of laundry and less hot water than the top-loaders. Their recommendations read as follows:
"It's not hard to see why front-loaders have developed a loyal following among some consumers. The two front-loading WHITE-WESTINGHOUSE models not only excelled in our important tests for operation efficiency, but they also shone in such lesser matters as unbalanced load-handling, freedom from linting, and sand disposal. They cost our shoppers around $500, which is in the same league with the prices of many top-loading models. If installation space is a premium, the stackable model, LT250J, merits special attention."

These results constituted the basis for many of the key points discussed during the first meeting of the steering committee, comprising people from all the four countries involved, on May 11 and 12, 1989, in L'Assomption outside Montreal. Participants in the meeting included Mr. Folke Andersson, Mr. Hans Stråberg, and Mr. Roberto Sburlino, Electrolux' Italian expert on washing machines. In his opening remark, Mr. Tony Hane, head of the Canadian unit, pointed out the significance of the project and emphasized its uniqueness in that persons from four different countries would be working together for the first time. He requested a positive and co-operative attitude from everyone toward making the project a success on all counts.

It was decided to retain a US consulting company to conduct a market survey to: a) test and validate the product concept as defined, b) identify and quantify target market segments, c) provide information necessary to develop product and brand positioning strategies, d) provide implications for design, pricing, advertising, merchandising, distribution, etc., e) quantify the opportunity, and f) develop elements leading to a cost-effective market-entry strategy. The 200,000 dollar bill for the report was to be paid by WCI Canada, the US Laundry Division, and Central Management Columbus, Ohio, in proportions to be negotiated by the three parties. Five research models were to be made available to the consulting firm in time for the survey in August: a) a free-standing washer, b) a stackable washer, c) a combination washer-dryer, d) a free-standing dryer, and finally, d) a stackable dryer. The washer and washer/dryer were to be prepared by the Italians with assistance from the US organization concerning the establishment of control panels, appearance, and size of the door opening. These Americans were to be flown in to Pordenone later the same month. Although non-functional, the models should be as close as possible to actual production units. Mansfield was to be responsible for supplying painted cabinets, drum fronts and backs, washer tops, and assembling the survey models, although the Italians criticized this decision on the ground that their domestic parts could be used. General specifications had already been
developed by the Italians, with some assistance from Mr. Tom Kaczmarek and his colleagues in the US marketing organization. However, the North Americans claimed that the US contribution and influence had been minimal. The group reviewed the first specifications, dated April 4, in some detail. These general specifications were divided into four broad categories: a) Installation/Connection, b) Basic Performance, c) Styling/Ergonomics, and c) Features.

Of particular interest are perhaps the initial cost targets. The suggested retail price of the washer was $599. A retailer was to charge $899 for a washer/dryer, with a manufacturing cost some 35% higher than the washer (All prices in 1989 $ US). The total investment was planned at approximately $30 million, of which development costs amounted to some 5.5 billion lire (approximately $6 million). Billing of development costs was to be on a monthly basis by the Italians and be accompanied by limited supporting documentation. A formal request for expenditure was also to be prepared to cover the project. Meanwhile, WCI Canada would pay for development costs. The pay-back time was calculated at 4.5 years or better.

Initially, the design was not supposed to have “Jet-system” capability, but this washing system could be introduced at a later stage. Another point under discussion concerned the type of material to use, mainly for the inner drum and outer tub, the choice mattered, since prices of materials varied between Europe and North America. The introduction date of the new 75 liter washer and combo had now been advanced to January, 1993. There were also plans to introduce comparable European 53 liter machines in 1990 and 1991. The committee suggested further that representatives of CSA and U.L., US product approval agencies, be invited to Pordenone to review the washer as well as the combo unit when functional models were available. Their opinion would help the company to meet requirements prior to sending the units to these two agencies for approval. Another matter of importance was to secure co-operation with detergent producers. The steering committee decided that marketing was to be responsible for contacts with suppliers of detergent, so as to ensure compatibility with the new machines.

In terms of personnel, WCI Canada was presently looking for an engineer who would be willing to work for a while with Zanussi personnel in northern Italy. This person would eventually be located in Cambridge, Canada, as the company’s washing engineer. At a later date, WCI Canada also planned to hire an industrial engineer, an electrical engineer, and a mechanical engineer to collaborate with the Italians during the development of the new
machines. The company would also request manpower support for the project from the central Industrial Systems group in Sweden.

At the end of this first meeting, for the sake of confidentiality it was decided that the project be given a name; "ALLIANCE" was chosen. Finally, a new meeting was tentatively scheduled for September 11, to be held in Pordenone, Italy, and the following preliminary schedule of future activities was presented.

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<td>Pilot Series</td>
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<td>III IV</td>
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<td>I I I</td>
<td></td>
<td>I I I</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Production of first model (test mark.)</td>
<td>WCI</td>
<td>I I I</td>
<td>III IV</td>
<td></td>
<td>I I I</td>
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Table 5.2: Schedule and description of phases in the Alliance project
To obtain the resources and time needed, Mr. Hagquist turned to his immediate superior, Mr. Folke Andersson, at New Products, who approved the funding and granted him the half year needed for research to find the appropriate technologies and design for a high-performance water purifier. From the very start it seemed obvious to Mr. Hagquist that the only viable solution was the reversed-osmosis technology (r/o). This technology was used in a few purifiers on the US market, but in general their quality was far from satisfactory, according to Mr. Hagquist.

However, no one in the firm was knowledgeable about the particulars of this technology. Water purification in itself was a new area at Electrolux, and none of the existing Electrolux products had made use of the r/o technology so far. Therefore, much of the six months which Mr. Hagquist had been given was devoted to developing an understanding of the r/o technology itself and to studying its possibilities in the water-purification area. He was also aided in the development of his concept by Mr. Per Fonser from the Research & Innovation department (RI) and Mr. Peter Codwell, an external consultant. Apart from investigating the technology, Mr. Hagquist continued to discuss the anticipated future of the water-purification area with Mr. Adeberg and Mr. Andersson.

Quite soon, a viable concept for a household water cleaner was formed, and by the end of the first half year Mr. Hagquist was able to present a working prototype, a functioning laboratory model. Early in 1989, a decision to go for future development of the r/o product was taken by Mr. Adeberg, Mr. Hagquist, and Mr. Andersson. Backing from Mr. Scharp and Mr. Johansson from Group management was assured by Mr. Adeberg.

In March-April 1989, the core of the development team was formed when Mr. Hagquist met with Mr. Fredrik Delby, an engineer working at RI. Also present at the meeting was Mr. Per Fonser, who had worked with Mr. Hagquist earlier. They both agreed to join the development project as consultants, with RI to be paid by New Products on an hourly basis for work requested. At the same time, a steering group at HC was organized. It was to include Mr. Adeberg, Mr. Kari Gustafsson (the technical manager), and Mr. Olof Sjöborg (the marketing manager).

Mr. Adeberg believed that credibility was critical to success. Credibility could only be gained through a professional approach, which required that the company obtain a knowledge of
the water quality in each area where it operated and have well educated sales representatives. By comparison with the less complex filter-based solutions, credibility was even more critical when it came to r/o products. He believed that the product group had to be convincingly "portrayed" in some kind of sales presentation, as it was little known to the consumer. Moreover, many rivals were active on the market, with more or less qualified products, and it was crucial that the company did not acquire a bad name. Rather, it was possible that the entry of a major competitor like Electrolux would benefit the entire market by guaranteeing the credibility of the product group "water".

Only a few general goals were set for the project team. First, as noted above, the product was intended for a consumer market, in accordance with the HC concept. However, no geographical restrictions were set; that is, the product was not focused on a specific geographical market. Rather, discussions between Mr. Adeberg and Mr. Hagquist on the special characteristics of the r/o technology had led to the conclusion that one of the main benefits of the new technology was that it could purify any type of water anywhere in the world; i.e., it was not limited by local water constraints. Consequently, it provided a genuine opportunity for a truly global product, and major markets were foreseen in Western Europe, the USA, and the Far East. Second, the product, which first had been planned for production at the Strömstad factory in Sweden, and for sourcing from the Anaheim manufacturing facilities in the USA, was now set for manufacturing at the Castellbisbal factory in Spain, since the Strömstad unit had been closed and excess capacity existed at the Spanish facility.

Also, a number of product specifications were set by people at HC, and Mr. Adeberg in particular. A preliminary schedule was proposed, but dropped after Mr. Hagquist objected. To be able to compete with existing products, especially those on the US market, the r/o water purifier should: a) produce one gallon of clean water per minute, b) fit under the kitchen sink (300 X 350 mm), and c) cost no more than 200 dollars.

Holger

ABB Process Automation had three basic options when developing a new systems: a) keep both the MOD and the Master system and develop them separately, b) keep one system and develop a new generation, or c) keep both systems and merge them in developing a common new one. Management argued that it would have been too expensive, in terms of
marketing and production as well as R&D, to keep both existing systems and develop them separately. To adopt a single solution, probably the Swedish one, was not believed wise since the systems were complementary. Furthermore, it was anticipated that several experts were liable to leave the US unit if the Swedish system were the sole choice. US customers would also hesitate to buy a European system that was not compatible or comparable with their old one. The competence deemed necessary for the development of a high-performance system was limited to some 10 to 20 individuals, who were rather evenly distributed among the USA, Sweden, and Germany. To utilize the full potential of the BA, these units had to co-operate.

Planning of the new system was conducted jointly by personnel from Sweden and the USA during the spring of 1990. Work was organized in groups where people with MOD or Master backgrounds participated. In addition, various experts were hand-picked to join the groups. In these groups people examined the terminology underlying the MOD and the Master systems. Two factors were particularly critical. First, it was important to attain full compatibility backwards to both existing systems, so as not to lose any customers. This requirement produced additional problems. Technically, it was more difficult to develop the new system. It was also difficult to persuade the customers that it was possible to develop a new system that would be as well adapted as the prior one to their needs. Second, it was vital not to lose the existing advantages of MOD or Master, but also to review the weaknesses of these systems so as to find out what new features to add to the future one. For practical reasons, most meetings were held in Sweden. During this phase, few technical conflicts were encountered in the project, an effect attributed by some to the fairly conceptual nature of the work. Moreover, a number of people claimed that the documentation and specifications resulting from the work reflected a vision that tried to incorporate every desirable feature into the new system.

The fact that the Swedes were one year ahead of the Americans in their plans for a new system had several consequences. It was irritating for the Swedes to set aside all previous drafts and to start from scratch. However, the Americans at Rochester were also discouraged at the outset of the project when their almost completed applications for the pulp-and-paper industry were replaced by the Master applications. In addition, the Americans felt they were behind when discussing the new system with the Swedes. Although the overall vision was the same, many North Americans felt that the Swedes were moving too fast and still could not see beyond the solution for which they had previously planned. The Americans began to fear that the Swedes, who were in charge, sooner or later would try to abandon the US system. It is also
worth noting that the acquisition had left the US personnel unsure about their future. While their apprehension had been largely neutralized after top-management, and particularly Mr. Barnevik himself, had promised that the American system and unit would continue to exist, some still suspected that this reassurance had been intended mainly for the marketplace.

Research efforts before the project actually started were of two different kinds. First, market research was undertaken to find out what customers might require of the new system. This research was conducted primarily in the USA. Second, research of a more technical nature focused on a search for new technologies to apply. The latter type of research was done primarily in Sweden. The general impression from the research efforts was good. Customers seemed satisfied with the intentions incorporated in the product specifications.

The number of variables specified for the new systems was immense. However, the general vision was to develop a platform product so flexible that it could be adapted to any of the industrial segments in which ABB Automation had customers. It was also seen as strategically important to move toward a more open architecture. Two main objectives can be identified. First, the process was planned as an evolutionary merger of the two systems. New common elements were to be added to both systems, in simultaneous annual releases. Each release should bring customer benefits and each new element had to be a natural development of both systems. The first steps were to concentrate on inter-connectivity, engineering tools, and user interface. Moreover, it was seen as critical to protect customer investments by enabling: a) connectivity to installed systems, b) reuse of applications, and c) continuing development of existing application languages. Second, it was important to divide work among the units in as efficient a way as possible. However, management came to see this objective as extremely difficult, since no clear principle for division of tasks existed. Moreover, neither the German nor the Swiss unit were convinced of the wisdom of developing a common system, and at first they were reluctant to take part in the project.

The initial work in 1990 resulted in a product "road-map". The first stage was to ensure that the two systems could communicate. The second would mean adjusting the user interface by means of engineering tools. The third would involve building a common hardware platform. In the final stage, common software was to be introduced. All costs for development were to be borne by the local units. Occasionally, this policy led to problems. The US country manager had difficulty understanding why the US unit devoted money and effort to a system that would be manufactured in Sweden. The stepwise development effort is illustrated in the figure below.
When evaluating the possibilities for a common design, ABB Motors management also considered the alternative of keeping the best present construction. Although this approach appeared attractive in many ways, and presented clear cost-saving possibilities, management believed that it would not utilize the full potential for global synergies. For instance, the Swedes were knowledgeable in production, whereas the French had their main capability in electrical sheet-iron. Nor would this alternative be ideal for future investments. Thus, management decided on a project, M2000, in which all existing designs were to be merged into one common ABB design.

In this context it is also worth noting that the company made a deliberate attempt to position M2000 ahead of the competition. Apart from bringing in products from competitors for reversed-engineering, the main effort was put into investigating the US company Reliance, by far, the most profitable company in the industry. Because of differences in standardization, Reliance was not yet active on the European market. Still, management believed that a lot could be learned from studying this company and using it as a benchmark. From a strategic point of view, it was most central for the development of M2000 that Reliance had a focus on high-end products. Its products were energy-efficient with variable speed. Through customer adaptation based on a standard, Reliance could differentiate its product offerings without raising prices.
excessively. By building a standard generation, ABB Motors hoped to avoid the trap in which especially the former Brown Boveri units in France and Germany had been caught earlier. The trap was one of excessive focus on customer adaptation, resulting in unfavorable cost positions for the units. This development had started in the 1970s, when the Central and South European companies encountered competition from low-cost exports from the Eastern-bloc countries. Consequently, after initially having the best standard motor on the market, these units had been forced to focus more on custom-tailored motors (specials). Eventually, exaggerated adaptation undermined all standardization efforts, and these units lost most of their economies of scale.

In a market-balance situation, the company would have one standard and would then build special motors for customers with specific requirements. However, by establishing M2000 as the world's best catalogue motor, management hoped to combine the advantages of low-cost and differentiation. With a standard motor as the base for customer adaptation, Motors aimed at attaining even larger volumes. In this way, specialization would not lead to unfavorable cost structures, as had happened before. Accordingly, in a sense M2000 was not only an innovation project. More accurately, management regarded it as a combination of innovation, restructuring, and improved cost-effectiveness. In line with the initial intentions, the overriding objective of M2000 was; “to develop the world’s best catalogue motor”. The reasoning underlying the M2000 concept is illustrated below.

**Figure 5.2: The basic M2000 concept**
Early in 1990, the units agreed that the design of the new motor generation was to be guided by a number of principles. The basic design had to be identical for all producing units. The standard catalogue version was to fit the principal requirements of the market. Additional requirements should be realized by modifications to the basic design. Development, costing, and design were to be based on common elements. Mutually compatible data systems would facilitate this work. However, national languages, procedures etc., should be respected whenever necessary. With local volume in mind, production was to follow identical methods, with the same machinery and tools, whenever feasible. Furthermore, to benefit from cost-effective mass production, the company could concentrate the manufacturing of parts and components to certain factories/suppliers. Special products with limited worldwide demand should be produced at only one unit. Finally, common principal cost structures and costing rules were to be developed.

Several critical features characterized the common M2000 design. The objective was a common motor full-line series, based on a loose-core principle. To achieve it called for standardization and harmonization of many components, as well as lamination, diameters, electrical and mechanical performance, as well as manufacturing processes, and instructions. ABB Motors continuously examined products of competitors, and ten marketing managers were asked to fill out a questionnaire on the preferred characteristics of the new generation. When these special requirements had been summarized, management realized that the price would be too high and that it would be necessary to compromise. Some also questioned the need for any market studies, arguing that the company was in a mature industry and in technological terms actually knew customer requirements better than the customers did themselves. The problem was to determine the correct price/performance ratio, and to prevail over the competition.

BA management saw many advantages to the common design. First, ABB would be the first company with a “global” product (though still excluding the North American market). This achievement would improve their image and strengthen their position with worldwide customers. Since the company focused on a common design, much effort was put into ensuring a visible difference for the consumer. An external designer was contracted to design the product chassis in a new and innovative way. Second, in terms of product development, management hoped for increased synergies in that the basic design offered all factories common designs, instructions, test results, acceptances, support material, etc. Moreover, it was believed that the best resources from all design offices could be used simultaneously. Third, production would
become more efficient since machines, tools, systems, etc. could be imitated. Also, concentration of expensive machinery and tooling was possible, thus enabling the company to use more advanced machinery. Fourth, purchases could be made on more favorable terms, since the total volume of the firm could be used in bargaining with common suppliers. Fifth, marketing would be facilitated, because no parallel ranges would exist in brochures, stock, etc. It would also be easier to train salesmen and for them to use sound selling arguments. In addition, access to all market segments would be improved since convincing arguments developed in one country could easily be used elsewhere. Management hoped to improve service to international customers and to reduce the difficulties of the spare-part business. Sixth, personnel administration would benefit as the development and utilization of technological expertise would improve, and co-operation would be facilitated, thus reducing the likelihood of arguments.

However, ABB Motors also realized the disadvantages of the common design. It would lead to changes in all factories, although to a varying extent. For instance, the design, the tools, and possibly also the technical performance offered to customers would be different. On the other hand, these kinds of changes were quite normal when creating new product generations. It was believed that with a reasonable transition time the project would not result in any extra costs. The German unit, however, was not fully convinced and hesitated about taking part in the venture.

One further potential problem was that marketing units, which were used to more custom-tailored products, might turn to the manufacturing units and ask for adaptations. To anticipate this situation, management decided to develop a price list for specific adjustments. In this way, the costs of adaptation would be borne and known in advance by the sales companies. These would in turn be less inclined to ask for changes. In general, the advantages were considered so great that the only limiting factor for the timing would be the capacity of the business area to carry out the changes and related investments. Moreover, calculations of cost savings showed that M2000 would decrease inventories by 40%. Component variants could be reduced by more than 50%. As a consequence, the number of suppliers could be reduced by some 60%. However, development could not be totally dissociated from past events. Of particular importance was the existing investment in tools and machinery. Potential investments in tools accounted for a major part of total development costs. To keep these down, it was
critical to be able to use as much as possible of the existing equipment. After a meeting in June, 1990, the following preliminary and informal milestones were set:

<table>
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<tr>
<th>Date</th>
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<tr>
<td>June 1990</td>
<td>Product specification proposal</td>
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<tr>
<td>September 1990</td>
<td>Product specification decision</td>
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<tr>
<td>Sept/Oct 1990</td>
<td>Decision Restructuring step two</td>
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<tr>
<td>End of Oct</td>
<td>Kick-off meeting for project groups</td>
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<tr>
<td>Nov 1, 1990</td>
<td>Project groups start work</td>
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<tr>
<td>1991</td>
<td>Development work in project groups</td>
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<tr>
<td>Jan 1, 1992</td>
<td>First M2000 motors to be delivered</td>
</tr>
</tbody>
</table>

Table 5.3: Preliminary milestones set in M2000

The costs for the total project were also estimated. These were to be borne by the local units. The following table summarizes the anticipated project costs per product range.

<table>
<thead>
<tr>
<th>Range</th>
<th>Small Al</th>
<th>Big Al</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculation, analysis, design and tests</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tools per unit</td>
<td>3 Odense</td>
<td>5 Västerås</td>
<td>4 Vaasa</td>
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<td></td>
<td>1 Sabadell</td>
<td>4 Sabadell</td>
<td>5 Decines</td>
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<tr>
<td></td>
<td>1 Decines</td>
<td>3 Decines</td>
<td>3 Saarbr.</td>
</tr>
<tr>
<td>Total project costs</td>
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<td>14</td>
</tr>
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Table 5.4: Anticipated project costs for M2000 (in MUSD)

Reasons for international innovation projects

When we left the projects in the last chapter, it was still not clear that the efforts under way were to end up as IIPs. In principle, all projects could have been carried out within and by functions located in one country. Still, management decided to utilize assets from several nations. In the first chapter, we argued that the rise of IIPs is promoted by the dispersion of complementary assets, and/or by political considerations. Both of these driving forces could work intra- and inter-organizationally. Let us now take a closer look at the four cases.
In the Alliance project, the international aspects were partly inherent in the enactment of the project idea. The technical base for horizontal-axis washers was located in Italy. Knowledge about the North American market and customers naturally resided with the units in the USA and Canada. Manufacturing could have been located in any of these three countries, but as transportation costs would be too high if the washer and combo machines were manufactured in Europe, the two North American countries were the only viable alternatives. As for knowledge in this area, the US organization seemed the superior alternative. The existing front-loaders were produced here, as were the bulk of top-loaders. The problem, however, was that US technical management did not seem to believe in the horizontal concept. Consequently, the product ended up with the Canadians, who had both commitment and excess capacity. The main point at this juncture, however, is that the knowledge pertaining to the three primary bases discussed in the first chapter - technical, manufacturing, and market - was geographically dispersed and complementary. Further, Electrolux top management appeared to be motivated by what might be called a global integration imperative; it was important to strengthen the ties between the newly acquired units, and to establish closer transatlantic relationships. Consequently, from an overall political or relational perspective the effort could be legitimized. Moreover, by also involving the US personnel, management hoped to avoid "not-invented-here" (NIH) reactions on the most important market. The power of the US unit, which controlled a strategic asset - access to the largest market, made it difficult to exclude the Americans.

The 3rd-tap project displays a somewhat different logic. As argued in the former chapter, the impact of the manufacturing structure of the company was apparent. The project was basically planned as a Swedish effort, but it evolved into an international venture after the unit in Strömstad had been closed down, leaving excess capacity at the Spanish Castellbisbal factory, which was seen as a future base for HC products. Thus, in this case the impact of one particular foreign resources in absolute terms, i.e., manufacturing capacity, seems stronger than that of critical and complementary knowledge located elsewhere.

In the Holger project, the political/relational aspects were more pronounced. The Swedish unit could probably have developed the new product on its own. However, management feared that North American customers would hesitate to buy a system that had no local
“intellectual content”. It is worth noting that many of the engineers who develop a process automation system also perform service on the new system once it is installed with a customer. Thus, the North American customers may have feared primarily that the US personnel at ABB would not be able to understand a system which had been developed by someone else, and that the unit eventually would be closed down (alternatively heavily reduced in size), rather than that the Swedes lacked the knowledge or resources to develop a reliable product. Aspects of internal relations also came into play. For example, it was important to avoid the NIH syndrome. By involving the US unit, management hoped that it would be more committed to the solution, reasoning that a local Swedish development project could have jeopardized future sales on the largest single market. Thus, just as in the Alliance case, the ownership of strategic assets in the form of access to a large market gave the US organization such a crucial position that it would have been difficult not to include them. Finally, what appears critically important in triggering the decision to form an international project was the geographical dispersion of a number of individuals with strategic knowledge. Elsewhere, we have called these few individuals core competents, since they seem to possess much of the critical knowledge of the firm. Their competencies, which were of fundamental importance to the development of a new system, were employed in different geographical units within the business area. Thus, an international project became the natural consequence, since knowledge pertaining to the task was dispersed and complementary.

The M2000 project was also primarily driven toward international participation by this latter logic. The various units were expert in different technical areas. Moreover, since production was fairly specialized, at least among the Scandinavian units, manufacturing knowledge was also dispersed. Consequently, in one sense, the asset structure more or less forced the firm to form this type of multinational project, unless the different units were to continue working in unco-ordinated LIPs. Another factor tending to rule out the use of HBIPs, i.e., development only in the home country, was that the business area did not want to lose either the enthusiasm or the critical individuals of the units located outside Sweden. This statement is especially true of the German unit, which controlled at least one strategic asset - access to the largest European market.
Differences in rationales for IIPs

In the survey we were also interested in why the ventures were set up as international projects. Both the R&D managers and the project managers were asked why personnel from more than one country were used in the projects. The responses of the project managers, who were asked open-ended questions, seem consistent with our earlier interpretation. In the following figure, examples of these responses are classified according to the taxonomy implied by the preceding discussion. (The full list of answers given by project managers can be found in Appendix 5.)

<table>
<thead>
<tr>
<th>Complementary assets</th>
<th>Intra-organizational</th>
<th>Inter-organizational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not all different functional knowledge bases or resources available in one country</td>
<td>Suppliers and/or customers located abroad</td>
</tr>
<tr>
<td>Political necessity</td>
<td>Local company acceptance needed (avoid NIH)</td>
<td>Local adaptation of products needed</td>
</tr>
</tbody>
</table>

Figure 5.3: Types of reasons given by the project managers for establishing IIPs

Compared to the responses of the project managers, the answers of the R&D managers to closed-end questions reflect a slightly more general and systemic or political logic (see Appendix 6). A reason for initiating 11 of the projects was to encourage international collaboration more generally. Further, the international element of many projects seems to have been prompted primarily by the lack of knowledge about customer needs (17 cases), or by requests for cooperation from some of these customers (18 cases). The role of manufacturing was also prominent; as many as 15 projects became international as a result of foreign location of production facilities. Finally, the R&D managers (8 cases) seemed to emphasize the “political” motive of avoiding NIH reactions more than the project managers. The relative emphasis which the two groups of respondents placed on reasons for launching IIPs is displayed below.
It seems logical to suggest that the formation of international innovation projects is driven by a multitude of motives which may vary from case to case. Of crucial importance in our cases, apart from political or relational considerations, is the dispersion of complementary knowledge. The dispersion may be essentially within the same knowledge base, as in the two ABB cases, or result on the fact that different knowledge bases are geographically separate, as is most evident in the Alliance project. Moreover, the availability of excess manufacturing capacity figures prominently as a critical driving force in the two Electrolux cases. Consequently, although we suggested in the previous chapter that the duplication of assets was a major factor triggering the search for and enactment of new ideas for innovation, it seems to have been difficult to concentrate all activities to one location. Also, complementary assets were geographically scattered throughout our case companies. Moreover, it appears as if these international efforts in some cases, at least from a top-management vantage point, are used as vehicles to further the global integration of the MNCs as such. Finally, control over critical assets, such as access to a large local market, is evidently a strong reason to include certain units in a venture, when management wants to avoid NIH reactions on major markets.

Describing the conception and planning phase

Having established the principal rationales for the international composition of the projects, we will now turn to how the projects worked. The phase can be considered a sub-process, ultimately aiming at the establishment of goals and specifications. Initially, one might view the conception and planning of activities in an international innovation project as a negotiation game across nations and functions, in which sometimes several actors could
compete for leadership. The evolving team could be regarded as a coalition of individuals and sub-groups with sometimes varying opinions on how to proceed. They belong to different and multiple reference groups or cultural sets, i.e., national, professional, functional etc. However, before discussing the validity of a negotiation metaphor, we will first return to the specific issues of multinationality and multifunctionality.

Multinationality and multifunctionality

The international aspects are more visible than in the stimulus phase. All IIPs, except the 3rd-tap effort, had multinational participation during this period. However, if multinationality was the rule, co-ordinated and integrated multifunctionality was the exception. It is true that representatives from more than one department took part in the conception and planning of the projects, but together the functions rarely seemed to form a closely knit team. Rather, they were separated, sometimes in time and in the two Electrolux cases also in space.

We will discuss questions of ‘relay’ vs. ‘rugby’ and cross-functionalism in more detail in Chapter 9. Here, suffice it to note that the division of labor to a large extent seemed to follow the logic implied by the configuration of the overall organizational architecture. Although Electrolux, and especially ABB, could be described as having matrix-like organizational structures, both were essentially organized by function within the units to which the IIPs belonged. Sequential routines for innovation seem to have been followed. In effect, R&D investigated the technological possibilities, production analyzed manufacturability requirements, and marketing examined customer needs and preferences. Further, the impact of all functions other than R&D was fairly limited. Marketing activities were particularly limited, and in the 3rd-tap case representatives from manufacturing did not even participate. The two ABB cases differed, in that manufacturing was co-located with R&D and the two functions came to work more closely together.

Also in the survey, there was a relative bias in favor of the “industrial” parts of the organization, and especially R&D. During the conception and planning phase, as many as 76% of the individuals taking part in the IIP ordinarily worked in R&D. Merely 11% normally belonged to manufacturing, and as few as 13% came from marketing.
R&D domination and conflict avoidance

One consequence of the R&D function’s taking charge was that the country(ies) in which it was located became the informal leader(s) of the projects. In both ABB cases, more than one R&D center was involved, and consequently a situation of potential rivalry for leadership existed. The Motors case was an exception, since the separation of tasks among the Scandinavian countries was generally quite clear, depending on the product range specialization of the units, and also since business-area management took an active part in managing the venture.

In the process-automation case, however, the Swedish and US organizations were to some extent competing for control. Since these units were less specialized, it was more difficult to find a mutually satisfactory way of defining goals and dividing tasks. As a result, distribution of work and authority became more of an issue. It is also relevant to note that more than the project itself is at stake in new product development efforts of this type. When the overall objectives, specifications, project leadership, and division of tasks are set, they will not only have an impact on the remainder of the innovation process, but also provide a strong indication about how future responsibilities will be allocated throughout the life cycle of the new product. Thus, in the Holger case, one could argue that the critical period was the 10-to-15-year time span until a new system would be developed, and that the present distribution of authority and tasks would have an impact on this far into the future. In part, the situation was resolved by BA management who retained project leadership. Since they were not co-located with any of the units, the potential conflict was neutralized to some extent.

The ‘negotiation-game’ aspects became somewhat more visible in the specification of critical variables for the new products. Once again, the cases differed in that multinational and multifunctional aspects were not of equal importance in all projects. Negotiations in the 3rd-tap effort were held between the ‘developers’ from central R&D and the ‘administrators’ from HC. In this case, negotiation is perhaps not the best word, since the HC people dominated this sub-process and unilaterally set the targets for the new r/o water purifier to be followed by the core development team. The negotiation process in the other Electrolux project displayed both geographical and cross-functional aspects. Since the three basic
functions were located in different countries, the two dimensions came to overlap. During this phase, bargaining primarily went on between the R&D unit in Italy and the US marketing organization. However, also in this case, the technical personnel dominated the discussion to an extent that makes the negotiation metaphor slightly misleading. Rather, it is our impression that a preference for temporary conflict avoidance characterized behavior and activities.

In the two ABB cases, the international dimension was more pronounced. Since the projects were technically dominated, the process of determining the proper specifications, was largely one in which the R&D personnel from the various countries met to decide on common premises. Some of the difficulties encountered have been described earlier, particularly those in the Holger case. Other problems arose from the fact that individual perception of the product and its related positioning differed across geographical space. For instance, in the M2000 project, the level of efficiency/performance to be regarded as top-of-the-line differed between the Nordic and South European units. The interpretation of the general philosophy behind the concept of a new motor thus differed considerably.

Notable in all cases, including the Electrolux ones, was the limited involvement by actors outside the focal firm, i.e., suppliers or customers. Indeed, the companies searched for information in their environment. Market research, although limited in relation to the time and effort spent on technical research, was conducted. In this process, external technical experts at universities, suppliers of key components, were consulted. However, external actors never had a critical impact on the product concept. Nor did these outsiders become part of the team(s) that was beginning to form. Consequently, it seems as if the initial knowledge-creation processes were primarily intra-organizational. This consequence is partly due to our research design, in which we chose not to include joint-venture efforts. Still, it is interesting to note the limited impact of any actors external to ABB and Electrolux, respectively.

Goal definition - a process of uncertainty reduction

As to the types of goals that were set, the Alliance project, as well as the two ABB efforts, ended up with long lists of technical specifications. The 3rd-tap venture differed significantly
in this respect, as the project team that was to develop the water purifier was only given a
general guideline covering size, price, and performance. In our view, the conception and
planning phase can be regarded as a process of problem generation (i.e., uncertainty
production) followed by knowledge creation aiming at uncertainty reduction. Problem
generation was initiated by information gathering, guided by the initial product concept, and
proceeded in parallel with a transfer of information, in our cases across geographical borders
rather than functional ones. Throughout this phase, and as bargaining went on, the product
concept(s) became more specific. In general, the more specific the technical goals, the less the
uncertainty surrounding future efforts, since the company is left with fewer possible options
or combinations to meet this set of more elaborate targets. However, the uncertainty reduction
often related merely to what (i.e., what will be the characteristics of the new product?), and
not to how (i.e., how will the team meet the specifications?). In effect, it may still be unclear
how to interpret the specifications, as well as who has the preferential right of interpretation,
and how to apply specific technologies, materials, components, or other solutions. We will
return to a third kind of uncertainty - the one relating to who (i.e., who is responsible for
meeting the objectives?) - when discussing the division and co-ordination of labor, tasks, and
responsibilities in the next chapter.

A second aspect of developing the product specifications relates to the set of non-technical
goals, of which we will focus on three types; time, money (or budget), and market goals. All
projects except the 3rd-tap utilized some type of checkpoints or milestones to control the
timing and sequencing of activities, including market introduction of the product. These three
projects also used budgets, or else investment requests were prepared. Perhaps, since the 3rd-
tap effort involved a high degree of experimentation, the project leader did not want a specific
schedule or budget. Combined with the lack of distinct technical goals, this vagueness in
regard to time and money gave the developers potentially greater freedom of action in
relation to the administrators. However, the freedom of interpretation was probably more
limited.

Detailed specifications not only reduce uncertainty; they also put restrictions and pressure on
the team to produce an offering with a specific set of characteristics, on time, and on budget.
The more elaborate and numerically fixed the specification, technically and non-technically,
the less the team’s freedom of action and interpretation. (At least if sanctions and corrective control are likely to be used if the specifications are not met.) If no budget and schedules exist, it is more difficult for top management to claim that the project is not performing well. The more general the specifications, the greater the operating and strategic freedom of the development team. Our main point, however, is that goal specificity is a two-edged sword. While very specific goals may decrease uncertainty for the team, they may also inhibit them, mentally and practically, just as general goals increase uncertainty and freedom of action. 10

There were no formal market-related goals at this time, for any of the four international innovation projects. In the questionnaire, we asked the project leaders to describe the definition of their IIPs in terms of the goals that had been set. In this case, too, goals of a technical type dominated. As can be seen in the table below, in approximately 50% of the cases there were no market-related goals, such as final price to the consumer or market share.

<table>
<thead>
<tr>
<th>Goals</th>
<th>Time</th>
<th>Budget</th>
<th>Product performance</th>
<th>Quality</th>
<th>Manufacturing cost</th>
<th>Consumer price</th>
<th>Market share</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of cases</td>
<td>30</td>
<td>28</td>
<td>31</td>
<td>30</td>
<td>27</td>
<td>17</td>
<td>13</td>
</tr>
</tbody>
</table>

Table 5.5: Frequency of goals set in IIPs (n=31)

Building acceptance and commitment

Another significant activity during the conception and planning phase can be labeled acceptance- and commitment-building. Since none of the teams in the four projects had worked together before, they needed to be committed to the idea of the IIP itself. It is evident in the Alliance case that the US organization was less inclined to take part in the project from the start, so that Canadian management had to persuade them of the advantages of the project. The situation in the two ABB cases was similar in that the German organizations initially were not willing to take part. In both cases, BA managers appeared to hope that these units would later join the projects but generally took no specific action to gain their commitment.
The second aspect of acceptance- and commitment-building pertained to the goals and specifications. Here, in accordance with our earlier observations, the four cases differed somewhat. In the 3rd-tap effort, the future administrators of the product did little to commit the developers to the goals set, but rather just presented them. In the Alliance project, most actors seemed committed to the goals in an informal sense. However, since no formal market targets had been developed, the marketing organization, primarily in the USA, made no actual promises. Moreover, given that the more specific and technical product objectives were set more or less exclusively by R&D in Italy, it is at least questionable whether other personnel involved were (or would be) committed to the technical solutions in the long run. In the two ABB projects, the goal acceptance and commitment process was largely limited to the technical units that took part. In these cases, too, the lack of genuine efforts to win acceptance from marketing was apparent. Opinions were solicited, but then largely disregarded. No formal commitment by marketing to sell a certain number of products was established.

Problems in the conception and planning phase

In addition to minor technical disputes, two critical problems stood out during this phase; a) difficulties in finding the right point of reference for developing the specifications and positioning of the product, and b) reaching agreement across functional and geographical boundaries under time pressure. While other significant problems may well have arisen during this phase, their consequences could not then be identified by the people involved. Therefore, we will restrict our analysis at this point to the two fundamental difficulties that were already obvious to the managers of the IIPs during the conception and planning phase.

Evaluating the feasibility of a product concept

The positioning of a product is largely determined when the specifications are set, although later marketing efforts may be used to (re-)differentiate the offering further. Particularly in the two Electrolux cases, management and the others involved in the phase found it difficult to establish a point of reference against which the new product could be bench-marked. In the ABB cases, since the two projects concerned the development of new generations of existing

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products, the question related more to product improvements. To judge from our interviews, the difficulties involved in evaluating the feasibility of a new product concept have much to do with finding the answers to the following three questions:

1) What are the advantages and disadvantages of the concept compared to existing products available to target customers on the market - i.e., will value be added for the consumer?
2) What factors in the organizational environment will hinder and facilitate, respectively, the introduction of the new product - i.e., will the external network accept it?
3) Does the organizational architecture block or encourage the realization of the new product concept - i.e., can the company develop and successfully introduce the new product?

In our opinion, the following tentative and somewhat rough framework captures the more essential variables to consider. We will briefly apply our framework to the Alliance case, which is the richest in relevant background information, to illustrate some of the more critical issues facing management prior to the decision in favor of development.

Figure 5.5: A tentative framework for evaluating the feasibility of a new product concept
**Existing products:** For the purpose of comparing the Alliance concept with existing products available on the North American market, the critical issue seems to be whether a higher price is justified by the expected superior performance of the new washer and combo. However, it is questionable whether an Alliance washer is actually more expensive than competitor products. While the Alliance sales price is higher, the reduced consumption of water, electricity, and detergent over a 10 year product life cycle may make the washer less expensive in the long run. In addition, it gives a better wash, is quieter, and saves space; it is also gentler on clothes. The question, nevertheless, is whether customers can be convinced to base a decision to buy a washer on the “total economy” of the product. Further, one could suspect that the poor reputation of existing front-load washers might negatively distort consumer perception of the actual characteristics of the washer and combo. The front-loaded machine also holds some more intangible advantages, such as European design, and it could be argued that the combo version makes washing and drying more convenient. On the other hand, it appears that for North American consumers convenience in washing consists largely in not having to bend down to load the washer. Finally, the use of laundromats, which is generally more widespread in the USA than in Europe, might limit the market. However, these are used mainly by consumers with less purchasing power, rather than by the target customers for the Alliance products.

**External conditions:** In terms of matching the product concept with external conditions, the anticipated segmentation and trading-up of consumers, combined with a “green” trend, may prove favorable to the Alliance concept. However, consumers seem content with the performance of the present machines, and the Consumer Union magazine did not even consider washing results a relevant variable for evaluating washers. Electrolux also has a potential advantage in that the competitors on the North American market have limited knowledge of their own in developing, producing, or selling these types of machines. On the other hand, at least Whirlpool has access to these kinds of knowledge through Philips, and especially Whirlpool, but also Maytag and GE, dominate a market where the focus is more evidently on price/brand competition than on performance. Moreover, one is tempted to assume that in the long run it would not be impossible for some of the other major competitors from the USA, Europe, or even Japan, to develop a similar type of machine, although they presently lack the necessary resources, capabilities, routines, and experience.
Thus, the threat of semi-new entrants is apparent, although perhaps not alarming. The importance of suppliers is difficult to assess, at this point in time. However, it is conceivable that the development of the new product may well also require the development of a new supplier network, since suppliers of certain components may not exist in North America. Anticipated US legislation may be a major environmental facilitator; it could mean that the horizontal-axis technology is the only viable solution for the future. However, in this case one would probably expect some of the domestic companies with limited access to the technology to lobby and thereby at least postpone the legislation. Finally, it is important that companies in related industries are powerful and will therefore exert some influence over the future of the concept. First, Sears, which could be placed in this category, dominates the marketing channel; unless Sears accepts the front-loaded washer and combo, the market will be severely restricted. Second, as mentioned in the empirical description, detergent producers like Unilever and Proctor & Gamble are also strong. Since one of the advantages of the European type of washer is the use of less detergent, these companies may well act to prevent their market from diminishing by some 50%.

Internal architecture: From an internal vantage point, it seems clear that Electrolux has the knowledge and resources to develop the new products, although the technical assets are not co-located with the market(ing) ones. The total Electrolux Group no doubt can finance the effort. It is perhaps less certain that they have well developed administrative routines for leveraging information and knowledge across geographical borders, particularly since Alliance represents one of the first IIP attempts, at least in the Wet area. In the administrative hierarchy, support for the project is assured at the top, which initiated it, but its status throughout the US organization, including the management team, is more ambiguous. Further, the historical strategy of the firm shows more of an emphasis on exploitation than on creation. Traditionally, the creative elements at Electrolux are more geared to financial and industrial analysis followed by acquisition and integration of competitors, than to organic growth by technological innovation. Consequently, it is also open to question whether the company more generally has advanced routines for new product development. Finally, there is a potential problems in the fact that the co-ordinative structures of the firm are localized to a large extent. Because of the company’s polycentric history and the relative novelty of its
current asset structure, most integration mechanisms function more at the national or regional level, than at the transatlantic one.

The framework highlights some of the more important questions confronting Electrolux management and the Alliance project team prior to the launch of the project. Our theoretical reasoning, however, is primarily based on the reality that development of a new product in this international context is not only a question of technology. In fact, technology appears to be the least problematic aspect of Alliance. Though of course not always the case elsewhere, here the challenges seem as much related to changing consumer behavior by market(ing) development, and to realizing the concept by ensuring organizational integration across functional and geographical borders. Questions of timing, not only externally but also in relation to the internal architectural development, appear critical.

Reaching agreement under time pressure

The second important problem identified by many managers and team members during the conception and planning phase was related to the fact that they and the evolving team often felt rushed. This problem is evident in any innovation process, but in our view the difficulties are aggravated in an international context. Above, we described this phase as potentially marked by negotiations across functions and nations. Needless to say, these discussions take time. Three factors contributed in making discussions time-consuming. First, since the parties involved had different histories and traditions, time had to be spent on articulating fundamentals and basic assumptions usually taken for granted. Examples: whether a metric system should be used, what parameters to include in the product specification, the level of detail necessary when developing the specs, etc. Second, the political aspects referred to earlier naturally prolonged the process. The different technical units involved in both ABB cases wanted the new product to bear more resemblance to their own earlier generations than to those of the others, and the participants in the Electrolux projects argued for solutions based upon their own preconceptions and rationales. Third, since the actors were physically separated, more time passed as most day to day discussions were restricted to electronic media, i.e., telephone, fax, e-mail. For reasons of cost, meetings involving face-to-face contacts could not be held as often as most people wanted.
Related to the second point and our discussion above is the question of how the negotiations were resolved, how the product specifications were finally set. It has been argued that four principal ways to unravel such “conflicts” exist: a) all parties but one give in (voluntarily), b) a struggle after which one side dominates, c) compromise, and d) integration. In our cases, solutions of type four seem to have been relatively rare. Rather, since there appeared to be “little” tangible progress during the discussions, some managers feared that these debates could go on forever. To speed up the process, management in the two ABB cases chose different solutions. In the Holger case, many argued that the specification list was a transatlantic compromise that took no clear stance on merging the Master and MOD systems. In the M2000 project, management appears to have applied a “least common denominator” principle; only a core of non-negotiable common parameters were specified. In part, the principle in use seems to depend on how tasks and responsibilities were to be divided. The M2000 project differed in that there were clear lines of demarcation according to specialization in terms of product range. In the two Electrolux cases, in which R&D efforts were concentrated to one location, the specifications were more single-handedly determined by one party, although the views of the others were taken into account to some extent. Finally, it is worth noting that the two ABB solutions were largely the result of negotiations between technical functions from various countries, whereas the Electrolux specifications essentially emanated from one function, located in one country.

The conception and planning phase revisited

Throughout the analysis of the conception and planning phase, we have argued that the dispersion of complementary assets, often embodied in core competents (i.e., individuals with critical knowledge), and the desire not to disrupt critical linkages and relationships, more or less forced Electrolux and ABB to form international projects. The resulting processes of planning and conception were strongly influenced by the fact that actors from more than one function and country took part. Management had to devote considerable effort to merging and committing the different parties to the IIP, and also to the specifications and overall goals developed.
Variety in goals and differences in logic of action

One problem inherent in the modern MNC is related to the fact that functions have rather different perspectives, ranging from global to local, due to differences in geographical location patterns. In general, R&D is most concentrated, and marketing most dispersed, with manufacturing somewhere in between. As a result, the technical functions appear to follow a logic more focused on global standardization, while marketing is more inclined to argue for local adaptation. Further, whereas the goals of R&D are more linked to technological opportunities, the marketing function seems more focused on satisfying customer needs. Thus, the notion of pull or push, as discussed in the previous chapter, is perhaps more relevant here, in that the commercial function tends to think in terms of a ”pull”, while the industrial departments have more of a ”push” mentality.

Evident from our cases is that perspectives and goals may also diverge more generally among the hierarchical levels of the configuration. Top management displays a more global logic, by comparison with country management, here manifested in the global integration imperative underlying the IIP. Moreover, the logics of action may also differ from country to country, even within the same function, as a consequence of different historical strategies and structures. The almost intrinsic goal variety inherent in the conception and planning of an international project creates the basic conditions for the negotiation game that may follow. Further, this variety could result in more or less constructive tension, since the units involved in an IIP not only possess complementary knowledge, but sometimes also hold conflicting assumptions depending on functional, geographical, and hierarchical location.

Conflict avoidance - reduction of complexity and uncertainty

In most cases, it appears as if management temporarily avoided the differences in logic of actions and in goals rather than confronting them and seeking to integrate views and produce cross-national and cross-functional synergies. First, the more local logic of the marketing function was not brought to bear, since this function was largely excluded from the conception and planning of operations. With the R&D function in charge, technological opportunities rather than customer needs often guided the process - i.e., sometimes it seemed
more important to outperform existing competitor products than to research customer needs and focus on satisfying these. Second, since top managers were active in this phase, they could use the power innate in their position to prevent local mutiny. Third, the geographical differences most visible within the R&D function in the two ABB projects were also partially sidestepped, either by developing specifications that were a very general compromise, or by only agreeing on a core set of variables. Accordingly, in many respects considerable ambiguity and uncertainty would accompany the projects into the development phase.

Negotiation-game aspects were not as pronounced as one might have expected. Rather than taking on the task of integrating perspectives and handling conflicts, management merely quasi-resolved many of the differences. The process is best characterized as one of "problem pushing" as much as problem solving. It is our impression that the traditional and rather sequential routines for innovation at both companies more or less automatically prevented the marketing organization from having a more fundamental impact during this phase - product development was defined as a task belonging to the R&D department. Admittedly, the complexities involved in developing the specifications were reduced. A number of restrictions could be ignored, or avoided until later phases of the process. Evidence to this effect can also be found in the survey, i.e., in the limited use of market-related goals. This functional constraint, implicitly superimposed on the generation of problems and solutions, appears to have led to an "artificial" reduction of uncertainty, complexity, and conflict, at least temporarily. Representatives from the R&D function were given the more or less exclusive prerogative of framing the issue, i.e., of defining the problems and possible solutions. Consequently, almost by design many potential ideas and conflicts (or creative misfits) were postponed to future phases.

Nevertheless, at least in the two ABB projects, some bargaining went on during the development of the product specifications and other goals. However, as noted above, these negotiations were essentially restricted to the technical function. During the process, the different units sometimes came to use the power stemming from their position in the administrative structures, and from their access to critical assets. The sequence of events appeared to be generally as follows: First, underlying assumptions concerning the desired characteristics of the new product and how it should be developed were articulated. Second,
guided by the general concept inherited from the stimulus phase, the units generated problems and started to search for the knowledge necessary. In our cases, and especially when technology was concerned, the generation/search was largely restricted to the organization itself, i.e., to the actualization of existing knowledge. This knowledge was then either utilized locally or transferred to other units. Third, the proposals and solutions sometimes differed, and the determination of specifications and goals involved the resolution of these differences by the parties involved. Reaching an integrated agreement was occasionally difficult, since information and knowledge were not objective. Depending on the underlying assumptions, the same information could be given a variety of meanings; interpretations tended to be consistent with individual advantage. Finally, by merging perspectives, compromising, or letting someone dominate, the project team could proceed to the next phase. The process as we view it is illustrated below.

Figure 5.5: Critical activities and factors in the conception and planning of the IIPs

The influence of the organizational architecture

To sum up, also during the conception and planning phase, the influence of the organizational architectures of the two companies was visible. The geographical dispersion of critical and complementary assets drove the firms to set up international projects. Once planning had started, the traditionally sequential routines for innovation seemed to allocate this activity to the technical units, thereby largely excluding at least the marketing function and its
requirements. The nature of these requirements could also be linked back to the organizational architecture. Since the marketing function was more dispersed than the others, this department tended to follow a logic more focused on local adaptation. Differences in logic could also be found among the different levels of the administrative hierarchy. In general, the closer to the top, the more global the logic.

The task of defining the product specifications was made less complex, and uncertainty was reduced, by postponement of problems to future phases. Moreover, many potential conflicts were temporarily avoided. When there were multiple actors within the R&D function, or when major marketing companies took part in the venture, these units used their asset bases to influence the process. Both internal assets and access to an external network were utilized. The impact of the organizational architecture is summarized in the table below.

<table>
<thead>
<tr>
<th>Type of structures</th>
<th>Variable</th>
<th>Influence on innovation process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asset structures</strong></td>
<td>Dispersion of complementary assets</td>
<td>Promote international formation</td>
</tr>
<tr>
<td></td>
<td>Functional location pattern:</td>
<td>Affect functional logic of action:</td>
</tr>
<tr>
<td></td>
<td>- Concentrated</td>
<td>- Global logic</td>
</tr>
<tr>
<td></td>
<td>- Dispersed</td>
<td>- Local logic</td>
</tr>
<tr>
<td></td>
<td>Access to critical assets</td>
<td>Provide means to influence process</td>
</tr>
<tr>
<td><strong>Administrative structures</strong></td>
<td>Location in hierarchy:</td>
<td>Affect positional logic of action:</td>
</tr>
<tr>
<td></td>
<td>- Top-management</td>
<td>- Global logic</td>
</tr>
<tr>
<td></td>
<td>- Subsidiary management</td>
<td>- Local logic</td>
</tr>
<tr>
<td></td>
<td>Nature of innovation routines:</td>
<td>Influence functional participation:</td>
</tr>
<tr>
<td></td>
<td>- Sequential routines for innovation</td>
<td>- Give the right to frame the issue to the technical function(s), and lead to temporary reduction of conflicts, complexity, and uncertainty</td>
</tr>
</tbody>
</table>

Table 5.6: Structures influencing behavior in the ABB and Electrolux IIPs

Summary of the chapter

In this chapter we have described and analyzed the conception and planning of the IIPs. We focused on three sets of questions. First, why did the projects end up as international ventures? Second, how did activities in the phase proceed? Third, what major difficulties and problems were encountered?
We started the analysis by suggesting that the four projects were formed as international ventures because of the geographical dispersion of complementary knowledge and resources, and/or because of relational or political considerations. In the Alliance case, it was primarily the dispersion of technical, manufacturing, and market knowledge that necessitated an international project. In addition, also the desire to avoid the NIH (Not Invented Here) syndrome in the USA made it difficult to exclude this unit. The 3rd-tap project had to become international since manufacturing resources were only available outside Sweden. Both ABB projects were furthered by the fact that complementary knowledge was geographically dispersed, and often manifested in a few critical individuals working in different countries. We refer to these individuals as ‘core competents’. Political considerations were also discernible. In the Holger project it was important to commit the US organization as well as the US market more generally. The M2000 project was partly driven by the desire not to lose critical individuals or enthusiasm in the units located outside Sweden.

The answers from project leaders and R&D managers in our survey appear to support our interpretation, although the R&D managers seem to follow more of a systemic and political logic than the project managers. Thus, we suggest that although the mergers and acquisitions of ABB and Electrolux left them with considerable duplication of assets, much of the important knowledge geographically distributed among the various organizational units was complementary. Combined with the aspiration not to disrupt critical linkages, internally and externally, this complementarity “forced” them to form international projects.

All projects except the 3rd tap had multinational participation during the conception and planning phase. However, multifunctionality was not co-ordinated, as the functions were separated in terms of tasks performed, of time, and sometimes also in space. Further, in our cases, as well as in the survey, there was a clear bias toward letting the R&D function take charge. In effect, the country(ies) in which the R&D unit(s) was (were) located became the informal leader(s) of the projects.

The phase revolved fundamentally around the development of product specifications, and overall goals or objectives. In the two Electrolux projects, there were visible aspects of a negotiation game between the technical and marketing functions. However, in both cases the
technical function dominated to such an extent that it is doubtful whether negotiation is an appropriate term for the pattern of interaction. In the ABB cases, bargaining went on primarily between the geographically dispersed technical units. The different units used power based on their position in the administrative structure, and on their access to critical assets, to influence the process. Rarely did any external actors take part in the negotiations, or more generally in the conception and planning of the projects.

We describe the conception and planning phase as a process marked by problem generation and knowledge creation, aimed at uncertainty reduction. Three types of uncertainty are identified: uncertainty as to a) what will be the characteristics of the new product, b) how (in technological terms) will the team meet the specifications, c) who will be responsible for meeting the objectives? We suggest that elaborate specifications may reduce uncertainty, but may also decrease freedom of action for the team in later stages. In general, the projects (with the exception of the 3rd-tap venture) developed detailed technical goals, as well as time and budget restrictions. In none of the cases, however, were market-related goals specified. The survey also shows that these types of goals were absent in 50% of the projects. Thus, while problems of a technical nature were generated and solved, those relating to the requirements of the other functions were often ignored at the time.

The other significant activity, which went on in parallel with the negotiations was what we label commitment building. Since the four HIPs were the first attempts to work in constellations of this kind, it was important to commit all participating units to the idea of an international project in the first place. Moreover, it was critical to obtain the commitment of the participants to the specific goals which evolved during the course of this phase, or at least to persuade them to accept and respect these goals.

Two significant problems were identified by the managers during this phase. First, it was difficult for them to find a clear point of reference when developing the specifications and positioning the product. Second, they often felt rushed by having to reach agreement across functions and countries under the pressure of time. We suggest that the first problem relates primarily to the fact that the new product must be positioned not only in relation to existing products, but also more generally to the external conditions on the focal markets, and to the
internal organizational architecture of the firm. In effect, new product development is not only a question of technology but also one of market development. In addition, it raises issues of organizational integration. The second type of difficulty was related to management perception that little tangible progress was being made during the phase; management feared that the cross-functional and international discussions could go on "forever". This tendency was less pronounced in the Electrolux cases, in which one function in one country was in charge. As for the two ABB cases, some claimed that in the Holger project there was an attempt to develop specifications that would incorporate all features of the two different systems, without really taking a stance on merging them; by contrast, only a core of non-negotiable parameters was set in the M2000 case.

We concluded the chapter by suggesting that the different actors taking part responded to different kinds of logic in global-local terms. The consequence was a variety of goals depending on function, nation, and level in the administrative hierarchy of the MNC. In our case, it seemed as if most of the inherent friction was avoided (at least temporarily) rather than actively managed. Sometimes, there was as much evidence of conflict avoidance as of the reduction of genuine uncertainty. We attributed these phenomena to the use of the traditional and often sequential routines for innovation resulting from the organizational architectures of both firms. These routines tended to exclude the marketing organization from conception and planning, thus leading to temporary reduction of conflict, complexity, and uncertainty.

In all, the nature of the asset structures influenced the international formation of the projects, the functional logic of action, and access to critical assets could provide means to influence the process. The administrative structures affected positional logic of action. Moreover, these structures tended to influence who (functions and countries) got to take part in the conception and planning of activities.
Notes to Chapter 5

1 For reasons of space only two vertical axis top-loaders rated are used as benchmarks, but the results of the others did not differ significantly.

2 See Hedlund and Riddervall (1993) for the original idea of core competents as carriers of the critical knowledge in organizations.

3 It is sometimes argued that the more specific the goals, and the greater the acceptance of them and commitment to them, the higher the performance that can be expected. See Callahan et al (1986), referring to Locke et al (1981), and Locke (1982), for empirical support. In addition, it is argued that difficult goals generally lead to higher performance. We choose not to discuss this point, since we believe it too difficult to judge this aspect without being technologically knowledgeable in the specific areas under investigation.

4 See Cyert and March (1963) for a discussion of organizations as coalitions, where goals and objectives are set as a result of bargaining processes. Also see research on game theory, e.g., Milgrom and Roberts (1992) for an outline of the basic ideas.


6 See Schein (1986) for a discussion of different cultural sets to which people belong.

7 See Takeuchi and Nonaka (1986) for a discussion of the concepts of rugby and relay in new product development.

8 For a discussion of individuals and organizations as reducers of uncertainty, see Cyert and March (1963), Sjöstrand (1985).

9 The distinction between freedom of action and freedom of interpretation is further developed in Stein (1993).

10 See Sjöstrand (1985) for a discussion of the difficulties associated with combining independence and certainty.

11 Our tentative framework is based on a relatively broad theoretical base. The variables included in the internal architecture follow our own model developed in Chapter 1. The conception of external conditions draws to some extent upon variables included in the industrial organization (IO) frame of reference, e.g., see Scherer (1980) and Porter (1980). It is also influenced by more network-oriented approaches, e.g., see Håkansson (1987). Finally, as for the factors associated with comparing the new concept with existing products, much is owed to Rogers' (1983) work on the diffusion of innovations.

12 Naturally, if the product is aimed at more than one region, or a more heterogeneous region than North America, the characteristics of both external conditions and existing products are more difficult to interpret, as they may vary from country to country.

13 Provided that the new front-loader uses half as much detergent and half as much electricity (see table 4.2) as the best top-loaders, the following annual savings seem reasonable, given that an average North American family uses some 25 bottles of liquid detergent/year priced at 5 dollars a bottle:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual savings in detergent consumption:</td>
<td>62.5 dollars</td>
</tr>
<tr>
<td>Annual savings in electricity consumption:</td>
<td>26.0 dollars</td>
</tr>
<tr>
<td>Total annual savings:</td>
<td>88.5 dollars</td>
</tr>
</tbody>
</table>

Thus, even though the front-loader may seem more expensive than the best top-loaders, if we view the total economy of the two machines, the European type of washer would seem less expensive over a 10 year product-life cycle (even if the initial saving of some 300 dollars is deposited in a bank account in year one). Furthermore, we have not accounted for the savings in water consumption, and reduced wearing of clothes, which would further improve the position of the front-loader.
These four types of conflict-resolution mechanisms were suggested by Mary Parker Follet, see Graham (1995). Also see Norman (1975) who refers to a) compromise, b) expulsion, c) over-legitimization, d) incongruence, and e) synergies.

See Cyert and March (1963) for a similar argument.

See Norman (1975) for a discussion of creative and destructive misfits.

See Cyert and March (1963) for a discussion of quasi-resolutions of conflict.
CHAPTER 6

MANAGING THE DEVELOPMENT PHASE

Introduction

In this chapter we will follow the four IIPs through the development phase, until when the new products were ready to be transferred to manufacturing. Once more, we will also utilize material from the survey to complement our qualitative interpretation. In addition to outlining the main events that took place during the phase, we will focus on four general questions. First, how were the projects organized, and how were roles and responsibilities distributed? Second, what management systems and co-ordination mechanisms were used? Third, how were co-operative arrangements (if any) with external partners managed? Fourth, what major problems were encountered?

We will use our empirical material somewhat different as compared to the last two chapters. To acquaint the reader with the development phase, we will start by describing the main events in the Alliance project. (The case which we studied in greatest depth). We will then return to the four questions presented above, and also use empirical examples from the other cases and the survey. We hope that this sequence of presentation will help the reader to grasp the essentials of the process, as well as to focus our analysis and interpretation on what we consider to be critical issues.

Development - moving toward commercialization

Alliance

In the summer of 1989, a new plan to move the “Z-washer” from Mansfield to Cambridge by the end of 1990 was requested by top management. The time constraint made
it urgent for the Alliance team to meet and arrive at solutions, primarily regarding the outer tub and inner drum. Unfortunately, neither US nor Canadian marketing could take the time to attend the meeting that was scheduled for September in Italy. Instead, it was decided to limit the meeting to technical matters and to hold another one with more of a marketing focus, later on. Furthermore, a decision to stop market research in its original form had been taken at the Canadian and US board meetings in July. The marketing study would therefore be done in-house. However, the future marketing meeting would have to be held without any substantial input from a study of customer expectations and reactions.

The September meeting centered around issues that were linked to the technical aspects of Phase I, Phase II, and Phase III of the new strategy. The meeting included a discussion regarding the relative merits of various tub sizes and of enamel or stainless-steel tubs. Pordenone had many years of experience with stainless-steel tubs, which were considered standard in Europe. Tooling costs were roughly identical, but enamel tooling was less complex and less time-consuming to prepare. Consideration also had to be given to the fact that Cambridge did not have porcelain facilities and therefore would have to turn to outside vendors. The committee concluded that the costs of a steel-porcelain versus a stainless-steel tub needed to be evaluated. A possible alternative was to use a powder coated steel tub or a plastic tub; the latter could be very cost effective. Changing the design to a plastic tub, however, could create problems, since the washer/dryer project would be delayed by half a year because of technical obstacles. Moreover, the fact that both stainless steel and plastic were significantly more expensive in the USA also created problems with the support belt of the tub. Should it be made of plastic or welded-on brackets?

Differences between the two continents and their traditional ways of designing and manufacturing washers surfaced repeatedly. For instance, it was necessary to decide on the type and technology of the counter-balance, since this item affected tub design. Mansfield was accustomed to high-density hematite, while Zanussi had always used low-density concrete. Once again, the costs had to be determined and analyzed, and the method matched to the skills available in Cambridge (Canada) and the supplier network of that unit. Perhaps it would be more cost effective and otherwise preferable to import material and components from Europe? Canadian purchasing, together with personnel from the other three countries, had to address all these questions as soon as possible.
Other issues that were brought up during the meeting included: discussions with suppliers of equipment, redesign of tooling and drawings for cabinets, preparation of an investment request, and a feasibility study of manufacturing the Webster City dryer in Canada. The steering committee also felt that additional information was required to determine whether the existing Mansfield cabinet or a new European design was more desirable from a marketing viewpoint. Finally, an updated capital-cost analysis was needed. For each specific issue discussed, individuals or units were appointed with responsibility to take the necessary action, and a new preliminary time table was established.

Early in 1990, the results of the first marketing study were ready. A ranking of the importance of different washer characteristics revealed the following:

<table>
<thead>
<tr>
<th>Washer characteristics</th>
<th>Mean</th>
<th>Percent of “10”s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning ability</td>
<td>9.57</td>
<td>81</td>
</tr>
<tr>
<td>Reliability</td>
<td>9.56</td>
<td>81</td>
</tr>
<tr>
<td>Durability</td>
<td>9.49</td>
<td>74</td>
</tr>
<tr>
<td>Overall quality</td>
<td>9.41</td>
<td>68</td>
</tr>
<tr>
<td>Warranty</td>
<td>9.05</td>
<td>61</td>
</tr>
<tr>
<td>Gentleness on clothes</td>
<td>8.85</td>
<td>54</td>
</tr>
<tr>
<td>Energy efficiency</td>
<td>8.74</td>
<td>49</td>
</tr>
<tr>
<td>Load capacity</td>
<td>8.50</td>
<td>41</td>
</tr>
<tr>
<td>Does not tangle clothes</td>
<td>8.40</td>
<td>47</td>
</tr>
<tr>
<td>Ease of operation</td>
<td>8.40</td>
<td>38</td>
</tr>
<tr>
<td>Cost of operation</td>
<td>8.33</td>
<td>38</td>
</tr>
<tr>
<td>Quiet operation</td>
<td>8.21</td>
<td>38</td>
</tr>
<tr>
<td>Ease of loading/unloading</td>
<td>8.16</td>
<td>36</td>
</tr>
<tr>
<td>Price</td>
<td>8.08</td>
<td>40</td>
</tr>
<tr>
<td>Ease of understanding controls</td>
<td>7.84</td>
<td>36</td>
</tr>
<tr>
<td>Easy on environment</td>
<td>7.69</td>
<td>33</td>
</tr>
<tr>
<td>Amount of water used</td>
<td>7.45</td>
<td>30</td>
</tr>
<tr>
<td>Amount of detergent necessary</td>
<td>6.93</td>
<td>21</td>
</tr>
<tr>
<td>Floor space necessary</td>
<td>6.55</td>
<td>23</td>
</tr>
<tr>
<td>American made</td>
<td>6.10</td>
<td>21</td>
</tr>
<tr>
<td>Brand name</td>
<td>5.78</td>
<td>14</td>
</tr>
<tr>
<td>Electronic controls</td>
<td>5.75</td>
<td>11</td>
</tr>
<tr>
<td>Style or appearance</td>
<td>5.61</td>
<td>10</td>
</tr>
<tr>
<td>Color</td>
<td>4.49</td>
<td>9</td>
</tr>
<tr>
<td>European design</td>
<td>3.05</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 6.1: Importance of washer characteristics (1-10 scale, 10 meaning very important)

Market/brand potential for the washer and washer/dryer were estimated; 6.5% of the respondents indicated that they definitely would buy a front-loader, but when given the option of a laundry center, the purchase intent for the front-loader dropped below 5%,
indicating a 30% "cannibalization". Taking this factor into account, the total US market for front-loaders was estimated at slightly over 163,000 units annually. Those customers who selected the front-loader liked its appearance, particularly the control panel, energy savings, and the small space required. Water and detergent-use efficiency, however, though often presented to the consumer, was cited less often than energy savings as a selection criterion or benefit. Furthermore, these customers were more likely to be unmarried, divorced or separated, male, age 20-40, and currently not owners of a washer. They were average in their attitudes toward the relative importance of washer characteristics. A full 75% of those indicating purchase intent said that they would stack the units rather than set them side by side. Consumers who rated the front-loader units last disliked the limited capacity, found them difficult to load and unload, and considered it poor quality construction. Additionally, many just generally disliked its appearance. Suggestions for improving the front-load unit were to increase capacity, simplify the instructions, add lights, and make it top-loading.

As for the washer/dryer combination, approximately 4% of the participants responded that they would definitely buy the machine. These consumers were impressed by its small size, energy savings/efficiency, design, and style. They were more likely to be younger, single, to reside by themselves in an apartment or condominium, not currently own a washer, to have very limited laundry space, and to wash fewer loads of clothes. In general, these people were less concerned about every aspect of washing. They rated all characteristics but four (European design, floor space necessary, easy on environment, and energy efficient) as lower in importance than did the average consumer. They were also much less concerned with load capacity, and ease of loading/unloading. Some 80% of them indicated that they would use the appliance as the only washer/dryer in their home. Those more likely to use it as an additional unit were from large households (5+ people) and had very high incomes (over $80,000 annual household income). Among those consumers who selected the combo unit as the first alternative, or showed a positive purchase intent, the most frequently mentioned location for installation was the kitchen. Suggestions for improving the washer/dryer included increasing capacity, making it top-loading, simplifying the controls, and clarifying the instructions. Consumers tending to disfavor the concept stated their dislike for the fact that they could not wash and dry at the same time. They were also afraid that combining the washer and dryer would increase the risk of break-downs.
At the next meeting of the steering committee, in Pordenone in February, 1990, the development schedule was reviewed by Mr. Sburlino. The first drawings would be ready by the end of March, and a functioning sample washer was to be sent to Canada the following month. Nine prototypes, including one combo, would also be available in April. Camille Menier, Vice President of Engineering WCI Canada, presented a projected manpower plan (see Figure 6.1) and remarked that four candidates had expressed their desire to become project manager, but had all declined at the last minute because of expected long stays in Italy.

![Manpower plan - organization of the Alliance project, (number of persons)](image)

**Figure 6.1**: Manpower plan - organization of the Alliance project, (number of persons)

Mr. Menier added that the company was still actively seeking a person for this critical position. Perhaps stays in Italy could be more frequent but shorter? For the time being, the position was temporarily filled by Mr. Kaye from WCI Canada. Janet Felmeth, the Product Planning manager at WCI Canada, reviewed the market survey, and Mr. Stråberg advised that a follow up study should be made to identify prospective niche-market customers. Mr. Tom Kaczmarek indicated the following expected volumes for washers and combos:

- **First year of production**: 68,000 units/annum
- **After three years**: 150,000/200,000 units/annum
The company was also investigating the possibility of selling 10,000 to 15,000 units (washers and combos) in Europe, primarily in the UK, France, Switzerland, and Scandinavia. The first product-cost estimates, however, would not be available until the next meeting, in April. In addition to reviewing the marketing and general specifications, the committee concluded that certain technical considerations; the “tub-material and counterweight problems” remained to be solved. Mr. Stråberg stressed the following considerations:

1. Components should be from local sourcing when possible.
2. Design flexibility should be maintained for both the American and European versions.
3. Start-up investment costs should be kept to a minimum.
4. The original investment should not exceed 15 million Canadian dollars.

Two months later, the team met again in Columbus, Ohio. The objectives presented by Mr. Hane were to freeze the specifications, to look over the meetings for the rest of the year, and to determine who from the US organization would be responsible for marketing. A prospective project leader had been found at WCI USA, but he did not take part in the meeting and eventually never joined the team. The project structure had been revised to the following:

![Figure 6.2: Revised organization of the Alliance project, (number of people)](image)

No Italian took part in the meeting, but the team could still conclude that product development was proceeding as planned. Pre-prototype laboratory activities had been
concluded with good performance results, and design as well as drawings of the basic models were completed. A preliminary bill of materials had been supplied by Zanussi, but cost estimates of components that were not common to the Group had been requested but not yet furnished. Product costing was not under control, and at the upcoming presentation of the Business Plan (including profitability, product cost, investment, etc.) to Leif Johansson on June 18, they would only be able to cost the washer completely, whereas combo costs would have to be estimated.

Construction of prototypes had started and were expected to be available by the end of the month. A preliminary study of possible equipment had also been conducted, and factory space had been allocated. Investments were required for the: a) drum factory line, b) tub manufacturing line, c) bulkhead press line, d) cabinet manufacturing line, e) assembly and material handling, f) production control, and g) tooling.

During the meeting, product specifications were reviewed and finally set, although a review of washing programs was deemed necessary. It was decided that the outer tub would be stainless in view of high enameling costs. Decisions regarding the styling, type, and different locations of the knobs for the control panel needed to be taken as soon as possible. The first US and Canadian line-ups were presented. These two were to be unified, and the team had to decide on a base model. Further co-ordination and consideration were also required to ensure sufficient differentiation.

Market research was now moving into phase two, which would include confirming the definition of the niche and further estimating sales volumes. It was decided to proceed, with financing to be shared equally by the US and Canadian organizations. A brief review of phase one was presented, and a US sales forecast prepared by Mr. Kaczmarek was discussed. The preliminary marketing plan covered five primary areas: a) situation/background analysis, b) opportunities, c) strategies, d) target sales and market share, and e) US Alliance five-year income statement summary.

In addition to the background data and opportunities mentioned earlier, the marketing report was focused on pricing, distribution, and promotion. Mr. Kaczmarek concluded that pricing to Sears would require intensive negotiations, and although the product would be competitive and offer superior performance, opportunities to raise prices would be minimal unless the entire industry changed. The team also had to consider that few washers sold for more than $600. This high-end segment was largely dominated by Maytag. The combo
machine, however, might offer a chance to improve margins and generate incremental sales, assuming that it could be priced advantageously in relation to the stack and console front-load pair.

The critical channel for retail availability was believed to be through Sears. Not only would WCI be in Sears' catalogue and more than 850 stores, with well over 30% of total US sales, other dealers would also be encouraged to carry and market front-loaders and washer/dryers. The builder channel could be an important outlet for the front-loader, but it would also put WCI into head-on competition with White-Westinghouse and Frigidaire 27" laundry centers. Fast moving "super-store" floors would perhaps not be the best retail environment. Specialty retailers positioned to meet the needs of various niche segments would, on the other hand, play a major part in the overall distribution strategy, suggesting that both Frigidaire and White-Westinghouse ought to control their distribution by using a franchising concept involving those dealers who were willing to support front-loading. The following estimates for front-loaders and combos were presented.

<table>
<thead>
<tr>
<th>Estimated US Front-load potential</th>
<th>W-W and Frigidaire</th>
<th>Sears</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>23,123</td>
<td>41,663</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated US Combo potential</th>
<th>White-Westinghouse</th>
<th>Frigidaire</th>
<th>Sears</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>5,959</td>
<td>7,560</td>
<td>34,356</td>
</tr>
</tbody>
</table>

| Total both units                  |                    |            |       |       |
|                                  |                    | 99,142     | 63,500|

Table 6.2: Estimated sales of Alliance washers and washer/dryers in the US (units/year)

The company would be heavily dependent on Sears. One problem recognized by the committee was that the Sears business could not be guaranteed, as Sears did not sign contracts in advance. Moreover, Sears had not yet been informed about the combo, nor had they been told about the possible changes in Mansfield. Past experience indicated that Sears should be involved in phase-two market research. However, Mr. John Price, Director of Marketing Information at WCI USA, could not contact Sears until the combo and Mansfield
issues had been covered with Sears representatives. Whether or not to include Sears in the project had to be decided on a higher level than the meeting, which therefore made no decision as to the precise action to be taken.

As for promotion, in view of the need for sound financial planning, and the relatively narrow consumer target area, national advertising should be limited to printed media, more specifically using publications appealing to the characteristic lifestyle of the consumer targets. This effort should be national and well merchandised with the "franchised" dealer base, as well as complemented with local mass media on a spot-market basis where there was a concentration of target customers and good product availability. The latter would be of special significance in areas where water, energy, and the environment in general were particularly sensitive issues. Local dealers should be given the tools and resources to augment national efforts with advertising and promotional materials that related to and leveraged the national campaign. These could consist of ad slicks, radio scripts, direct mail, door-knob hangers, flyers, and a full array of in-store material. Public relations at the national and local levels had to be a key element of support for the new products. Substantial advertising and promotional funds were required to take advantage of the growing interest in water, energy, and environmental protection. In addition, merchandising and promotion incentives were necessary for dealers and retail sales personnel. The advantages of the new washer and combo could be complicated and time-consuming to explain. For success, it was essential to give dealers a good reason to carry and sell the products.

During the year that followed, "Alliance" finally obtained a project leader, although the formal title was project co-ordinator. Mr. Bustamente, an engineer in his mid-thirties, was recruited by WCI Canada from outside the company. Since he was not an expert in the wet area, he spent half a year with the Italians in Pordenone. After having returned to Canada, however, he soon left WCI for employment elsewhere. He was replaced eventually by another person, and finally by Mr. Aldo Marucchi, an engineer in the mid-forties recruited from outside the organization. The actual project leader, however, was Mr. Hane, who made all decisions of any magnitude. Moreover, Tony Hane was also regarded by both the Italians and the US people as the team leader in reality, particularly after the project had lost one of its key initiators, Mr. Folke Andersson, who left R&D and the Alliance steering committee to set up "New Products", the new application-oriented development department in Sweden.
An unexpected difficulty arose when the US personnel realized that the program time, which had not been included as an item in the original specifications, for the Alliance washer, as for the average European washing machine, was 10-15 minutes longer than for a typical North American machine (see Table 5.5 in the previous chapter). The Americans insisted that the "Alliance" machines had to meet this constraint: to sell on the US market; it was essential not to give competition the argument that the new product took longer to complete its program. Moreover, the cycle time of a dryer was 45 minutes, and it was critical that the two appliances finished simultaneously. Initially, the Italians neglected their arguments. To them, 10 or 15 minutes more or less did not matter. No European customers had ever complained on this point. The Italians were upset, after having spent more than a year to arrive at the best design for the North American market, they were required to redesign the washer. After long discussions, the Italians finally realized how important this parameter was to the Americans, though never why it was important, and started working on decreasing the cycle time.

In the beginning of 1991, the Swedes and Italians concluded that the "Alliance" project was nearing completion. All the principal technical problems had been solved, although much testing remained. However, the Italians were still sending new drawings to the Canadians, who therefore believed much work remained before test manufacturing could begin. During the steering-committee meetings, discussions on technology continued. When the team met in Chicago, on March 15, 1991, concern was expressed about wrinkling due to high spin speeds. Mr. Sburlino explained that water cool-down before spinning, combined with a slow ramp-up, would prevent this problem. Other sources of difficulty were the gap between the washer and the US dryer - to be remedied by Webster City personnel, and the need to drop the auto-advance to pre-wash as a feature after a fault/hazard analysis.

The two most intricate technical problems, however, were related to the door and the timer. The North Americans claimed that the door hinge was not strong enough, particularly if someone leaned on it for support in standing upright after stooping. Mr. Sburlino stated that the door was as strong as it could be, given that it was round and only had one point of contact; the hinge was also causing problems in Europe. He suggested a square door with two contact points, and together with Jim Hughes, an industrial engineer from WCl USA, he would explore the possible use of a dryer door. They also needed to conduct a cost analysis of this square door to decide whether to use a plain door (for semi-professional users), a door with glass, or other options. A final problem concerning the door was related to the fact that
the anticipated supplier had to be abandoned as it was too closely associated with Whirlpool. As for the timer, it was too stiff. This judgment showed a difference between Europeans, who perceived a firm timer as an indication of quality, and North Americans, who appreciated an easy-to-set and quiet timer. By this time, production had been pushed forward to mid-1993.

Although technical subjects surfaced throughout the meeting, the more strategic ones dominated. The Canadians felt that the Swedes and the Italians had begun to hesitate as to whether to develop the washer/dryer at all, fearing arguments that development costs were becoming too high and Italian unwillingness to set aside the resources necessary. Like all others involved in the project, the Italians also had to take care of more local, day-to-day business, and thus did not work 100% for Alliance. Most of them were involved for shorter periods of time, and even then usually less than full-time.

The Italians conceded that the combo was a natural extension, but claimed that they needed to start with the washer since it was less complex to manufacture. By so doing, they would help to build competence at the Canadian subsidiary. Mr. Sburlino assured Tony Hane that deleting the combo would not reduce washer costs. Furthermore, Mr. Stråberg presented a generation-plan chart to show the timing for introducing models. To be able to "box in" the competitors and attack them on two fronts, it would be necessary to develop the combo washer/dryer and eventually also to launch an economy model of the washer.

The production dates for the Alliance washer and combo had still not been determined. Cash flow, product-development expenditures, and product costing would all influence the future date. Mr. Hane, in particular, needed further reassurance on costs before proceeding with an investment request. Officially, costs were now at a level which would permit retail prices of 998 dollars for the washer and 1298 dollars for the washer/dryer. In the case of the washer, the price should be compared with those of competing products from Whirlpool, Maytag, and GE ranging from 589 dollars to 689 dollars. At the same time, sales forecasts for the US and Canadian markets had been adjusted downward by some 10%. Various possible cost reductions were mentioned, including a change from the stainless drum to painted cold-rolled steel. New cost comparisons of various drum materials needed to be made. Although the product would be superior, it was questionable whether the US customer would pay as much as a 50-60% premium price. Mr. Kaczmarek from US marketing claimed that despite growing environmental awareness for "green" products, there was little evidence that consumers were willing to spend one cent more.
Apart from the limited volumes, the other main reason why costs would be high was that many components had to be imported from Europe. The problems were mostly related to the lack of a network of suppliers in the USA or Canada. The Italians tried to convince some European suppliers involved in the development efforts to locate in North America. These suppliers were favorable to the suggestion, but only if the volumes were sufficient - above 500,000 units annually. In addition to the main objective of lowering costs, the Canadians were anxious to contract North American suppliers to build a network for the future. The Italians, on the other hand, preferred European suppliers during the early phases of the development process. These were more accustomed to participating in development efforts and already knew the type of components to be developed. The Canadians considered that European suppliers were too expensive and contacted them to bargain.

The changes in 1990 and the first months of 1991 were modest by comparison with those to come. In parallel with the development of “Alliance”, North American operations underwent yet another phase of restructuring. The result was that the manufacturing unit in Cambridge was closed down, while Canadian production of top-loaders was transferred to Webster City, and of the ”cash-cow” product, a refrigerator, to another plant in the USA. The US organization was still not very interested in the Alliance concept, especially as costs seemed very high, and as the new investments in Webster City had not been flexible enough to allow for manufacturing a front-loader without expensive adaptations. Since the Canadians, on the other hand, were clearly committed, Group management decided that “Alliance” was to stay with the original owners, though it would be placed with the L’Assomption unit outside Montreal. This unit was basically involved in “hot” products and had no prior experience in producing washing machines, or any other “wet” products for that matter. Without question, the unit was motivated, but many in the US organization claimed that the reason why the project ended up at Montreal was to compensate the Canadians for the loss of their ”cash-cow” product. By this time production was expected to start late in 1993.

Meanwhile, increased ecological awareness, combined with years of severe drought in the south of the USA had led to a demand for lower water consumption in washing machines. In addition, the Department of Energy (DOE) had asked for dramatic reductions in energy consumption of washing machines, with targets for 1995 and 1999. As a consequence, the horizontal-axis concept started to be seriously considered as the washing technology of the future for North America, with mass production not far off. An internal market study
undertaken by Electrolux showed that as many as 12% of US consumers wanted a front-loaded machine. At this point Webster City suddenly became more interested in the concept, and launched a project of its own called "Horizon II" in February, 1992. The aim of this project was to develop a 85 liter top-loaded horizontal-axis machine like the one manufactured and sold in France.

Not everyone in the Alliance project welcomed the US initiative, although it indicated that the concept had been correct from the start. Horizon II also made it necessary to start coordinating activities more closely. At an Alliance product council meeting in Chicago, on April 28, 1992, the team discussed the new developments. Mr. Stråberg emphasized that the "enemy" was outside the Group, not within, and that the new project should not be seen as a move by the US organization to take over the concept. He pointed out that if Alliance failed, there would be no Horizon II. The lack of cooperation had already caused problems. For instance, the new US cabinet had not been designed to be of the same size as the Alliance one.

As outlined earlier, Alliance was to source some European components. If Horizon II quantities could be added, local sourcing might be justified. Perhaps the European producers of certain elements, primarily the motor and the timer, could be persuaded to set up operations in North America. Of a total 298 components, only six at this point would be imported from Europe. On the other hand, these components accounted for almost 30% of total purchases in terms of costs. The 16 components imported from the USA corresponded to some 25% of total purchase costs. If local sourcing could be secured, and combined sales of some 500,000 units could be realized, direct material costs of the washer could be decreased by 20%. Moreover, by not using the entire reduction of input costs to lower the prices of the Alliance washer and combo, but to position these appliances as high-end products with retail prices of 699 dollars and 999 dollars, respectively, it would be possible to increase margins, and thus over time also accumulated profits. Internal figures showed that an accumulated contribution of over $150 million four years after market launch was within reach. A team from all four countries (Sweden, Italy, USA, Canada) was set up to ensure the use of common components. Mr. Aldo Marucchi, the new project co-ordinator, who did not take part in the meeting, was to represent the Canadians.

A few technical problems still remained. No dryer matching the size of Alliance existed. The US Image dryer, which originally had been specified to match both the "Z-
“washer” and Alliance, was a quarter inch wider than the new washer. The drum also extended up to counter height. Therefore, the existing dryer would require changes in the front panel as well as lowering of the drum to assure a match. The Image team was asked to fix the problem by adapting their dryer, but to be sure the Alliance team would start developing specifications for a dryer of their own. This product could also serve the replacement market. Production was needed in December 1993.

Since the Group wanted to reduce investment levels, an identical control panel had to be used on the washer and the dryer. Another multinational team, including Mr. Marucchi, was set up to ensure that proper action was taken. Three Zanussi proposals for door-lock systems that would permit those washing to add clothes during the wash portion were considered. Since one system would not pass UL (the US testing institute), and the cost of another was too high, the decision could be swiftly reached. Combo prototypes were not yet ready, and had not even been planned in detail, as they would be similar to the Nexus washer/dryer developed in Europe. These prototypes would be ready in December 1993. After much work, the Italians had been successful in decreasing the cycle time of the washer to some 47 minutes, and in terms of most performance variables the machine was superior to competitor products.

Tom Kaczmarek reported on the plans for the USA. A dedicated public-relations person was being sought to promote the “Z-washer” in specialized markets, to prepare them for Alliance. It was suggested that sales to Europe be managed from Canada, with a representative to work with the Swedes and Italians. Therefore, European prototypes were needed in the future. Sears was only interested in the washer if it had a matching dryer. The buyer with whom Mr. Kaczmarek had been in contact was more enthusiastic about the combo than the washer, and this buyer believed that the Alliance team had underestimated the market. No contacts had been taken with detergent producers for almost half a year, and now L’Assomption had to establish a direct relationship. A letter had been sent to Procter&Gamble and Lever apologizing for the delay and stating that prototypes would be available in July. The team planned to meet with them after prototype delivery.

Although some of the technical and marketing matters were still pending, most of the remaining discussion was centered around the cost and pricing of the products. As a result of depreciation of the Italian lira, as well as cost saving efforts, direct material costs of the washer and combo, given a combined volume of either 100,000 or 200,000 units, were now
greatly reduced. As further decreases in costs could be foreseen over the years to follow market introduction, new retail prices and sales-forecast figures were presented.

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume (000)</th>
<th>Retail Price (US $)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Washer</td>
<td>Combo</td>
</tr>
<tr>
<td>1994</td>
<td>74</td>
<td>21</td>
</tr>
<tr>
<td>1995</td>
<td>164</td>
<td>49</td>
</tr>
<tr>
<td>1996</td>
<td>176</td>
<td>60</td>
</tr>
<tr>
<td>1997</td>
<td>76</td>
<td>89</td>
</tr>
<tr>
<td>1998</td>
<td>58</td>
<td>114</td>
</tr>
</tbody>
</table>

Table 6.3: Projected volume and retail prices of the Alliance washer and combo

According to marketing research on consumer price sensitivity, a $700 price would mean that the mass-market could not be conquered. Approximately 9% of the US consumers were willing to pay this much for a large-capacity front-load washer according to internal market-research figures. Nevertheless, in reality only 0.5% actually paid this much for their washer (see Figure 4.5).

**Division of tasks and responsibilities**

As indicated in the previous chapter, one of the main difficulties already evident during the conception and planning of the IIP was how to configure the project, i.e., how to divide tasks and responsibilities among the units involved. In the Alliance case a functional division of tasks across geographical space was chosen; that is, the three different functional knowledge bases were located in different countries. Furthermore, top management was located in Sweden (and Italy). A central tenet of organization theory is that different principles for division of work and tasks give rise to different interdependencies among the units involved.\(^1\) In turn, it is argued that these dependencies impose distinct co-ordination requirements.\(^2\) The following section will describe and analyze how the four IIPs were structured in this respect. Questions of co-ordination will be discussed later.
The 3rd tap

As the 3rd-tap project turned out a joint effort between HC and New Products, assisted by RI, the overall organization came to reflect a split between “developers” and future “administrators”. One of the “developers” stated that he would have enjoyed working more closely with the personnel from marketing, but that during his years at the company - including his time on the project - he had seldom done so.

Mr. Hagquist explained that any innovation process really needed three players: a “starter”, an “entrepreneur”, and an “industrialist”. He was the starter, and Mr. Adeberg was the industrialist. Consequently, New Products and RI were to develop the product and report to the PAB. The Home Comfort team was to prepare market introduction and be responsible for marketing research. This research was restricted to market segmentation and potential, and to finding an appropriate exterior design for the water purifier. Backing from top management was to be secured by the leadership of each unit. The Spanish unit, where production was foreseen, had not yet been involved, however. No formal organizational chart was developed by the team, but in practice the project configuration looked something like the following.

Figure 6.3: Organization of the 3rd-tap development effort

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Late in the summer of 1990, the Holger project was officially launched after a two-day meeting in Stamford, Connecticut. It was decided to form working-groups to continue to develop specifications for the different subsystems. A division of responsibilities between the development centers was necessary to achieve a reasonably efficient organization, but it was difficult to find a proper configuration principle. Top management admitted that the division of responsibilities could lead to motivational problems in some of the local units, but added that it was the job of line management to handle these problems. Finally, it was decided that the different countries involved in project Holger were to be technologically specialized.

It was obvious that the availability of the relevant competence did not fully coincide with the distribution of responsibilities. Therefore, Holger project management, together with the respective development managers, would have to find ways of sharing resources between the development centers. Overall development responsibilities were allocated as outlined in Table 6.4 below (Later on, it was decided to close down the Swiss unit, and I/O responsibilities were transferred to the Swedish unit). The assignments had been made based on the availability of resources, competence, and proximity to production, and with the Holger project in mind. Product responsibility was defined as the responsibility for:

- development and maintenance of the product and all associated documentation, internal and external but excluding sales material, with respect to correctness, conformity with applicable standards, and availability of components,
- maintaining a) product efficiency with respect to performance, use (including application engineering), and production cost, b) technological skills and knowledge in areas important to the product, and c) knowledge about user requirements regarding the product.

As the bulk of responsibilities were with the Swedes, who were also to manufacture the system, many Americans once more began to fear that their unit would be stripped of all development resources. Moreover, the responsibilities given to the US unit were mostly parts of systems for which the integral parts were developed by the Swedes. Some of the US project members saw themselves as mere suppliers to the future ‘owners’ of the new system.
| Germany | - Master Aid  
|         | - PLC/RTU  
|         | - CAPE  
| USA     | - Existing MOD 300 system  
|         | - Batch Controller  
|         | - System functions, such as: 
|         |   - historical logging, trend  
|         |   - report package  
|         |   - statistics package  
|         | - Some base software, like:  
|         |   - process data base manager  
| Sweden  | - Existing ABB Master products  
|         | - Operator Station (OS)  
|         | - Process Station (PS)  
|         | - Gateways (GW)  
|         | - Information Management System (platform)  
|         | - Hardware for OS + PS + GW  
|         | - Base Software (operating system, communications software etc.)  
| Switzerland | - I/O-system including mechanics  

**Table 6.4:** Division of responsibilities within ABB IPA

The total project was gradually broken down into several sub-projects, as illustrated below. Most of the work was allocated to component- and product development projects. Some tasks were also performed by various support projects.

**Figure 6.4:** Overall organization of the Holger project
In consistency with the formation of three centers of excellence, M2000 was organized like the business area. Consequently, the company established development centers in Sweden, Denmark, and Finland. The head of the Finnish unit was appointed project leader, since he was believed closest to the technical sector. The Danes were responsible for the small sizes, and Sweden had primary responsibility for the 112-180 range. Responsibility was split between Finland and Sweden in the 200-250 range, while the Finns had sole responsibility for sizes ranging from 280-400. France was involved in the development of the 200-250 range, whereas Spain and Germany were primarily purchasers of the designs. Initially, German management was not very enthusiastic about joining the project, but later it assumed a more active role, once Swedes had replaced the previous managers. Since BA management believed that the primary role of basic R&D was to focus on long-term experimentation with unproven technologies, rather than refinement of existing ones, the latter were separated from the project. The overall organization and basic processes of the M2000 project are illustrated below:

![Figure 6.5: Organization and basic processes in M2000](image-url)
Principles for division of tasks and responsibilities

As mentioned above, in the Alliance project there was functional separation of tasks across geographical space. This principle was also applied in the 3rd-tap effort, although the Spanish manufacturing unit had not yet been involved, and marketing as well as R&D were both located in Sweden. The two ABB projects, however, used different principles for dividing their work. In the Holger project a principle of technical separation was applied. Simply put, the bulk of hardware and software responsibilities were given to the Swedes, whereas relatively minor parts of systems were allocated to the other parties. Finally, tasks in the M2000 project were geographically distributed according to a principle of product-range (size) separation. The Nordic countries had primary responsibilities for motors of different sizes. Consequently, development in the two Electrolux projects can be described as marked by inter-functional dispersion, whereas the two ABB IIPs were also characterized by intra-functional dispersion, at least in R&D.

We should keep several factors in mind when discussing how work was divided among units and individuals. In organization theory, it is a common assertion that as the complexity of a specific task increases so does the uncertainty surrounding it.\(^3\) It has been argued that task complexity (and thus also task uncertainty) can be described in terms of; a) task variability (i.e., the number of exceptions encountered while performing a task), and b) task analyzability (i.e., the degree to which search activity is needed to solve a problem).\(^4\) When both these are high, the task can be characterized as non-routine; when both are low, the task can be considered routine.\(^5\) However, task uncertainty is a relative term in the sense that it depends on who is performing the task. Accordingly, the same type of task is surrounded by more uncertainty for the inexperienced, who of course lack information and knowledge, than for those more used to carrying out this type of work.\(^6\)

Another complicating factor is that since uncertainty can only be determined in relation to the existing body of knowledge, the views held by different actors on how much and what they know become relevant. Let us for the sake of argument assume that enacted uncertainty is "socially constructed" by people, rather than objectively given, and is evident in the actors' cognitive maps or schema of reality;\(^7\) then the type of uncertainty surrounding a task would
consequently vary according to who was interviewed, and also across hierarchical levels, functional residences, and geographical borders. In short, people would judge the type of uncertainty associated with the same type of task differently, depending on their personal outlook and position in the organization. Finally, in the case of innovation projects, uncertainty also poses difficulties in the sense that the exact result (or desired result) of the process is often not clear. However, this last question is perhaps less problematic in the development phase, when product specifications have been determined. By this time, the targets are clearer to the people involved (although interpretations may still differ) and the knowledge-creation requirements are thus more given.

Uncertainty and knowledge-creation requirements

As uncertainty is not only inherent in the task, but also subject to the information/knowledge held by those responsible for performing the task, we believe it is relevant to elaborate on the differences among the four case IIPs. We will start by making some of our biases known.

First, we will look upon task uncertainty as contingent on the knowledge-creation requirements facing the project prior to development, i.e., how much new knowledge or new combinations of knowledge must be developed (through transfer or transformation of existing knowledge or addition of totally new knowledge), given the project goals set. Since the targets may change over time, so may the knowledge-creation requirement, and thus also uncertainty. Second, we believe an important distinction can be made between requirements of knowledge exchange and creation within one functional base and/or nation, on the one hand, and projects demanding much joint creation across functional knowledge bases and/or countries, on the other. Third, we suggest that the task uncertainty surrounding the effort just before development starts depends on two variables. It is contingent on prior experience in the same and related areas before the idea was launched. However, it also depends on the extent to which uncertainty has been reduced during the previous phase(s) of the project. Fourth, we believe it just as interesting to see how the managers involved in the projects experienced uncertainty and determined how to divide tasks. Thus, their interpretations of the situation will be compared to a more analytically derived estimate of task uncertainty and the interdependencies implied.
To the laymen, the two ABB cases may seem more complex from a technical point of view than the Electrolux ones. Certainly, ABB's Holger project raises some new and challenging technical issues. Nevertheless, Electrolux' 3rd-tap effort is similar in that the reversed-osmosis technology was an unproven one for the team, as well as for the organization in general. The same was true for the Alliance project in regard to marketing and manufacturing. One could also argue that purely technical uncertainty existed in this case, since there was no real supplier network, and the choice of material for a number of parts and components was open for discussion. As a consequence, the lack of a clear point of reference referred to in Chapter 5 was most evident in the Electrolux cases.

In the ABB projects, customer preferences were regarded as more known and relatively stable. Moreover, the manufacturing process would not be dramatically different from that of former product generations (although major changes would be called for at some locations in the Motors case) and no new production facilities with inexperienced personnel were to be used. Thus, right from the start there seems to have been less of the kind of uncertainty likely to require joint creation across functions, at least in the minds of those responsible for the project. Certainly, the impression that less cross-functional knowledge creation was called for pertains to joint creation involving the commercial and technical worlds of the firm.

One of the more striking differences between the projects appears to lie in the type of uncertainty attributable to customer demand and preferences, and to lack of experience in producing these kinds of products at the anticipated manufacturing locations. We also believe that the relative novelty of the Electrolux tasks increases the need for cross-functional creation of knowledge. When consumer preferences are unknown, commercial and technical aspects must be considered together. If only the technical possibilities are unfamiliar, but manufacturing and marketing aspects are well known, the need for joint creation does not appear as great, since the targets for R&D are more certain. Therefore, it seems as if the more closely uncertainty is related to the customer, the greater the need for cross-functional cooperation.

Naturally, another approach to this problem would be for R&D to research customer preferences on its own, without direct help from marketing. However, a) marketing people
probably are (or at least ought to be) more competent at this task, and b) the marketing function should probably be committed to the solution before receiving the new product - their future sales efforts will likely be more effective.

The two Electrolux projects appear surrounded by more uncertainty, in marketing terms, than the ABB ones, even though the latter projects were intended to develop new products for more countries than at least the Alliance project. Both ABB projects were focused on industrial markets with apparently established “rules of the game”, as opposed to the more changing and varied customer preferences among market segments in the two Electrolux projects; this difference may provide part of the explanation.

Consequently, our analytically derived impression is that the Alliance and 3rd-tap ventures seem to have called for a) more creation with commercial/marketing overtones, b) more knowledge creation at anticipated production sites, and c) a higher degree of joint creation across the commercial-technical boundary. A summary of our attempt to derive the types of knowledge creation requirements implied by the nature of the task in the four projects is displayed below. Note that the requirements are defined in relative terms, in line with the discussion above. For example, manufacturing in the Alliance project faced demanding knowledge-transfer and -creation requirements, since the Canadian unit had limited experience in producing modern horizontal-axis washers and/or combos.

<table>
<thead>
<tr>
<th>Knowledge creation requirement</th>
<th>Functional</th>
<th>Cross-functional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>3rd tap</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>M2000</td>
<td>Medium</td>
<td>Medium/High</td>
</tr>
<tr>
<td>Holger</td>
<td>High</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Table 6.5: Knowledge-creation requirements in the four IIPs
Since the projects were geographically dispersed on the basis of different principles of task division, one could also foresee different requirements of cross-border co-operation. Whereas international collaboration in the Alliance case would necessarily imply inter-functionalism, co-operative efforts across geographical borders in Holger and M2000 could be either intra- or inter-functional. Nevertheless, given the “technical” definition of these projects, one would expect the bulk of international communication to flow within the R&D function, while the national interaction patterns could well embody more inter-functional elements, particularly between production and R&D.

**Designing task interdependencies**

In the last chapter, we distinguished three types of uncertainty initially facing the project team; the final one relating to who is responsible for meeting the objectives now came more into play. At this point, we would also present a second important theoretical assertion: that groups performing parts of an overall task can be related to each other in various ways. Since these units a) share the same overall goal (although they may differ in degree of commitment or in interpretation of the goals and their relative importance), b) work within a specifically defined time-frame, and c) need to share resources, they are interdependent.

One well established way of classifying relationships between groups and tasks is to distinguish among pooled-, sequential-, and reciprocal interdependence. Pooled interdependence exists when two or more groups function relatively independently, but their combined output contributes to the total organization. Sequential interdependence exists when the output of one group is the input of another group, but the reverse in not true. The second group is thus dependent on the first one, but not vice versa. Reciprocal interdependence, finally, exists when the output of one group becomes the input of another group and vice versa; thus, each of these groups is dependent on the other. Graphically, the three types of dependencies are illustrated in Figure 6.6 below.

In the operating organization, tasks are usually divided in a way that creates reciprocal dependence within functions, whereas relationships between functions are generally sequential or pooled. When the output of a process is given and will have a degree of
permanence, the different functions to be performed can be pre-specified, and tasks divided to reduce dependencies between departments.\textsuperscript{12} However, a number of scholars have argued that since the output of innovation processes is less certain, the relationships between the functions involved are (or should be) characterized by reciprocal interdependence.\textsuperscript{13} Thus, these authors seem to posit that this type of interdependence is almost inherent in new product development. Moreover, in the case of IIPs, we would add that the geographical interdependencies can also exist.

![Diagram of Types of Task Interdependence]

**Figure 6.6: Types of task interdependence**

Although the uncertainty and complexity surrounding a specific task, or set of tasks, may seem high from an "objective" or theoretical point of view, as outlined above, we argue that management may give the situation another interpretation and decide to create sequential dependencies between the units involved. For instance, the traditional approach to innovation in Western companies has been described as a "relay race", in which the R&D function hands over the drawings to manufacturing, which produces the new product and then hands it over to the marketing department.\textsuperscript{14} Two of the main rationales for sequential interdependencies would probably be to benefit from specialization of labor, and to avoid the higher coordination costs generally associated with reciprocal interdependencies, a subject that will be discussed under the following heading. Consequently, the efforts to reduce uncertainty during the conception and planning phase, and in organizing the project, could be interpreted as partly aimed at reducing interdependencies, and thus also the need for complex and costly coordination. By laying out the ground rules (and roles), it seems as if management in our cases tried to design project structures so that the geographically dispersed groups would attempt to work relatively independently.\textsuperscript{15}
Rather than trying to discern the “objective” interdependencies inherent in the tasks performed in the four IIPs, we will now focus our efforts on describing dependencies as they came to appear. By studying these, we can then hopefully discern how the managers perceived uncertainty, and thus also knowledge-creation requirements. We will discuss relationships in terms of intra- and inter-functional interdependencies, and of intra- and international interdependencies. We will restrict our discussion to the development phase, and save our analysis of interdependencies over time and between phases for Chapters 8 and 9.

In the Alliance case, the different functions, and consequently also the different countries in which they were located, worked in parallel during this phase. However, it would be wrong to say that dependencies were of only one type. In some cases, the marketing studies performed by the US organization could have been input for the Italians, though in reality the studies seem to have had little impact in that respect. Rather, if anything, they functioned as input for top management, and for the continuing search by the marketing organization for an appropriate market-launch strategy. The Italians were sending drawings to the production unit in Canada, but this dependence seemed more sequential than reciprocal. Since the different units worked in parallel, and not really together, the process also displayed signs of pooled interdependence.

The other Electrolux project is easier to characterize. Tasks were divided in a way that made the work of the development team of the 3rd-tap venture relatively independent of tasks carried out elsewhere. Neither the future administrators nor the anticipated production unit in Spain did much work related to the new water purifier during this phase. Later on, the developers were to hand over the drawings to manufacturing, but if the analysis is restricted to this phase, few realized inter-departmental dependencies can be discerned. Thus, since both Electrolux projects, and the 3rd-tap one in particular, had divided specific responsibilities not only across functions, but also across time, relatively little dependence between the work performed by the different units arose during the development phase. This finding is quite counter to our analytically derived argument that these efforts would seem to demand considerable joint creation, and we will return to this issue later.
The R&D function in project Holger was internationally dispersed according to a principle of technical division of labor; parts of integrated systems were developed in different countries. Therefore, reciprocal dependence came to exist across geographical space, though only within this function. The choice of a product-size principle for the division of work in the M2000 case meant that international dependencies could be reduced. Although some reciprocal interdependencies still existed, it is perhaps better to characterize this project as displaying a mix of all types of interdependence. In both ABB cases, dependencies between R&D and manufacturing were of a sequential/reciprocal type, but mostly restricted to the unit in the same country. However, since production of the Holger system was initially foreseen only for Sweden, the R&D units of ABB Process Automation, being located elsewhere, had to interact across geographical borders. Finally, in terms of dependencies between marketing and the other functions during this phase, these were fairly limited and at most sequential or pooled.

As most recognizable in the two Electrolux cases, the actual interdependencies may differ from the implied pattern, given the uncertainty associated with the task. Interdependency structures were created. This latter point is important. Rather than the interdependencies being inherent in the tasks to be performed, it appears as if managers interpreted the situations and designed specific structures based upon their enactment. In our view, and as will be discussed in more detail later, the co-ordination mechanisms in place seemed to influence the realized interdependencies, and both design parameters were subject to architectural dependence. Moreover, all projects seemed to involve more than one type of interdependence, even between two specific units, and during this limited time period. Therefore, we believe it is appropriate to conceive IIPs as systems of hybrid interdependence structures across geographical space and functional knowledge bases. When we return to the entire process in Chapters 8 and 9, the question of interdependencies over time will also become relevant.

All projects were heavily dominated by the R&D function. The R&D dominance appears consistent with an overall tendency for the innovation process in our four cases to be structured sequentially across the functions and over the phases. Since the R&D function in the two Electrolux cases was geographically concentrated, these projects came to be marked by less international reciprocity than the two ABB cases, in which R&D was geographically dispersed. The R&D dominance was also evident in the survey. Here, 68% of the projects
involved more than one function, and in 73% of the cases units from more than one country were active. However, on the average 61% of the people engaged in the projects during the development phase came from R&D; 34% of the team members ordinarily worked in manufacturing, whereas only 5% had a marketing background.

Management systems and co-ordination mechanisms

The basic argument advanced by a number of scholars is that different types of interdependence should be managed differently. In general, the more complex the type of interdependence, the less formalized the types of co-ordination mechanisms needed. Since our IIPs were characterized by multiple types of interdependencies, one would predict that a variety of integrating devices would be used. Moreover, since each project comprised a unique bundle of interdependencies, one could also predict that they all would (need to) be co-ordinated differently. From Alliance we know that diverse mechanisms were used, ranging from (limited) formal planning to more informal communication.

In our view, four aspects of co-ordination are critical to consider. First, what mechanisms were used? Second, how often did co-ordination take place? Third, from where did co-ordination emanate, i.e., who took the critical decisions and managed the efforts? Fourth, what role did the project leader play? What were his/her responsibilities and what were the most essential activities to perform? Consequently, we will discuss the type, frequency, and locus of co-ordination (geographically and hierarchically). We will only touch upon some of the critical issues; most of this discussion can be found in the section on problems experienced during the development phase.

The 3rd tap

Since the goals of the 3rd-tap project were so vague, at least by Electrolux standards, the members did not discern any clear stages in the development process. On the other hand, according to HC management one reason for setting diffuse goals was that the process should be allowed to take the time needed to produce a product of high quality. Development was best
described as a circular and iterative process of trial and error. It consisted of a number of distinct components: a) discussions within the group, b) laboratory work, c) drawing, d) workshop, e) collaborating with suppliers, f) assembly, g) machine testing, and h) evaluation. According to Mr. Hagquist, in practice a number of technologies for processes and production were reviewed. This work was followed by the construction of a prototype to test machine ideas. In effect, some ideas were discarded as the project proceeded. The procedure would facilitate subsequent discussions; knowledge of previous mistakes would make it easier to respond to criticism of different technical solutions. During the initial development phases Mr. Hagquist considered it crucial to work closely together. Mostly for this reason all participants were located in Sweden. The international actors could come in later. However, he felt that his work was made more difficult by his responsibility for another project at the same time. This project "stole" more than one-year of his time during the 3rd development process.

The initial effort of the project team had led to a prototype that was presented to HC PAB in June 1989. The project team had worked until 6 p.m. the day before summer vacation. When they returned, they found that the board had considered the prototype worthless as it did not meet the quality standards that Electrolux desired. Hence, the PAB had decided that no evaluation was necessary. The project team believed it was receiving dual messages. How could they make a product that was so cheap and still the most high-performing?

In effect, only two of the general goals defined came to affect the work of the development team from this point. The 200 dollar price limit was no longer taken seriously by any of the project members; the filter itself was priced at 200 dollars, given the relevant size and performance targets. Rather, they set their own goal; "Price = as low as possible", as one of the group members put it. In the future, work was more structured, and was divided up component by component. It was important to work fast. After the first rejection, a new model was developed. The product could be described as a "bowl" in stainless steel. It was later followed by "Black Jack" in which the bowl was turned 180 degrees, a distinct feature of the water purifier ever since. Eventually, this model was replaced by "Mark 4", in many respects similar to the "Mark 7" model that later was transferred to manufacturing.

The manner of working and the organization of the development team itself, i.e., "the developers", was easy-going and fluid. For instance, no documentation was set up until the summer of 1991. Most meetings were held on an ad-hoc basis, and the project members were evaluated and rewarded by Mr. Hagquist. On the other hand, the project seemed to suffer from
communication problems as the two members of the development team were fairly cut off from external contacts. Mr. Hagquist used what he called a “rings-on-the-water” model of management. In the middle was the project group, then the personnel from HC, etc. The further from the center, the less personnel knew (or should know) about what was going on.

However, in reality, as pointed out by one member of the team, the only person communicating with outside partners (with the exception of suppliers) was Mr. Hagquist. As a consequence, the project members from time to time felt isolated, although they suspected that one reason for isolating them had been to protect them from the distractions of the “administrators”, rather than an unwillingness on the part of Peter Hagquist to share information. Problems with, or lack of, communication between the project team and HC personnel were also evident. The general opinion among the developers was that HC was too passive in initiating marketing studies, and in providing valuable information. Business personnel were regarded as overly focused on the price target; they would not understand that the price and performance targets were incompatible. In the opinion of the developers there was too little co-operation. One project member complained that there was no market focus, either geographically or segment wise. He may not have been aware that one of the alleged advantages of the new technology was that it could purify any type of water anywhere in the world, or he may not have been convinced that the product could live up to this claim.

Furthermore, it was no longer clear where the water purifier was to be manufactured. The new product had been set for production in Spain, but now people in the development team did not know. The team was convinced that the knowledge was essential, so that the product could be adapted to the specifics of this site, and the commitment and involvement of manufacturing could be ensured at an early stage. Perhaps, it would have been better if someone from manufacturing had joined the project right at the start? Early in 1991, the question was still unanswered, and they did not know where or whom to ask.

Holger

Irrespective of location and tasks, all Holger projects were initiated according to the same rules and procedures. The projects also had identical organizational structures. Because of the size, complexity, and geographical dispersion of the total project, a number of groups with overall responsibility for co-ordination and communication were added to the development
organization. These were all appointed for the duration of the project. Often, people did not work full-time for the Holger project, but also had to take care of the existing systems. The organization, and the division of responsibilities, was presented in a “Management Letter” from top management in Stamford. The following figure outlines the basic reporting relationships.

![Diagram of reporting relationships in the Holger project]

**Figure 6.7: Reporting relationships in the Holger project**

As can be seen in the figure, responsibilities for several positions and on two different levels (local and overall project level) needed to be defined. On the level of the local development project, the project manager (PM) was responsible for the success of the project. In the US organization, the project manager and the operational manager were often the same person, whereas the split between overall-project and line responsibility was more evident in Sweden. It was the task of the PM to: a) manage the project, b) report to the Steering Group and the Holger project management team (PMT), c) co-ordinate the work with other related projects, d) request and manage project resources, both financial and technical, e) install sub-projects and appoint sub-project managers as needed, and f) summon the reference group. The PM was always responsible to the steering group and the PMT for the overall project. Finally, in some cases the PM was assisted by a technical project leader (TPL), whose main task was to a) supervise the design and implementation work, and b) bring up and resolve technical issues together with the PMs and the TPLs of related projects.

Each local project had an international reference group consisting of representatives from the business units, the product-strategy department, or units of equivalent status. This
group was to act as an advisory and supervisory board for the development project in regard to all user aspects. The local PM was to summon the group, which met as required, but at least quarterly. These meetings were to be recorded in the regular project reports. The members of the reference group were to be updated continuously on the progress of the project by being on the mailing list for appropriate project documents. Finally, the reference group was responsible for reviewing functional specifications, user guides etc., and for ensuring that the final product fulfilled the user and market requirements as defined in the requirements-specification document. The local steering group consisted of the local R&D manager, responsible department managers, and the Holger PMT. For some projects, it could be appropriate also to include managers from other departments in the steering group.

All individual projects had the responsibility and the authority to conduct development within the limits of the resources, financial and technical, which had been allocated. In effect, it was vital that project management ensured that the project stayed on track and was successful in reaching the goals set. Decisions were to be taken directly by project management, as long as the issues remained within the scope of the project. Decisions beyond that scope were to be reached in agreement with the management of other projects, with the Holger PMT, or with BA management, depending on the importance of the issue.

As for the entire Holger project, this steering group comprised people from top management, and the R&D managers in Sweden, the USA, Germany, and Switzerland (until the latter left the project). The group was to meet once every quarter to discuss issues of mutual importance and to synchronize activities between the development centers. The project management team had general responsibilities for the Holger project. Although the team was to act as a group, the five members had their own main areas of responsibility. Three individuals were in charge of project management; two of them were to act as project managers (PM1 and PM2), and the third as technical project manager (TPM). All were Swedes. The other two members of the PMT were responsible for release coordination. One Swede in Europe (RC1), and one American in the USA (RC2), were to secure annual transfers and the introduction of Master and MOD products, respectively.

The task of the project managers was to run the project, to make sure that appropriate resources were allocated, and that necessary preconditions were met for the individual projects to do their work. All PMT group members were to participate in project follow-ups, but their participation could be divided among the development centers. Reports were to be furnished to
BA management on a monthly basis. The technical project manager was to make sure that the overall systems architecture met the requirements, and that technical solutions were acceptable from a systems point of view. In this work, the technical project leader was to be assisted by the System Expert Group and the technical project leaders of the respective Holger development projects. The sharing of tasks among project management is displayed below.

<table>
<thead>
<tr>
<th>Key management tasks</th>
<th>Responsible manager(s)</th>
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<tbody>
<tr>
<td>The establishment of:</td>
<td>PM1, PM2, TPM</td>
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<tr>
<td>- overall milestones</td>
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<td>- project organization</td>
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<td>- project goals in terms of goals and time schedules</td>
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<td>- task forces</td>
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<tr>
<td>Supervision and co-ordination of:</td>
<td>PM1</td>
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<tr>
<td>- project and product costs</td>
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<td>- resource needs</td>
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<tr>
<td>Follow-up of development progress, time schedules, and milestones</td>
<td>PM1, PM2, TPM</td>
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<tr>
<td>Project support:</td>
<td>PM2</td>
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<tr>
<td>- development rules and guidelines</td>
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<td>- information to development projects</td>
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<td>- communication between development centers</td>
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<tr>
<td>Co-ordination with external partners</td>
<td>PM1, PM2</td>
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<tr>
<td>Supervision and co-ordination of technical issues such as:</td>
<td>TPM</td>
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<td>- overall system architecture</td>
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<td>- application programming and configuration paradigm</td>
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<td>- migration issues</td>
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<td>- consistency of user interface and systems models over different products</td>
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<td>- technical solutions as specified by different projects</td>
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<tr>
<td>- compatibility between releases</td>
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<td>- system performance</td>
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<tr>
<td>Chairing the System Expert Group</td>
<td>TPM</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>PM1, PM2</td>
</tr>
<tr>
<td>- interaction with IPA line organization concerning e.g. resources, influence as the result of utilization of external HW and SW, changes in product structures etc.</td>
<td></td>
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<tr>
<td>- assisting the Holger development projects on common administration issues; funds; project descriptions, etc.</td>
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<tr>
<td>- reporting monthly the overall progress of the project to BA System Product Management</td>
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Table 6.6: Division of responsibilities among the members of the PMT
Finally, the two release co-ordinators were to supervise all activities related to the transfer of development results to other organizational units within the BA. Main areas of responsibility included the establishment of release plans, and the securing of communication channels to production, marketing, and the other business units. Furthermore, it was also the task of these co-ordinators to supervise: user documentation, pre-releases of products and components, transfer to production and service, pricing and marketing issues, beta testing, type testing, and development of training.

The system expert group (SEG) was to assist the technical project manager, who also chaired this group. The SEG was charged with the major part of the systems architecture work, and with all kinds of issues not covered by individual Holger development projects. Each member of the group had a particular area of responsibility, but it was believed critical that all members had a good overall systems understanding. The SEG should also have access to all functional and design specifications from the Holger development projects, and was to be informed about all technical decisions.

Adaptation, and merging of existing working methods, development infrastructure and tools had to be addressed simultaneously with the development of the new system. Rules for documentation, drawings, etc., had been established when ASEA and Brown Boveri merged. When Combustion Engineering was acquired, management had decided to retain these rules. Later, this decision led to some problems since the rules - at least in opinion of the Americans - tended to favor the Swedes, who were more familiar with them. Some also claimed that when discussing problems each group tended to return to its own terminology, so that people had difficulty in understanding each other.

Nevertheless, top management explained that in the Holger projects responsibility was to be strongly decentralized, stressing the importance of taking decisions as close to the source of a problem as possible. This policy was relevant for general project issues as well as for more technical questions. Finally, the importance of having a rapid escalation process was emphasized; the PMT and the BA management team should act as fast as possible and communicate decisions efficiently. Management specified the following working principles for the project.
In terms of reporting, each local project manager should report the progress of ongoing project work to the local line management, the BA management team, and the Holger PMT at monthly follow-up meetings. Reports were to include such subjects as accumulated costs, resource situation, deviations from schedule, general problems, and questions related to other projects or to the overall project management. The reporting should be action-oriented and concentrate on problems and required decisions. It was the task of the project managers to propose actions to solve problems presented. These follow-up meetings were to be based on a standard report to be sent to the local line management, the BA management team, and the PMT, at least three days before the meeting. A reference copy of the reports was also to be sent to each of the other IPA development centers. Meetings having an impact on decisions within the project, or between projects, should be documented in minutes of meetings (MoM) or in review records as follows:

Steering Group Meetings: MoMs should be sent to steering group members, BA management (responsible person), and Holger PMT.
Reference Group Meetings: MoMs should be sent to the PMs of related projects, to reference group members, to project members, BA management (responsible person), and Holger PMT.
Review Meetings: Review records should be distributed as required, but normally only filed together with the reviewed document.
Task Force reports: Reports from task forces should be sent to task force members, BA management, Holger PMT, and otherwise as defined in the task description.

Miscellaneous Meetings: When meetings were held that a) affected the work in other projects, b) influenced the system behavior, or c) in other ways had an impact on other people's work, the individuals concerned should be informed in a written message.

Holger Project Information: Information of general interest, such as decisions, installation of task forces, etc., should be provided in a "Holger Project Information" document, which ought to be distributed regularly by the PMT to all PMs, SEG members, local R&D management, product strategists, and BA management.

In reality, most co-ordination was managed either by the PMT, or by the project teams on their own in efforts to avoid excessive bureaucracy. However, a number of people claimed that no clear standard existed for determining who was responsible. Rather, it appears that when problems could not be solved among the teams, the PMT (or in important cases the BA management team) had the final say. Some project members held that management made a trade-off between developing a common system and satisfying the different actors involved, in order to get things done. The decision-making process had focused on achieving consensus with all units; partly as a consequence, the two systems still had little in common.

The US personnel stated that when the PMT or the BA management team had taken important decisions, the Swedish backgrounds of team members had been easy to recognize. Thus, Americans felt the Master solution had been allowed to dominate at the expense of their own MOD 300. Moreover, many argued that the PMT and the overall steering group were too weak and gave the different teams too much leeway in co-ordinating activities among themselves. According to some of the US team members, it would have been better to have more centralization, particularly since they did not believe that any of the local units had really understood the total project.

The division of responsibilities and tasks between the units, referred to in the management letter, had been the result of a dialogue between all the development presidents and the Stamford group. However, it did seem to cause some problems. First, the Americans felt crippled, since no overall responsibility or future ownership of integral parts of the system had been given to them. Second, many individuals felt that the decision had been taken over their heads. Third, and perhaps most troublesome, people believed that no substantial systems for
changes of specifications and responsibilities had been developed by the PMT. Consequently, when interfaces changed as the project proceeded, problems and disputes often arose. Interfaces tended to change in two primary ways.

First, teams were delayed. Since a sequential supplier-buyer relationship sometimes existed between the different local projects, a situation could occur in which one team could not proceed until the other one had performed its tasks. For instance, one North American team was delayed some six months when its Swedish counterparts could not transfer information about data bases and the operating system. Occasionally, units affected were not informed in advance of known delays. There were a few cases in which people waiting for input from another group, contacted the other team only to hear that this group had been delayed for the last several months, without informing the others in the overall project.

Second, interfaces could also change technologically; i.e., it was unclear who was responsible for a specific task or for taking decisions on what technologies to use. The most severe problem in this respect arose in relation to the decision on what programming language to use. The Swedish experts preferred the "frontier" and C++ (object oriented programming), whereas the American experts were inclined toward the more proven language C. According to the Americans, the Swedes were too academic in their approach and sometimes isolated from the customers. To the US personnel, the Swedes always made the right decisions - in theory, but the lack of application- and customer orientation would be obvious once the product reached the market. The Swedes, on the other hand, claimed that the Americans were somewhat conservative and preferred the C language mostly from a relative lack of knowledge in object oriented programming. The dispute was finally resolved by the Stamford management group. (The solution seems to have been to allow for both C and C++, but in different parts of the system, so that no communication problems would arise).

Some people held that the root of the co-ordination problems rested with the fact that all functional specifications had been developed simultaneously. Another alternative might have been to develop the specifications for the base functions first, then build prototypes and test the results. These people argued that this more sequential approach, would have made it possible to specify the different functions more accurately later on, thus reducing the number of late changes, and the need for co-ordinating the geographically dispersed units. What seemed to help was the shift from a focus on previous technical solutions to one on customer functionalities. With this shift, the project was more apt to produce solutions of common applicability. In other
words, instead of discussing how they used to do it, they were now trying to find out how the different functions would benefit the future customers.

In terms of co-ordination and communication methods utilized, Process Automation made extensive use of the ABB Corporate Network for communication between the centers where development work was performed. In addition, each center had extensive LANs (Local Area Networks), enabling engineers to have access to different computing environments. The basic data storage, maintenance, and integration of information was implemented by the use of relational data bases.

Below, some of the more important management tools employed in project Holger are listed. Generally, the basic tools were acquired from third-party suppliers, whereas applications were customized specifically to fit the organization and the working methods of the BA. For example, some argued that E-mail worked well for technical matters, but not so well when it came to more administrative tasks. Data bases were used to check progress against milestones etc., and common templates gave reports a uniform appearance. Project-planning tools were used primarily on the local- or sub-project levels, as those applied to the entire project had a tendency to become either too detailed and badly arranged, or too rough to be really useful.

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<tr>
<th>#</th>
<th>Electronic mail system</th>
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<tr>
<td></td>
<td>- Accessible throughout project via corporate network</td>
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<tr>
<td>#</td>
<td>Relational data bank systems</td>
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<tr>
<td></td>
<td>- Project data bases</td>
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<tr>
<td></td>
<td>- Menu, report and other tools</td>
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<td>#</td>
<td>Desktop publishers; Text processors</td>
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<tr>
<td></td>
<td>- Intensive use of templates</td>
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<tr>
<td>#</td>
<td>Project planning tools</td>
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<td></td>
<td>- Bar-charts, GANT diagrams, Time-scales</td>
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<td></td>
<td>- Resource planning</td>
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<td>#</td>
<td>Spreadsheets</td>
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<td>#</td>
<td>Financial and Budgeting systems</td>
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</table>

**Figure 6.9:** Principal management tools used in project Holger
A number of more practical circumstances also led to co-ordination problems. For instance, the time lag (six hours) between the USA on the one hand, and Sweden, Germany, and Switzerland on the other hand, made collaboration more difficult. Therefore, direct on-line contacts between North America and Europe were not believed to be very meaningful. E-mail had been the tool most frequently used to communicate. However, business-area management was not connected to this system until 1993. Traveling was used as a major means of co-ordination, primarily during the planning phase and early stages of the development phase, but many considered it too expensive and time-consuming. Especially the North Americans had to spend substantial sums on traveling. Since most project work was performed in Sweden, it was easier to fly two Americans to Europe than five Swedes to the USA. Each unit paid its own traveling expenses. On the other hand, face-to-face communication was seen as the only way to initiate the iterative processes so vital in product development. Fax, phone, etc., could only be used for specific questions.

Another problem was that different principles for organizing were used in the USA and Sweden. A number of people pointed out that the Americans were organized into groups in which no one in particular was responsible for a specific task, whereas in Sweden one person was in charge of the team. Sometimes it was difficult for the Swedes to find the individual who was responsible, and for the US people to find the right person, not necessarily the person in charge, with knowledge about a particular issue.

M2000

In addition to assigning product range responsibilities to the different national units involved in M2000, management roles and responsibilities were also specified. Important decisions were generally to be taken by the business-area management team. Technology co-ordination was to be handled by the R&D managers of each unit. A marketing group was responsible for defining performance-value targets and gathering opinions from customers. Finally, the general responsibility for co-ordination rested with the M2000 project manager.

The organization of each center of excellence was also guided by certain principles. In each unit a project leader and a project manager was to be designated. All project subgroups for 1-2 sizes each should also be appointed. Decisions were to be taken primarily by the project leader, and on detailed questions jointly by the project leader and the project group. Additional
persons were to be called to meetings when needed, and all decisions were to be recorded and confirmed by the project leader. Moreover, information concerning important decisions was to be transferred to: a) the entire project group, b) R&D managers, c) production managers, d) business controllers, e) BA management, and f) the project leaders at the other centers of excellence. Finally, it was the task of the project group to co-ordinate and provide technology development. Ad-hoc subgroups should be formed when necessary. In turn, the project subgroups that developed specific products were responsible for co-ordinating activities with corresponding groups in the other countries.

To co-ordinate activities in the M2000 project, several different integrative bodies were used, besides those already mentioned. Apart from business-area management meetings, ABB Motors used annual technical forums, and marketing meetings were held twice a year. Since management realized that more integration was needed during a product-development phase, the concept of ‘technical quorum’ was launched. The technical quorum was a monthly meeting somewhere in Europe to discuss technical matters related to the project; the meeting was attended by one person from each unit. Management saw it as essential to ensure support for the project in all countries, and at all levels of the firm. The way to attain commitment was not to order people what to do. Rather, top management stressed the importance of giving people general direction and asking them what they believed. Of course, this process was more time-consuming and costly. On the other hand, once people were committed it was believed that the rest of the process would be greatly facilitated.

To make meetings more productive, it was mandatory to arrive the night before to have dinner with one’s colleagues. The project was staffed by strong-willed people who did not always agree. Most people held that major problems and conflict issues tended to be of an interpersonal, rather than purely technical nature. Quarrels about technical matters were mostly due to project members’ unwillingness to abandon their customary solutions and positions. By letting people meet and socialize, management hoped that they would have an easier time understanding the views of other nationalities. It was considered important to have face-to-face contact, the only way for people to really get to know one another.

An additional problem related to the fact that the project involved people from more than one country, was that summer vacation times in different countries did not coincide. For instance, the Finns were on vacation in July, whereas the French were away in August. It was sometimes difficult for those at work to act when their counterparts were not available.
Difficulties also arose from unfamiliarity with management practices in the other countries. One example is the difficulties encountered by the Nordic people when trying to reach persons in the Southern European units. All communication had to go through the chief executives of these organizations. Whereas relations between management and project members were informal in the Nordic countries; the other units were much more hierarchical and expected the Nordic countries to respect the positional hierarchy. Sometimes the Nordic team members felt frustrated in that everything took much more time than appeared to be necessary.

Turning from international issues to questions concerning the relationships between marketing and R&D/production, many difficulties were related to distrust. Although marketing was involved to some extent during the development phase, and its efforts highly valued by management, M2000 basically involved only R&D and production. Some project members argued that marketing could not be told about the project, because if they were they would brag to customers, who in turn would not buy the old motors anymore. Furthermore, once customers knew about the project, it was only a matter of time before the competitors also heard of it. Many engineers believed it was best to leave marketing outside development, except for initial input and when handing over the final product.

To handle these and other problems, some general principles of work were defined before actual development started. First, management emphasized the importance of documenting all work. Second, responsibilities for securing information were carefully specified. All project members within a country were responsible within their own product range. The project manager was responsible for interaction with other groups, and the M2000 project leader was responsible for contacts with units outside Europe. Third, decisions within ranges were to be confirmed by the local project leader, whereas all other major decisions could only be confirmed by the project leader of M2000. Fourth, it was critical to control the relative use of document exchange and meetings, respectively. Enough meetings should be held to secure information, mutual understanding, and commitment by the participants. On the other hand, management underscored that not too many meetings were to take place, since they took time and were costly. It was important that all participants came well prepared to the meetings, with good drafts. According to some project members this requirement led to a situation where the steering committees met too seldom. Fifth, contact persons from each subgroup should make regular visits and work with the main partner for days, or weeks when necessary. Finally, management emphasized the importance of maintaining a very tight time-table control.
In the beginning of 1991, the final diameter table was distributed. This item had led to many disputes among the units involved. However, the disputes were resolved by the project leader through what he called "relative democracy", which meant that he took the decision himself so as not to delay the process. Furthermore, the product-performance definition was developing approximately according to plan. All responses had been received during December, 1990, and project management was especially satisfied with the contribution of marketing. By the summer of 1991, all main diameters were still unchanged. A design co-ordination study conducted at Västerås was expected to produce some new common features.

The new products were planned to carry the old product-type symbols at least until the beginning of 1993. Product performance, active material designs, and CI structures 200 and 225 had been agreed upon by Finland, France, and Sweden. The Finns were about to start production according to targets, and France would soon follow soon. The Swedes had been working on the electrical design of 112 and 132, and the French unit would finalize mechanical design of CI types during 1991. The following timetable was developed for the rest of the M2000 project:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor size 63-100</td>
<td>112</td>
<td>132</td>
<td>160</td>
<td>180</td>
<td>200</td>
<td>225</td>
</tr>
<tr>
<td>1991</td>
<td>* Prestudy starts</td>
<td># FR</td>
<td>FR</td>
<td>FR</td>
<td>SE</td>
<td>SE</td>
</tr>
<tr>
<td>1992</td>
<td># FR</td>
<td>FR</td>
<td>FR</td>
<td># FR</td>
<td>FR</td>
<td>FR</td>
</tr>
<tr>
<td>1993</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
</tr>
<tr>
<td>1994</td>
<td>200</td>
<td>225</td>
<td>250</td>
<td>280</td>
<td>315</td>
<td>355</td>
</tr>
<tr>
<td>1995</td>
<td># FI</td>
<td>FI</td>
<td>FI</td>
<td># FI</td>
<td>FI</td>
<td>FI</td>
</tr>
<tr>
<td>1996</td>
<td># FI</td>
<td>FI</td>
<td>FI</td>
<td># FI</td>
<td>FI</td>
<td>FI</td>
</tr>
</tbody>
</table>

Table 6.7: Time table M2000 - summer 1991

Co-ordinating across interdependencies

Theoretically, a large variety of different co-ordination mechanisms have been identified. One fairly common way of describing these devices is to distinguish between formal and informal
Another distinction made in one line of research is to talk about mechanisms that increase the capacity to process information, and others that reduce the need for processing information. A third distinction can be made between those mechanisms that imply inter-personal communication, and those that do not. To a certain extent these dimensions seem to overlap. Formal mechanisms implying little interpersonal communication are often used to reduce the need for information processing, whereas more informal mechanisms involving personal interaction generally increase organizational capacity to process information. In addition to the co-ordination elements inherent in centralized decision-making, two other central integration mechanisms were presented in Chapter 1: formalization and socialization. A related notion is that different types of interdependencies necessitate different kinds of co-ordination mechanisms. Three such mechanisms are proposed: standardization, planning, and mutual adjustment. The first two mechanisms often imply centralization and/or formalization, whereas the latter is generally a more organic process with elements of socialization.

The basic scholarly argument is that pooled interdependence requires standardization, sequential interdependence demands planning, and reciprocal interdependence necessitates co-ordination by mutual adjustment. The underlying hypothesis is that the greater the uncertainty and complexity surrounding the relationship between two units, the less standardization and planning can be used, as sudden and unforeseen changes in one unit will also affect the work of the others. However, these co-ordination mechanisms should not be regarded as mutually exclusive. Rather, as complexity increases, new co-ordination mechanisms are added. Moreover, as noted earlier, we believe that the relationship between the units involved in our IIPs can not be described as being distinctively of one type or the other, but rather as a hybrid.

From our previous discussion we know that the two Electrolux projects seemed to require a relatively high degree of knowledge-creation within and between functions. Theoretically, this situation would imply reciprocal dependency and a need for mutual adjustment in co-ordinating work across functions and countries. Still, the actual interdependencies created when responsibilities were divided seemed more sequential, thus requiring extensive planning, particularly in the phase(es) preceding actual development work. When we examine
the mechanisms in use in more detail, our main conclusion is that international and interfunctional co-ordination was limited, if they existed at all. Certainly, the product specifications prepared in the Alliance project functioned as a plan which set goals, though less for the team, than for the Italians who developed them. Also the time plan gave direction. Some traveling went on, but international mobility was mainly restricted to the steering committee, whereas people more involved in development stayed largely where they were located. Naturally, fax, telephone, and information systems were also used in the project for continuous communication. However, face-to-face communication was relatively sparse. Thus, given the actual creation of sequentially structured functional responsibilities over time, the co-ordinative pattern used seems appropriate, although pre-development planning was fairly limited. In our view, however, the co-ordinative structures in place, contributed in shaping the interdependencies. Combined with the narrow technical definition of the projects, permitted by the use of sequential routines for innovation, the lack of mechanisms allowing for continuous mutual adjustment and socialization across borders limited the prospects of realizing more reciprocal interdependencies. However, the question of whether these pooled or sequential interdependencies were really implied by the nature of the task still remains.

The 3rd-tap project resembles the Alliance one, but here international and cross-functional co-ordination mechanisms were even less developed. The guidance provided by the three variables identified in the product specification, in addition to the PAB meetings and ad-hoc contacts between the project leader and the Home Comfort representatives, in essence constituted the methods used. The anticipated manufacturing unit in Spain was not involved at all during this phase, nor had they been involved earlier. Consequently, few, if any, international aspects of co-ordination can be identified. Here, too, the integrative structures in place shaped the dependencies. Yet, once again we face the question whether management may have misread the knowledge creation requirements, particularly those across functions, or taken them for granted.

The two ABB projects differed significantly in terms of co-ordination mechanisms employed. This difference could be partly due to the fact that more people were involved in these ventures, but we also believe that a number of other factors contributed in leading management to apply more and different co-ordination mechanisms. From our discussion
above, we know that the R&D function in the Holger project was geographically dispersed. Management had intended to minimize interfaces across geographical space. Still the units had to interact, since the different parts were connected. In fact, to judge from the comments of the people interviewed, it seems as if the need for international co-ordination had been underestimated. Nevertheless, co-ordination mechanisms of all three types were used to manage activities. Standards in terms of general policies, the management letter, rules for documentation etc., as well as extensive planning (notably in the extensive lists of product specifications and in the use of different planning- and gateway systems) were utilized. Indications of mutual adjustment can also be found. People communicated through the corporate network, by telephone or fax, and interacted in meetings. However, in this case, too, face-to-face communication was relatively restricted, in terms of frequency and in limitation mostly to a number of managers at the top.

The M2000 project differed only slightly. As outlined earlier, business-area managers decided early - in the conception and planning phase - on a far-reaching standardization of components, processes, etc. Moreover, roles and reporting relationships were sharply defined. Naturally, also here the product specifications worked as co-ordinative goals. One totally new integrative body - the technical quorums - was also established. Finally, although face-to-face communication, as in the Holger case, may not have been widespread, there were more rules for preparations and procedures than in the two Electrolux cases. One example is the order to arrive and start socializing already the night before the meeting.

It is our impression that Holger and M2000 were much more formalized than the two Electrolux projects. This formalization is consistent with the general administrative heritage of ABB. However, although both ABB projects used more and different co-ordination mechanisms as compared to Alliance and the 3rd-tap effort, it is critical to note that international integration was essentially restricted to the R&D function. Rather little cross-functional communication across geographical borders took place, with the possible exception of interaction between the US R&D unit and manufacturing in Sweden in the Holger project. The use of sequential routines for innovation, as discussed in the previous chapter, more or less excluded the marketing function from development work. On the other
hand, there was continuous mutual adjustment on the local level, at least between manufacturing and R&D, in both ABB ventures.

**Frequency and importance of communication mechanisms in use**

We have already touched on certain issues relating to vehicles used to communicate and the frequency of their usage. International face-to-face communication, which could be central in assuring socialization and mutual adjustment across geographical and functional borders, was relatively limited. Most people agreed that traveling was important, but it also entailed certain problems. First, it was considered **expensive**. Second, it was seen as **time-consuming**. Third, people were not willing to **leave home** for longer periods of time. The latter rationale was also used to explain why co-location of personnel had not been used to any substantial extent. Moreover, since costs of traveling were often borne locally, many local managers saw travel as a “double punishment”. Not only would they lose one of their core competents, who of course also had other duties, they would also have to pay. Another reason why individuals were reluctant to travel was the belief that their operational managers, who were still in control of their salaries and future promotion, considered their absence as disloyal to the operating organization.

Meetings were held regularly, but they often seemed to be the result of “plans” rather than a response to “problems”. Cross-border meetings were held relatively infrequently. Some people stated that these meetings became too crowded and turned into ‘discussion clubs’ and committees, rather than forceful decision-making bodies of rapid response and action, as many thought they should be. These comments were more common among non-Swedes, who claimed that the Swedish consensus-oriented style of decision making aggravated this problem. The main reason given for the tendency of meetings to be overpopulated was that the different local units wanted to protect their own territory. By having more representatives than the others, they hoped to gain more speaking time and other advantages. A few persons even argued that this factor provided an incentive for some managers to have part-time rather than full-time personnel on the projects. It was better to show up at meetings with six part-timers than with three full-timers. One person referred negatively to the steering group as the UN (United Nations) of the firm.
For the majority of international contacts, however, more indirect communication channels such as telephone, fax, and information systems were used. A number of persons claimed that it would have been extremely difficult to manage the projects without the access to a global electronic network. Of particular importance appeared to be the use of fax and information systems. The telephone was necessary, but without the use of channels that permitted continuous and frequent transfer of drawings, for example, across geographical borders, it would have been very difficult to co-ordinate international operations and to engage in global knowledge creation.

Still, most people agreed that face-to-face communication was the most critical co-ordination mechanism. This observation is also consistent with research on product development processes in general, and the management of internationally dispersed R&D in particular.20 The criticality of personal communication seemed due to a number of factors. First, innovation is an iterative process; information must flow freely back and forth for new knowledge to be created. Second, people need to get to know one another in order to be able to work creatively together. This need was also related to the fact that personnel had very limited prior experience of co-operation of the kind involved in our cases. Third, over time face-to-face communication also seemed to have a positive impact on the effectiveness of less direct communication methods. Fourth, the social learning process that (would have) followed from extensive face-to-face contacts, particularly during the conception and planning phase or the initial stages of development, could also contribute in giving people a) a shared body of knowledge, b) common frames of reference, and c) the additional knowledge necessary to interpret certain information.

The observations above are also consistent with much of the existing literature.21 Perhaps less obvious is the notion that the type of knowledge to be transferred partly determine which communication method is most suitable. In short, some kinds of information seemed easier to 'codify', than others.22 Codified information could be transferred by use of indirect communication channels, whereas un-codified information necessitated more direct communication between the persons involved. For instance, some people argued that results from tests or drawings were quite easy to transfer internationally, whereas design principles had to be discussed interpersonally.
However, even if knowledge could be codified, other problems sometimes arose. When people did not share a common frame of reference for interpreting the codified information, they could give the same information different meanings. Alternatively, they simply lacked the knowledge necessary to give the transferred information any interpretation at all. The former observation also seems to imply that knowledge has a context-dependent 'objective-subjective' aspect. With some information, it was relatively easy to arrive at an inter-subjectively shared interpretation, but not with other types of information. For instance, no one would dispute that the energy consumption of the Alliance washer would be less than that of a vertical-axis top-loader, given the estimates provided. However, when it came to the necessity of shortening the washing cycle, people in the USA and Italy had totally different views. Each party used its own local frame of reference to interpret the situation. Moreover, while no one in the Holger case would disagree on the technical differences between C and C++ programming languages, there were differing opinions as to what customers wanted.

An affective element also seemed to be at hand when an inter-subjectively shared frame of reference for interpretation was lacking. People were inclined to give information an interpretation which favored their own preconceptions. In general, it was our impression that market-related knowledge tended to be harder to codify, and the frame of reference for interpreting this type of knowledge appeared less inter-subjectively shared across functional and geographical borders. This reasoning would imply that market knowledge is more "sticky" to the local environment than the other two types - technical and manufacturing knowledge. It is more difficult to transfer and requires a deeper understanding of local circumstances.

To further investigate the extent and means of communication between project members in different countries, we asked the project leaders in the survey a number of questions concerning the methods and channels used to communicate internationally. Face-to-face contacts, telephone, and fax were used regularly in most of the projects. Other electronic communication methods, such as e-mail, common data bases, and CAD/CAM systems, were used in relatively few cases.
We also asked the project leaders to mark the importance of each communication method on a scale from 1 to 7 (7 being the most important). From Table 6.8, we see that face-to-face communication was regarded as significantly more important\(^*\) than telephone, fax, and letter (in the analysis, we used Wilcoxon tests, significance level 10\%=*, significance level 5\%=**). Letters were significantly less important than all other methods (all at 5\% significance level, apart from fax and CAD/CAM) except for common data bases, which were also significantly less important than e-mail*. The most striking result is perhaps that contacts by the method given the highest importance, face-to-face communication, were usually only taken on a monthly or quarterly basis. This finding is also consistent with our impressions from the four cases, as discussed above. Further, the relatively few individuals who used e-mail, data bases, and CAD/CAM considered these channels as important.
Table 6.8: Perceived importance of different communication methods used (scale 1-7)

<table>
<thead>
<tr>
<th>Communication method</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Minimum</th>
<th>Maximum</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face</td>
<td>6.23</td>
<td>0.82</td>
<td>4</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Phone</td>
<td>5.85</td>
<td>0.86</td>
<td>4</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td>Fax</td>
<td>5.30</td>
<td>1.35</td>
<td>2</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td>Letter</td>
<td>4.19</td>
<td>1.33</td>
<td>2</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Electronic mail</td>
<td>6.09</td>
<td>1.14</td>
<td>4</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Common database</td>
<td>5.66</td>
<td>1.21</td>
<td>5</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Common CAD/CAM</td>
<td>5.77</td>
<td>1.17</td>
<td>4</td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>

Locus of co-ordination

The locus of co-ordination is an important aspect of how the projects were managed. We will restrict our discussion to two main points. First, in geographical terms, who was in charge of the effort? Second, in regard to desirability of centralization or decentralization of project management, how did the views of the various international units differ? Thus, locus of co-ordination will be described in both geographical and hierarchical terms.

As described earlier, we find “centers of excellence” in more than one country in all projects except for the 3rd-tap one. Responsibilities for co-ordination were also geographically dispersed to a greater extent in the other three projects. Thus, rarely did we find one development unit formally in charge of the others. However, the Electrolux and ABB projects differed in the sense that, at least in the Alliance project, management tried to assign project leadership to one of the units involved. Although the Canadian unit was formally the leader in the Alliance project, we believe that its power over the Italian and US organizations was limited. No effective mechanisms existed for ensuring compliance with decisions. While the Canadians controlled the budget, they did not recruit or set the salaries of foreign project members etc. Thus, in reality it was very much up to the local units to do as they saw fit, and they appeared to co-ordinate activities on a case by case basis. The 3rd-tap project illustrates another situation, in which project leadership was divided functionally and not geographically. In fact, it is difficult to say who was in charge. New Products developed the water purifier for Home Comfort. On the other hand, the development team could disregard the price target, thus confirming our impression that overall leadership was divided.
In the two ABB projects, business-area managers largely retained leadership of the projects with themselves, rather than delegating it to one of the local units. In doing so, they seemed to hope to avoid a situation in which these units would get the feeling of 'us versus them'. Another possible explanation, although only hinted at by one of the managers to whom we spoke, could be found in the overall configuration of the company. It is our impression that one reason for keeping leadership at the BA level may have been to maintain the balance between products and countries. Assigning project leadership to a local unit would have meant giving additional power to the 'other side of the organization', the geographical one. By comparison, at Electrolux the real power had historically been located at the country level, even though "global authority" was formally vested in the product-area managers and the head of the white-goods product line. The ABB projects had a natural 'global home' - the business area - which could be used also in the project cases. Still, since the Holger project management team and the steering group was mainly Swedish, many Americans felt that project leadership had at least a European bias. In the M2000 project, responsibilities and reporting relationships were defined to an extent that in fact forced the units to co-ordinate locally. Nevertheless, the most critical overall decisions were still taken centrally at headquarters in Switzerland by the BA management team.

Our other principal point is that sometimes the various countries appeared to hold different opinions as to what level of centralization was necessary or appropriate. In general, it seemed as if Swedes liked the fact that the projects were based on a principle of decentralization. Other nationalities, most notably the Americans in the Holger project, would have preferred more centralization of authority. Related to this question is the existence of different interpretations of what the administrative hierarchy actually symbolizes. As outlined in the M2000 case, personnel from the Nordic countries occasionally encountered problems when approaching a colleague from a South European unit, because they did not follow the chain of command dictated by the formal hierarchy. Sometimes their superiors would even be telephoned by the manager of a South European units, who would complain that the Nordic people did not respect his position in the structure, and would request that future contacts be taken through him, rather than directly. Our results seem consistent with other research on cross-cultural management in which Swedes are often described as having a positive attitude toward decentralization and little respect for formal authority in the traditional sense.25
The role of the project leader

The final subject which we would like to highlight at this point is the role of the project leader. Much research on the management of product development and innovation projects has emphasized the importance of having a 'heavyweight' project leader.\textsuperscript{26} He/She is described as the "heart and soul" of the project - protecting, nurturing, championing, and integrating the effort. Naturally, there is no one best way of leading a project. Still, successful project managers seem to share a number of common characteristics. According to recent research,\textsuperscript{27} they have a wide span of co-ordinative responsibilities throughout the entire process, including decisions regarding specifications, costs, components, etc. They work closely with engineers as well as with customers or suppliers, and they possess the multidisciplinary skills necessary to exert influence in all functional areas. Finally, they guard the concept against outside forces and solve conflicts between the different parties involved.

If we take a look at the project leaders in the four case projects, a few features stand out. First, the project leaders' span of control was relatively limited. In some cases, it is even difficult to speak of a project leader at all. The 3rd-tap venture was in fact managed by two project leaders, who could take decisions within their own organizations but few if any decisions that related to the entire project or innovation process. Moreover, the 'technical' project leader also had to manage a separate project at the same time. In the Alliance project, there was a succession of project leaders, but actual responsibility rested with the head of the Canadian unit, and with those in charge of the other local companies. The Holger project had two overall project managers, as well as a number of different sub-project leaders, although in reality the more critical managerial responsibilities appeared to have rested with business-area management. In the M2000 project, the project leader was located in the Finnish unit. While he was responsible for the overall effort, most critical decisions were still taken by the BA management team, as discussed earlier. Second, rarely did we find project leaders with actual multifunctional backgrounds. In terms of foreign experience, which might matter when managing an international project, few of the project leaders had worked abroad for any extended period of time. Third, we received the impression that the steering committee, or its equivalent, generally had more impact on critical decisions than did the project leader. Therefore, none of the project leaders in our four IIPs can really be considered as
"heavyweight" project managers. The reason is not so much that they did not possess the necessary personal qualities, but rather that their roles and responsibilities were not defined in a way that gave them sufficient influence and freedom of action. Perhaps, other leadership, such as strong country management, sub-project leaders, BA managers, steering committees, etc., compensated for the lack of a single strong leader, but it may also have contributed to a fragmentation of the innovation process.

In the survey, we wanted to obtain a broader profile of the project managers. On the average, he (in all cases it was a man) was some 40 years old, and in 87% of the cases he was a Swede. More than two thirds of them held a master's degree in engineering, and as many as 72% currently worked in R&D. All of the project managers spoke at least two languages fluently, and one third spoke three or more. On the average, they had been employed with the current firm for a little more than a decade and had managed approximately six development projects prior to this one; of these projects, 50% had been international ventures. We believe this last figure reinforces our impression that today IIPs are relatively common in some highly internationalized Swedish multinationals. One could of course claim that these project managers represent the few existing international experts and constitute exceptions to the rule of more nationally based development. However, they had rather limited international experience in terms of years spent working abroad (on the average a little more than half a year), and of general management (approximately one year). Finally, most of the project managers in the survey rated the IIP in focus as being relatively important for their future career (mean=4.9, on a 1-7 importance scale, with 7 = very important).

To understand better the work of the project managers, we asked them to rank the importance and difficulties associated with a number of typical tasks. (On the ranking scale, a low number means important and difficult, respectively. In the figure, 1 and 7 are omitted for reasons of space, since no average rank was found at those extremes.) What stands out is the great importance and difficulty associated with 'task-related' work, such as planning and coordination of activities, and the relatively low importance associated with 'people-related' skills like conflict resolution and providing motivation.  The two former activities are seen as significantly more important than the two latter ones at a 5% significance level. The relatively high degree of task orientation may be the result of the predominance of engineers
among project managers, and the technical orientation as regards the definition of the projects.

![Figure 6.11: Importance and difficulty of project leader tasks, mean ranks (n=25-29)](image)

Finally, we were interested in determining the autonomy of the project leaders. We asked them if they were allowed to take a number of decisions without the approval of the control group (or equivalent). It is evident from Table 6.9 that most IIP managers were severely restricted in their freedom to act independently when time, money, and product performance were involved. On the other hand, a majority of these project leaders were free to hire and fire personnel, and to select components and suppliers, without the approval of anyone else.

<table>
<thead>
<tr>
<th>Type of decision</th>
<th>Change time schedule</th>
<th>Change product specs.</th>
<th>Hire/ fire</th>
<th>Choice of suppliers</th>
<th>Choice of manufacturing location</th>
<th>Choice of components</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of cases where decision could be taken without control group approval</td>
<td>3%</td>
<td>27%</td>
<td>80%</td>
<td>27%</td>
<td>80%</td>
<td>53%</td>
</tr>
<tr>
<td>(n)</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

Table 6.9: Mandate given to the project leader
Co-operation with external companies

As pointed out in Chapter 1, notions of outsourcing and networking figure prominently in many descriptions of the modern firm. In focusing on a few core areas or processes where the company has a clear competitive edge, and in using an external network to supply the remaining components and parts, there are many advantages. It is also argued that as the traditional boundaries of the firm become more blurred, the network becomes the more interesting level to consider. The issues suggested by such inter-organizational processes were not the focus of this study. Nevertheless, we believe that a few interesting observations can be made on the basis of our material.

From the Alliance case we know that primarily European suppliers belonging to the traditional Zanussi network in Italy were essential in developing the new concepts. Electrolux did not develop or produce all components of the washer and combo. Nor did they manufacture the tools and machinery required in the factory. Instead, the company was dependent on an external network of sub-contractors. However, we consider the concept of outsourcing to be slightly misleading in this context and prefer to speak of the company’s deliberate dependence on an external network as ‘out-tasking’. From our choice of this term, it should follow that entrusting development responsibility to another organization does not mean that the out-tasking firm remains passive, while their partners cope with all problems. Rather, knowledge about how to develop and manufacture specific components must be replaced by knowledge about how to manage relationships and the different interdependencies which exist.

As recognized by a number of scholars, relationships can serve multiple purposes. They can be used to increase productivity or technical efficiency, constitute information channels, or even serve to increase control over the environment. Furthermore, relationships can work as dynamic forces in driving firms to innovate, but they can also function as inertia in blocking new innovations. Finally, links to a number of different actors in the environment can be used for product development purposes. Some of the more important potential sources of knowledge are displayed in the figure below. Naturally, the other organizations may or may not be located in countries where the firm is developing the new product. With this in mind, we will first return to the cases.
Peter Hagquist felt it was important to know how all components worked. As a consequence, components were designed internally. Later, a decision would be made as to produce them within Electrolux or to buy them from an external supplier. Inter-organizational co-operation in general was handled primarily by Mr. Hagquist, although the other two project members visited certain suppliers when so required. In principle, all external contacts were focused on the various components needed to build the water purifier; no future end-users were brought in. On the other hand, through contacts with distributors in other countries, the development team managed to find out a lot about costs, process technologies, and different sales methods. The relationship with the different suppliers can hardly be described as strong, and their involvement in developing the water purifier was quite superficial. Project members traveled around to several potential suppliers of the same component, and then picked the one they felt could best meet their requirements. As it turned out, suppliers from many different countries were used, there among Sweden, Italy, Germany, Japan, and the USA.

Furthermore, Mr. Hagquist considered it essential not to spread information attained during co-operation negotiations outside the circle of three persons. The main reason for this policy also explained why Electrolux had chosen not to collaborate with any of its competitors; it was too risky to let out information. (To some extent, this argument also applied to the
relative absence of co-operation between the developers and the Home Comfort team. He knew how easy it was to induce a salesman from a competitor to reveal technical secrets about products, and he did not want that misfortune to happen to Electrolux.) However, the project did learn a lot about competing products by buying and dismantling them.

Holger

As for external linkages in the Holger project, a number of people emphasized the importance of being flexible by maintaining relationships with several different suppliers in the same field, rather than concentrating all efforts on one exclusive relationship with a single firm. However, this policy did not mean that substantial co-operative efforts with several firms in the same area were cultivated in parallel. Rather, the company focused on one strong relationship and complemented it with several weaker ones to be flexible in case the situation so demanded. There was also a dilemma present in co-operating with companies outside the firm. The North Americans seemed to fear that a close relationship would risk leaking information that could be passed on to competitors. The Swedes, on the other hand, were convinced that progress in development was only possible through working closely with suppliers.

One consequence of the Holger project’s greater focus on outsourcing hardware and software applications to external companies was that new relationships had to be established. Before initiating co-operation with one major new supplier, the company had spent six months evaluating its technology, organization, security, etc. Several managers emphasized that it was vitally important to have contacts at all levels of the firm, including the management level, both the strategic and the operative. To build personal relationships, one manager devoted half a year to the particular supplier. However, many project members further down in the hierarchy thought co-operation worked better on paper than in reality. Often, it was difficult to reach people. For example, almost half a year was spent trying to find the person who had outlined the specifications of a certain subsystem that had broken down during tests. It was finally discovered that this person had left that firm a year earlier and had taken the specifications with him. The BA experienced more problems after initiating co-operation with a young and rapidly growing firm in the microelectronics industry. This company functioned quite differently, its systems for development and co-operation were difficult for ABB personnel to understand.
Co-operation with customers was rather rare. Some of the project members pointed out that customers were not really useful in platform development, but could be valuable when it came to developing applications. Furthermore, customer-input that was used originated largely from service of the old systems. R&D personnel spent some 5% of their time on service, but once the new system was in place, customer contacts would take approximately 20% of their time. This situation was most prevalent in the Swedish organization, whereas the Americans were more used to involving customers in development. However, since the Swedes were responsible for the most important parts of the system, their view was more representative of the project as a whole.

Collaboration with other parts of ABB was limited. When it did occur it was primarily the consequence of historical co-operation when these units had been parts of ASEA, BBC, or Combustion, respectively; it was seldom specifically sought by the PMT or BA management. Some people even held that it was better to be dependent on outside companies in the home country than on foreign units within the company. Their country would then be strengthened in relation to other parts of the firm.

Throughout the development of the new motor series, lead customers and suppliers were brought in to take part in the development process. Furthermore, the firm kept on buying competitor products for reversed-engineering purposes. Most of the companies with whom close interaction and co-operation was initiated were based in the Nordic countries. Management stressed the importance of confidentiality and historical ties in product development. Therefore, they thought it too risky to involve companies in Germany, for example, since these were considered likely to have close ties to Siemens, a major competitor. The importance of a history of co-operation was illustrated by a case in which one center of excellence brought in a new supplier for a critical component. While this supplier offered a better price, it could not meet the quality standards agreed upon; as many as 30-40% of the components were marred with defects. When this company explained that it really could not do any better, the unit was forced to resume contacts with its former suppliers. The resulting delay was some eight months.
This problem also led the unit to start building competence of its own in this critical area, however, without intending to manufacture the component. While management believed that there was too little concentration on critical components, they did not wish to add another component to those already manufactured in-house. Rather, they thought that by having its own competence in the area the unit would better be able to find the best suppliers and to have a productive dialogue with these suppliers in order to develop satisfactory solutions.

Managing inter-organizational relationships

The fact that dependencies are created when certain parts of the innovation process are out-tasked also implies that various relationships may need to be managed differently. It also seems fair to assume that in more complex relationships with external companies, the firm needs an internal knowledge base in the relevant area. Without internal knowledge, it would be extremely difficult to know what to look for, and whom to turn to. However, given that we did not study development relationships with external companies in depth, it is hard to draw any far reaching conclusions from our material. It seems as if some relationships that involved relatively little uncertainty and limited creation of new knowledge could be handled by standardization and planning. Examples include the specification and procurement of already relatively standardized components to be included in the product. On the other hand, other relationships, which involved more revolutionary or joint creation, demanded co-ordination by mutual adjustment. For example, the links to external hard- and software suppliers in the Holger case appeared difficult to manage without close personal interaction.

A related fact is that many people, particularly in the Holger case, emphasized the importance of building relationships not only at the top-management level. The establishment of mechanisms ensuring continuous communication and interaction also at the levels where the ‘real’ work is done appears critical when vital parts of the new product development process are out-tasked. From time to time, it seemed as if top managers were left with a false sense of security, since they noticed no problems at their own level, and never heard about those so apparent further down in the administrative hierarchy.
A few other points, some related to our discussion above, were also brought up during our interviews. However, we would prefer to treat them as tentative ideas, rather than generalizable findings. First, historical ties seemed to matter considerably; only in a few cases did the projects initiate co-operation with entirely new partners. It seemed as if the efforts invested in previous co-operation had led to inter-organizational learning and routines for leveraging knowledge between the parties. Notions of trust and reliability were also mentioned. From the outset, it was important to know that the partner would be able to 'deliver', and to do so on time and with acceptable quality. One consequence of the reliance on historically strong relationships was that co-operation partners were generally from the same country or region as the unit initiating collaboration.

Second, substantial differences in organizational architecture between the co-operating firms seemed to create problems. Differences in perception of formal authority, and in the use of co-ordinative structures could be particularly problematic. For instance, variations in innovation routines were sources of difficulty, especially when the firms had little prior experience in co-operating. The example best illustrating this point was perhaps that of Process Automation, which worked with two micro-electronics companies in parallel. One of them was a long-standing partner with similar ways of working and co-ordinating activities. The other, a much younger firm, with whom no strong prior relationships existed, operated quite differently. Several persons from ABB found it difficult to understand how people in that organization reasoned, whom to contact, whether to follow the hierarchy or not, and what mechanisms to use for mutual co-ordination, since the preferred integrating devices could differ significantly between the organizations.

Third, the absence of a local network at the site of production of the new product led to dilemmas. As pointed out earlier, the Alliance project encountered problems, since certain components which differentiated the horizontal-axis technology from the vertical-axis one, were not produced in North America. Issues of both short- and long-term benefits had to be considered. It was realized that in the short run, it would be too expensive to import all components. On the other hand, the Italians preferred working with their traditional suppliers in Europe, since these were already an integrated part of the product-development process. As for the long run, the Canadians were more interested in building their own local network; for this
reason they also argued for that solution in the short run. The situation illustrates how local industrial networks can sometimes block, or at least delay, the introduction of new and more advanced technologies.

Fourth, perceptions of how to co-operate with external partners appeared to differ geographically. In general, people from the Nordic countries tended to argue that close interaction was necessary for new knowledge to emerge. As outlined in the Holger case, North Americans were more skeptical about intimate co-operation, apparently out of greater distrust for outside companies. The Americans appeared to view the relationship between their firm and others more in terms of a zero-sum game, in which one party could gain advantages only at the expense of the others, rather than as potentially one of mutual benefit. The buyer-supplier relationships in North America showed signs of a focus on squeezing out the best ‘deal’ rather than on creating shared advantages. We admit that these attitudes may be limited to particular industries or companies, and that in the USA and Canada we might also find examples of industries and companies more extensively engaged in close networking.

Fifth, we were also given the impression that people in different countries had different preferences on the kind of partner with whom to co-operate. The European units appeared more experienced in co-operating with suppliers, whereas North Americans seemed to prefer customers. In the Alliance case, this difference could in part be explained by the fact that the Italian organization was focused on R&D, and the US unit on marketing. In the Holger project, however, all units taking part were basically technical ones. Of course, the different preferences gave rise to discussions on the choice of partner, but they also seemed to have a more fundamental impact on development efforts. In the Holger case, the Swedish unit appeared focused on technology, whereas the North American appeared to emphasize satisfying customer needs. The difference is reflected in the tendency of some Americans to describe the Swedish researchers as overly “academic”. The Swedes, on the other hand, argued that since the product life-cycle of the new process automation system was 10 years, the firm actually had to satisfy customer expectations in the year 2005, not in 1995; since they believed that the future systems would be based on developments occurring in the supplier chain, the project had to incorporate the latest innovations.
Problems in the development phase

Our discussion and analysis of the development phase has been focused on the division and co-ordination of tasks and responsibilities, internally as well as in relation to outside partners. Many of the managerial problems experienced during this phase were related to these areas. After the discussion above, we would like to limit our analysis of critical problems to issues concerning a) the lack of well developed routines and other administrative structures for leveraging knowledge across different boundaries, and b) the relative absence of marketing and/or customer contacts.

Co-ordination across multiple borders

It is evident that innovation processes covering great physical distance pose somewhat different integrative requirements and problems than do locally concentrated ones. Since the former appear more costly to co-ordinate, possible advantages in terms of superior input and greater intra-organizational acceptance of the new product after the development process, may be offset by the greater administrative costs and difficulties encountered in managing the effort. We believe that a number of factors in our cases contributed in making matters more complicated than may have been necessary.

First, the lack of co-ordination mechanisms for handling sheer physical distance made feed-back loops longer. There were two primary consequences: the process was prolonged, and more time elapsed before problems were detected. Sometimes, delays led to processes of “goal-drifting”, in terms of time as well as performance, in that objectives were changed without everyone’s realization. Since the organizations did not seem willing to assume all the additional costs associated with co-ordinating across greater geographical distances, these difficulties were almost inevitable. Yet, management did not realize that extra integrating mechanisms were called for. In a sense, it seemed as if the companies focused so much on the potential advantages of the international projects that they forgot or disregarded the drawbacks. The greater the mutual adjustment across geographical borders required by the division of tasks and responsibilities, the more difficult the problems that were encountered. On the other hand, once these problems had been “muddled through”, and people had learned to know each other, the
seed of a new and stronger relationship has been planted. In projects which had provided little for international integration in the creation of 'local' co-ordination structures and sequential dependencies across space and time, few problems appeared to exist for the time being, but then the products were still not ready for market introduction. Moreover, the lack of a single strong center for managing the effort, and the relatively high turnover of personnel, including project managers in the Alliance case, seemed to contribute in making co-ordination even more difficult. These circumstances, combined with the fact that few people worked on a full-time basis for the projects were a serious obstacle to continuity of effort. Exactly who people should turn to, abroad or within another function, tended to vary over time.

Second, the lack of a clear, communicated, and shared strategy or vision, for the organization in general and the innovation project in particular, seemed to create problems. When people could not see their contribution to the general effort, it was often difficult for them to take proper action. All projects were more or less the effect of a "top-management push", as argued in Chapter 4. While top managers may have had a relatively clear idea of what they wanted to accomplish, their vision occasionally became operationally impotent, since it was not always communicated or shared by the people involved in the actual effort. From time to time, the greatest enemy seemed to be within the firm. Some units appeared to feel that they had been forced into taking part in the ventures. In both Electrolux cases, seemingly competing projects were conducted in parallel. The two ABB projects appeared to encounter fewer problems in this regard. One possible interpretation could be that the organizational units of ABB are more "confined"; the business areas of that firm are more focused than the countries or product areas of Electrolux. Thus, the development of the new generations at Motors and Process Automation were vital to the survival of these units, whereas the development of Alliance and the 3rd tap was, if not marginal at least relatively less important to the survival of some of the units taking part in these projects. For all these reasons, the inclination to share the same super-ordinate goal across functions and countries may have been higher in the ABB cases.35

Third, the lack of a common "language", in the sense of terminology, and frame of reference, made interpretation of what others were saying difficult. The disputes that occurred often seemed related to interpretations, rather than facts. People could return to their own terminology when discussing critical issues. Frequently the result was that the other party did not understand,
though sometimes erroneously believing that he/she had understood. The latter problem was probably more severe; work could proceed in different directions without the various parties being aware of it. In the two ABB business areas, efforts to adopt a mutual terminology were made in parallel with the innovation projects. The Motors’ attempt seemed more an effort to merge existing “dialects”, whereas the approach of Process Automation was marked by the decision to adopt the Swedish terminology. Both approaches appeared to have their strengths and weaknesses. The latter approach was a swift one, but it is doubtful that a common language is very useful if only one party understands, uses, or is committed to it. While the other approach was more time-consuming, once the language was accepted in the organization, most units tended to adhere to it.

Customer vacuum

The other major group of problems can be labeled "customer vacuum". Although the most obvious co-ordination problems during the development phase were associated with physical distance, the lack of co-operation across the technical-commercial border had already begun to spawn some difficulties. We believe the main reason why so few of the co-ordinative problems realized during the development phase can be characterized as genuinely multifunctional, as opposed to internationally generated, is that little cross-functionalism was pursued. Still, it is evident from the cases that the lack of communication between functions was becoming troublesome in some of the projects, most notably the two Electrolux ones. Since the majority of these problems would erupt in the commercialization phase, let us focus on the sources of difficulty.

First, the problem of establishing fruitful co-operation between functions was partly one of attitudes. The technical functions of the firm, i.e., R&D and manufacturing, appeared to distrust marketing, and vice versa. Thus, the problem seemed more related to differences in the professional cultures of business people and engineers, respectively, than to differences in the functional cultures of R&D, manufacturing, and marketing. Some of technical personnel held that their marketing colleagues could not make any substantive contribution to development, and that they had a weakness for fads; either the input was trivial, like the color of a component, or so general that it was obvious to everyone, like the requirement that a product be
environmentally friendly. We refer to this prejudice as the "knobs and clouds" syndrome. Another example of inter-functional mistrust is the following: as mentioned previously, some technical employees claimed that if marketing were told that a new product was being developed, they would either stop selling the existing one, or start telling the customers about the new one, information that sooner or later would fall into the hands of the competitors; probably, they would do both. Marketing people, on their hand, criticized the technical side for only being interested in the latest technologies, and for not really caring about meeting customer expectations; they always focused on developing the most advanced technical solution, no matter how much time this took and disregarding the future price of the product; we call this prejudice the "creeping-enhancement" syndrome. Others from marketing accused engineers of a tendency to "trivialize" marketing and "to consider it as something that anyone could do".

Second, once again the lack of a common "language" gave rise to severe problems. While technical staff discussed field buses, osmosis filters, DIN rinse tests, or loose-core principles, marketing personnel were taking about market share, final price to customers, and pay-back time of the investment. To some degree, these differences were probably an effect of separate careers paths for engineers and business graduates at the companies. However, a more general cause was that the professional languages and mind-sets of the groups had been developed and nurtured separately since their university days. It should be added that at ABB sales and marketing personnel often had a technical background and focus, so that some of these language problems were avoided there.

The development phase revisited

Throughout this chapter, the discussion has revolved around a classical theme in organization theory - how to divide and co-ordinate tasks and responsibilities. We have tried to contrast the traditional, and somewhat rationalistic, theoretical approach to organizational design with one more emphasizing the organizational architecture of firms.

The "rational" perspective would tell us that task uncertainty, combined with the existing knowledge bases, determines the need for knowledge creation, and thus also the appropriate
interdependencies among the units taking part. The types of knowledge-creation requirements also tell us to what extent codifiable and non-codifiable knowledge need to be transferred across organizational boundaries. Further, the more interdependence we find among units, the more flexible the set of co-ordination mechanisms that need to be utilized. Finally, when it is difficult to codify knowledge, more elaborate types of co-ordination are called for. Our attempt to outline the “rational” perspective is illustrated below.

<table>
<thead>
<tr>
<th>Task uncertainty</th>
<th>Existing knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of interdependencies between units involved</td>
<td></td>
</tr>
</tbody>
</table>
- Pooled
- Sequential
- Reciprocal

<table>
<thead>
<tr>
<th>Knowledge-creation requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-ordination requirement</td>
</tr>
</tbody>
</table>
- Type
- Frequency

<table>
<thead>
<tr>
<th>Types of knowledge being transferred between units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codifiability</td>
</tr>
</tbody>
</table>

**Figure 6.13:** Task-determined division and co-ordination of responsibilities

**Processes of structural reproduction**

We believe that both multinational and multifunctional co-ordination problems encountered in our cases have their roots, at least partially, in the firms’ propensity when designing IIPs to reproduce the structures apparent in the overall organizational architecture. Earlier in the chapter we raised the question of what could make managers misread uncertainty or knowledge creation requirements, and in effect sometimes create less than ideal interdependencies and co-ordinative structures between the units involved. Our thesis is that strong forces tend to keep organizations from departing from solutions of the past. Traditionally, these solutions have worked, and few people see any reason to believe that they would not do so in the future. Historically, innovation at both companies had been defined as the task of the technical departments, in some cases possibly aided by the local marketing and sales company. We find that this definition or conception was also the case with our IIPs - sequential routines for innovation were followed.
International co-ordination at Electrolux had traditionally been restricted to extensive socializing at the top, and financial monitoring of subsidiary results. As noted in Chapter 3, the company was perhaps the prime example of a polycentric Swedish MNC. Moreover, in its basic configuration, the firm was split into a commercial and an industrial side. When it came to coordinating the international projects, no new mechanisms of substance were added. Nor was the traditional ASEA/ABB approach of formalization abandoned to any notable extent. Formalization in terms of clear goals, roles, well-defined responsibilities, and reporting relationships had worked before, and was consequently followed again.

Rather than the analytically derived framework presented above, another force seems to determine how ABB and Electrolux organized and managed the IIPs during the development phase. Once more, we see how the companies are captives of their past in that the overall organizational architecture is reproduced in the design of the international projects. It seems hard to break free from the interdependencies inherent in the operating organization, i.e., to shift from one type of dependence to another. A new type of interdependence, implied by the different nature of the project task, may: a) run counter to relations apparent in the overall configuration, b) require utilization of other co-ordination mechanisms than those included in the overall administrative structure, or c) imply the creation of processes not covered by the general innovation routines. Since the IIPs in our case companies were among the first attempts to engage in international innovation, little prior experience existed as a basis for new routines. There seemed to be a built-in resistance to setting up new structures, and those apparent in the architecture tended to be reproduced. Our reasoning is illustrated in the following figure.

Figure 6.14: Architecturally determined division and co-ordination of tasks
In the case IIPs, there also seem to have been a number of built-in problems in co-ordinating reciprocal interdependencies - a possible reason why relationships took pooled or sequential shapes instead. It appeared difficult to use mutual adjustment and more informal co-ordination mechanisms since a) little shared experience and no homogeneous norm systems or interpretive "schema" existed, and b) greater physical distance made informal and continuous communication more difficult and costly. Thus, although the interdependencies and the types of knowledge to be transferred across borders would imply the use of flexible co-ordination structures, these may be replaced by another and more rigid design.

Temporary avoidance of uncertainty, complexity, and conflict

We described the conception and planning phase as marked by efforts to reduce uncertainty, but also to avoid conflicts. A result was behavior characterized as problem generation, -solving, and -pushing. To a certain extent, problem pushing was also present during the development phase. Contacts between the creators and the future exploiters of the products were still rare; that is, the technical parts of the organization had relatively little to do with those who were later going to market and sell the new products. As already argued in the previous chapter, an alternative to viewing this behavior as conflict avoidance is to interpret it as a way of reducing uncertainty and complexity; by not having too many different views present in the project during this phase, development could proceed in a more linear fashion than otherwise anticipated.

Moreover, if everyone "minded his own business", all parties involved would have a "way out" if things went wrong. Marketing could always blame the technical personnel for having developed a product unwanted by customers, and thus almost impossible to sell. On the other hand, the technical staff could claim that the marketing organization was incapable of finding the right sales points or arguments, since marketing did not understand the technical merits of the product. In some cases, the willingness to work on a project designed so that "you could save your own skin" appeared as great as the desire to regroup into a dedicated team on which everyone would be accountable if the product failed. If the "fragmented" project succeeded, all units involved would still be able to praise themselves as the real winners and claim that they were the reason why the new product had done well. Ironically, a "parts definition and design",

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i.e., a fragmented and sequential division of tasks and responsibilities over functions and time, appeared to yield a “local” (functional) win-win situation from this perspective.

The influence of the organizational architecture

To summarize, the impact of the organizational architecture was also noticeable during the development phase. Some of these structures were now reproduced in the project architecture. The innovation routines of both firms basically defined development as the task of the R&D function; they relegated the responsibilities of the other departments to minor tasks, proceeding in parallel but not actually affecting the content of the development process. Since goal variety was reduced by one department’s dominating the phase, much uncertainty and complexity, and many conflicts across functions, were temporarily avoided.

To be sure, the dispersion of complementary assets forced the firms to consider issues of cross-border co-ordination. However, the nature of the task was generally not taken as the point of departure for designing the architecture of the projects; rather their configurations came to bear a close resemblance to those of the firms. Thus, the basic separation of departments (and to some extent of countries) was still evident. Instead of designing a ‘global’ team with joint responsibilities, specialization of labor still prevailed in the IIPs. Cross-border relationships and/or dependencies between functions were generally weak.

The co-ordination mechanisms in place also echoed the influence of the organizational architecture. The companies did not seem to abandon their co-ordinative heritage to any great extent. Thus, if formalization prevailed on the organizational level, it also tended to do so on the project one. As a consequence, the portfolio of co-ordination mechanism made available to the project appeared to shape the interdependencies in place. Without sufficient vehicles for socialization and mutual adjustment across borders, geographical and functional, reciprocal interdependencies were not realized, even if required by the nature of the tasks performed. Our interpretation of the influence of the organizational architecture during the development phase is summarized below.
<table>
<thead>
<tr>
<th>Type of structures</th>
<th>Variables</th>
<th>Influence on innovation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset structures</td>
<td>Dispersed and complementary assets</td>
<td>Force the firm to consider issues of cross-border co-ordination</td>
</tr>
<tr>
<td>Administrative</td>
<td>Overall configulative pattern</td>
<td>Reproduction of firm configuration: Project architecture determined by organizational architecture rather than the nature of the task - basic separation and specialization intact</td>
</tr>
<tr>
<td></td>
<td>Co-ordination mechanisms</td>
<td>Reproduction of overall co-ordinative pattern: Portfolio of mechanisms determined by the organizational architecture rather than the nature of the task - shapes interdependencies</td>
</tr>
<tr>
<td></td>
<td>Sequential routines for innovation</td>
<td>Temporarily reduce uncertainty, complexity, and conflict by limiting the number of participants with different goals and requirements</td>
</tr>
</tbody>
</table>

Table 6.10: Structures influencing behavior in the ABB and Electrolux IIPs

Summary of the chapter

In this chapter we have outlined and analyzed the management of the development phase. We have discussed four overall questions. First, how were the projects organized, i.e., how were roles and responsibilities distributed? Second, what management systems and co-ordination mechanisms were used? Third, how were co-operative arrangements (if any) with external partners managed? Fourth, what major problems or difficulties were encountered?

The case IIPs applied diverse principles for dividing work. Both Electrolux project relied on functional separation of tasks across geographical space. In the Holger project a principle of technical division of labor was applied, whereas tasks in the M2000 project were distributed geographically on the basis of product-range (size) specialization. It is a common theoretical assertion that the uncertainty surrounding a task affects the interdependencies among groups performing parts of the task. Knowledge-creation requirements within and between functions, and thus also across geographical borders, may vary considerably with the nature of the task and the degree of knowledge in the organization prior to entering the development phase.
From this theoretical point of view, the two Electrolux projects would seem to demand more cross-functional creation than the ABB cases.

Interdependencies may be of three primary types; pooled, sequential, and reciprocal. In general, the higher the uncertainty associated with the overall task, the more reciprocal interdependencies exist between sub-groups. However, in none of our cases did we see substantive reciprocal relationships being set up between the different functions taking part. Rather, during the development phase, our IIPs were more or less confined to R&D projects. While the work of the other departments proceeded in parallel to some extent, seldom did they work together with their R&D colleagues. From this theoretical perspective, we argue that the managers involved may have ‘misread’ interdependencies and created less than satisfactory structures. Moreover, if we view the total set of interdependencies within our projects, they appear to be a “hybrid” of different sorts, rather than purely of one type in each case.

The other major argument on which we focus is that each specific type of interdependency should to be co-ordinated differently. In general, pooled interdependencies can be managed by standardization, sequential interdependencies by planning, and finally, reciprocal interdependencies by mutual adjustment. The two Electrolux projects, theoretically appeared to call for substantial cross-functional creation and reciprocal interdependencies; however, in the more independent relationships that existed between the departments taking part, there was reliance on planning and standardization. There was some socialization, but mainly among top managers rather than at the levels where real work was carried out. The two ABB projects were much more formalized, and a plethora of rules and policies were used. Responsibilities and project-wide reporting structures were sharply defined. However, co-ordination was largely restricted to the R&D organization. If anything, the co-ordination mechanisms in place seemed to produce the interdependencies, as much as the other way around.

In terms of frequency and importance of communication mechanisms, most people agreed that face-to-face communication was critical. Nevertheless, it was also difficult to rely exclusively on this mechanism, which was believed expensive and time-consuming.
Furthermore, many individuals were not willing to travel extensively. Therefore, this method was not used as much as people would have liked. To maintain a fruitful level of communication, information technology (fax, telephone, common information systems, etc.) was used as a complement. However, these channels of communication were not a full substitute for personal contacts. For example, information which was not easily codifiable was difficult to transfer in other ways than by socialization. Marketing information in particular appeared “sticky” to the local environment and could be given great many interpretations.

The locus of co-ordination was often placed outside the project or split between the parties involved in the venture. Seldom did we find strong project leaders or one unit formally in charge of the others. In the Electrolux projects, leadership also seemed functionally divided, whereas business-area management in the two ABB cases was determined to keep many of the important decisions away from project managers. In effect, our project managers could not act as “heavyweight” leaders, even though they may have had the necessary personal qualities.

In terms of managing relationships with outside firms, historical ties seem to matter greatly. Since trust in partners was essential, traditional relationships tended to be utilized. This factor often appeared to limit the choice of partners to firms from the same region. Major differences in the organizational architecture of the co-operating companies caused difficulties. It was sometimes hard for personnel of one company to understand the logic and structures of the other. The absence of a well developed local network where the product was to be produced also created problems, most clearly so in the Alliance case, in which much time had to be spent on finding new materials and components for the washer. Moreover, differences appeared to exist between North Americans and people from the Nordic countries in terms of attitude toward to co-operation with external companies. The former often argued for arms-length relationships, whereas the latter were convinced that firms had to work closely together in these types of processes. Finally, views on whom to co-operate with also differed in our cases. North Americans tended to prefer to work with customers, while Europeans in general were more keen on establishing close relationships with suppliers.
We emphasized two broad classes of problems appearing in the development phase: the lack of well developed routines and other administrative structures for leveraging knowledge across multiple borders, and the relative absence of marketing and/or customer contacts. The former class of problems appeared to be based on weak co-ordination mechanisms, an unclear overall vision, and the lack of a common "language". The latter created problems between functions, particularly since the cross-functional climate was often characterized by a lack of trust. However, many direct conflicts were avoided for the time being by not including the marketing organization in the project.

Theoretically, an argument can be made that the 'ideal' project design should be based upon an evaluation of task uncertainty and existing knowledge within the organization. The resulting knowledge-creation requirements should in turn determine interdependencies and the types of knowledge to be transferred. Together, these variables indicate what type and frequency of co-ordination is appropriate. However, in our case IIPs it appeared as if the structures inherent in the organizational architecture of the firm were reproduced. Traditional routines defined innovation as the task of R&D, thus limiting goal variety. Structural reproduction then determined both the interdependencies between units and the co-ordination mechanisms established to handle inter-unit relationships. The co-ordination mechanisms (made) available contributed in shaping the interdependencies, and the resulting project architecture appeared more contingent on the structures of the firm than on the nature of the specific task.
Notes to Chapter 6

1 See Thompson (1967).

2 For a discussion of the assertion that different ways of dividing tasks create varying dependencies, and that these pose distinct co-ordination requirements, see Lawrence and Lorsch (1967), Thompson (1967), Perrow (1967), among others.


4 See Perrow (1967).

5 Ibid.


7 For an outline of cognitive theory, see Anderson (1985), and Stubbart (1989).

8 For the underlying theoretical argument see Weick (1969/1979), as well as Berger and Luckman (1966), and Schutz (1962, 1964).


10 The analytically derived framework draws heavily upon the so called information processing school. For some references see Galbraith (1973, 1977), and Nadler and Tushman (1988). For an application of this perspective on multinational companies, see Egelhoff (1982).

11 See Thompson (1967).

12 See Simon (1962).

13 See Thompson (1967), and Galbraith (1982).

14 See Takeuchi and Nonaka (1986).

15 According to Thompson (1967), there is a natural tendency for organizations to try to minimize interdependencies between units.

16 The distinction between formal and informal co-ordination mechanisms, akin to Barnard’s (1938) formal and informal organization, can be found in Martinez and Jarillo (1989).

17 The distinction between mechanisms employed to reduce the need for information processing and those employed to increase the capacity to process information was proposed by Galbraith (1973, 1977).

18 Thompson (1967) introduced standardization, planning, and mutual adjustment as the three overall types of co-ordination mechanisms. A similar idea can be found in March and Simon (1958). These authors discuss programming, planning, and feed-back as the overall integrating devices. A more detailed distinction is made by Mintzberg (1979). This scholar identified the following six co-ordination mechanisms; 1) Mutual adjustment, 2) Direct supervision, 3) Standardization of work process, 4) Standardization of output, 5) Standardization of skills (and knowledge), and finally 6) Standardization of norms.

19 See Thompson (1967).


21 Nonaka and Takeuchi (1995) emphasize the importance of having shared knowledge as a platform on which to build further on in creation oriented activities.
22 A number of different dimensions can be used to describe the nature of knowledge. Here, we choose to talk about codifiability, rather than tacit and articulated (Polanyi, 1967), since this term better seems to capture the fact that that people have difficulties in classifying and communicating some types of information in a way that permits an inter-subjectively shared interpretation. We are talking about a continuum, rather than two separate categories. For a summary of some relevant literature on knowledge dimensions see Eklund and Sjöstrand (1977), Zander (1989), Kogut and Zander (1992), and Hedlund and Nonaka (1993).

23 See March (1995) for the underlying theoretical argument.

24 To our knowledge, the concept of "sticky" information was originally introduced by Von Hippel (1994).

25 For a number of studies on cross-cultural management in which the traits of people from the Nordic countries, among others, are outlined see Zander (forthcoming).

26 For a discussion of the importance of a strong project leader see Wheelwright and Clark (1992), from whom we have borrowed the term 'heavyweight', Clark and Fujimoto (1991), as well as Roberts and Fusfeld (1981), among others.

27 The full description of a "heavyweight" project-manager profile can be found in Wheelwright and Clark (1992).

28 See Fiedler (1967) for a discussion of task vs. people orientation.


31 Ibid.


33 This argument is evident in much of network theory. The reliance on historical ties is also one of the prime arguments of the home-based MNC (see Solvell and Zander, 1995). Another point of view is presented by Granovetter (1973) who emphasizes the importance of also having weak ties so as to allow for strategic flexibility.

34 See Lindblom (1959) for the concept of muddling through.

35 See Cyert and March (1963) for a discussion of super-ordinate goals.

36 For a detailed discussion on the reproduction of "institutions", such as routines and other structures, see Sjöstrand (1985).

37 See Cyert and March (1963) for a similar idea.
CHAPTER 7

MANAGING THE COMMERCIALIZATION PHASE

Introduction

This chapter deals with the final phase of the innovation process - the commercialization of the new product offerings. As outlined in the first chapter, included in our definition of commercialization is transfer to manufacturing and initial market(ing) activities. In describing and analyzing this phase we will seek to answer two separate questions. First, how did transfer to manufacturing proceed, and what problems occurred? Second, how was the market introduction strategy developed, and what problems were encountered?

We will start by taking a closer look at the four case IIPs, and then move on to the questions presented above. However, as soon will become evident from the two Electrolux cases, this company went through a major phase of formal reorganizations in 1992/1993, and later also acquired parts of the German competitor AEG. Since we believe that these organizational changes had a number of effects on the development of "Alliance" and "the 3rd tap", we will start by briefly outlining the principal new features of Electrolux. ABB also altered its formal structure to some extent, although not at all to the same magnitude as Electrolux. We will outline the more interesting revisions of their architectures as a background for our discussion and analysis in this and future chapters.

Structural changes in Electrolux and ABB

Toward the end of 1992 Electrolux changed its formal configuration to a geographical-area type of structure. The world market was divided into three overall regions: Europe, North America, and International. European product divisions (EPDs) for Wet, Cold,
Hot, etc., were established, although still excluding the marketing and sales companies. The new Wet EPD had its center in Pordenone and was headed by the former Italian subsidiary manager, Mr. Aldo Burello. Marketing was co-ordinated on a European basis by Marketing Europe, located in Italy, and on a local level by portfolio managers; quite often the latter were former subsidiary managers. Moreover, a Swede, Mr. Hans Bäckman, was appointed new CEO for operations in North America where the company also changed its name to Frigidaire. The resulting formal configuration can be seen below.

![Diagram of the new formal structure of Electrolux (effective as of January 1, 1993)](image)

Since 1992 Electrolux had been co-operating with the white-goods sector of the German competitor AEG after gradually increasing its ownership in that company. In the beginning of 1993 Electrolux offered to purchase the entire white-goods unit. At that point in time, the unit (AEG Hausgeräte) had some 9,000 employees, and annual sales of DEM 2.6 billion of which approximately 40% were on the home market. During 1993 and 1994, the acquisition was finalized, and efforts to integrate the two companies were initiated.
ABB also underwent a formal reorganization during this period. In 1993, the matrix was altered so that fewer people would report directly to Mr. Barnevik, the CEO. The number of geographical regions was reduced to three; Europe, the Americas, and Asia Pacific. Some argued that this change was part of an overall drive to diminish the influence of individual countries. In addition, the number of segments was reduced from eight to the following five; Power Generation, Power Transmission and Distribution, Industrial and Building Systems, Traction, and Financial Services. As a consequence, the number of business areas was cut back from 65 to 50. Finally, Process Automation, now part of the Industrial and Building Systems segment, relocated its headquarters from Stamford (USA) to Zurich (Switzerland).

Commercialization - moving toward market introduction

Alliance

During 1992, the Canadian organization began to experience serious cash-flow problems and had difficulty obtaining funding for the Alliance project, although Group management had approved the investment request during the year. The L’Assomption unit was losing some 2 million dollars per month. Work in Italy had been delayed by a shortage of personnel. In 1992 and early 1993, new and revised drawings were still being sent from Italy to Canada. Most tools were in place or on their way, and decisions on the bulk of the 26 million dollar investment had been taken.

At this time, the company was reorganized. The new organization of Electrolux had three critical consequences for the “Alliance” project. First, no formal links existed between Europe and the USA, and interaction between people from the two continents decreased in frequency. Second, the Montreal unit that previously was responsible to the Canadian country manager, who in turn reported to top management in Sweden, was now directly subordinate to US management. Third, the man who had actually initiated the project, the Wet Product area manager, Mr. Hans Stråberg, was appointed manager of a European product division for vacuum cleaners, and therefore left the Alliance steering committee.

In April 1993, the Canadians were ordered to suspend the project. Bill Miller, head of Wet Products USA, wanted it transferred to Webster City. During 1992 the US personnel at
Frigidaire had worked desperately to obtain a large order on side-by-side washer/dryers from Sears, but missed it. Therefore, substantial excess capacity existed at the factory. Also, several skilled engineers had been recruited in connection with the “Horizon II” project. By that point, this project had been canceled, but most of the engineers were still with the firm. Thus, a transfer of “Alliance” seemed logical for many reasons. However, a final decision from Group management had to be made. Meanwhile, the Canadian organization was ordered to stop all communication with outside suppliers in its home country, Sweden, Italy, and England, until the decision had been made official. Later, people referred to this as the beginning of the “dark period”. The reason why all communication had been stopped was that the Canadians were not to make any decisions on behalf of the new owners of the project.

The final decision to move Alliance was taken at the Product Council meeting the following month in L’Assomption. Two principal reasons to transfer the project were advanced. First, as part of the Electrolux philosophy, a plant should only have one type of products. The L’Assomption facility would have ended up as a mixed Hot/Wet factory. Second, in a new internal marketing survey, anticipated sales for the first year dropped dramatically from 85,000 units to some 23,000 units. With this volume, supporting a major investment would mean financial disaster and possibly plant closure. The L’Assomption plant could no longer carry the project.

In the summer of 1993, the transfer plan was to be put into action. On June 1, the Canadians received a fax from Frigidaire headquarters in Dublin, Ohio, confirming that the project had been officially transferred to Webster City. However, on the very same day, Webster City went on a one month strike. The announcement of the decision to Webster City personnel was postponed so as not to affect the strike settlement. In July, Alliance was given an interim project leader in Dan Brown, the plant manager at Webster City. By the end of the month, two engineers, accompanied by Réal Bernier from the Canadian organization, were sent to Sweden to prepare for the start of the production line. These engineers were chosen primarily for their passports. They had no drawings and little idea about what parts to procure. During this trip, the news about the transfer was broken to the European suppliers, who became quite upset. At the same time, back in North America, Bill Miller had gone to L’Assomption to convince people to move with the project to Webster City. However, two weeks later he was transferred to Greenville, Michigan.
In August 1993, a new team started to form. Senior management were interviewing prospective project leaders, but none of them accepted the job. The project frightened them. One month later, Mr. Harold Pursley turned down the project-manager position for the second time, but was still appointed a couple of weeks later. He headed a four-person team, which included one electrical, one mechanical, one quality, and one manufacturing engineer. Two of them were the men who had visited the European suppliers a month earlier. In October, Mr. Pursley went to Canada to recruit Aldo Marruchi and Réal Bernier to obtain the benefit of their knowledge on a consultancy basis. One drafting and one purchasing member were now also part of the team. Responsibility for design was assumed by Webster City without the help of Zanussi, for cost reasons. The team estimated that the product would be ready for introduction in September, 1995, but management insisted that the new washer had to hit the market in February of that year.

A number of factors made work difficult for the team. First, senior management seemed to believe that the design of the washer was ready and that the prototype had been tested. Thus, the only work that remained was to build the product and bring it to the market. Reality, however, was more complex. Second, the project team had little or no product knowledge. Third, the “kiss of death” syndrome was apparent among the project members. Past experience showed that it could be risky to be part of such a team at Frigidaire. On numerous occasions, once a project had been completed, people lost their jobs. Alliance was a “hot potato”.

In November, 1993, actual work could begin. The team started to test Canadian prototypes to learn more about the product. Just before Christmas, the team members were co-located in one room, but they did not work full-time for Alliance. Moreover, at the November Product Council meeting, management decided to drop the combo model. Instead, the money would be used to develop a matching dryer. By the end of 1993, a new Vice President of the Wet area, Brad Determan, was appointed.

In January, 1994, Mrs. Cheri Shepherd became project leader of Alliance. Cheri was hired by Mr. Determan, but her immediate superior transferred responsibility for the project to product planning on the same day that she was to begin her new job. Product planning did not want Alliance either but was forced to take it. The project was still very much a hot potato - “the stepchild of the division”, as someone put it. It also seemed as if the project were pursued by bad luck. For instance, when tools were to be transferred from Canada to Webster.
City, the shipment was turned back at the border since the axle-width of the truck did not conform to US regulations. The second time, a corn-syrup truck parked beside them exploded, and quite some time had to be spent on cleaning the machinery. In all, the transfer from Canada cost the company almost half a million dollars, excluding the lost time and disturbed relationships with suppliers. Among other things, documentation had to be translated, electrical devices converted from 575v to 480v, and because of a breach of contract with the Canadian manufacturer of the tub, a legal battle was fought and lost to the cost of 230,000 dollars.

The new project leader, Mrs. Shepherd, had a marketing and sales background, and had worked with the company for six years at that point in time. In addition to English she spoke Spanish, French, and Italian. The reaction of the team members was not entirely favorable. She did not know anything, she was far too young, and she was a woman; worst of all, she was from marketing. Since Mr. Determan had expressed his genuine support for Alliance, she was a bit surprised when she realized that others were not as committed to the project. She knew that in order to turn the situation around, a number of urgent measures were necessary. From that point on, the Alliance team would be officially located in the same premises, the team should comprise people from all relevant functions; all members should be 100% dedicated to Alliance. The difficulties of creating a team and a winning atmosphere were further aggravated by the fact that the entire Webster City factory underwent a major reorganization into a team structure at the same time that she was trying to form the Alliance group. Some people saw these changes as part of just another fad.

Mrs. Shepherd concluded that a genuine shift in perspective was necessary. She believed it important to give people the freedom to do their job, not to micro-manage them. She could involve them and be their guide, but they were the experts. Relationships with suppliers had to be rebuilt. Weekly group meetings to review schedules, costs, etc. were introduced. From now on it was permitted to break the rules and make mistakes. A manufacturing manager was brought in to contribute advice on how to improve manufacturability. Benchmarking studies for world-class manufacturing were undertaken.

After two months she understood that the team was suffering severely from the lack of clear goals. After discussions, she reviewed the business objectives and revised them to what the members could reasonably attain with some effort. These new goals were formalized in a “project contract” that was signed in May, 1994, by the team members, senior management in
Webster City, and the corporate management of Frigidaire. Two central points in this contract concerned product quality and time to market. First, as for quality, the acceptable service call rate (SCR) for the Alliance washer had been set at 1%, but the machine had been designed for an SCR around 15%. This rate should be compared with 48% for the old horizontal-axis washer, and 8% for the European machines manufactured in Italy. Cheri first proposed 15%, in parity with the best SCRs in the Frigidaire organization, but later agreed to better this target by one 1%. Second, in terms of time to market, senior management was firm on the planned February, 1995 introduction date, but no one on the team was willing to agree to this target. Mrs. Shepherd was prepared to fight for the team. She negotiated an exclusive incentive plan. The company lost some 10,000 dollars each day the washer was not in production (excluding lost first-mover advantages). By explaining to top management how much money would be saved by committing the team to a more realistic introduction date, she persuaded them to accept an incentive plan that would give each project member a personal benefit in case of success. Market launch in March 1995 meant that all team members would win an all-expenses paid trip to Hawaii with their spouses. Introduction in April would render them a similar trip to Orlando, Florida. On the other hand, if they did not finish until May, they would be lucky to keep their jobs. The big difference, however, was that now the targets meant something, and everybody believed in them. Two project members even declined a promotion just to stay on the team.

A number of other measures taken to create team spirit and make Alliance visible within the organization are also worth mentioning. First, the factory floor space in the Webster City facilities where the new washer was to be produced was redecorated - the floor, walls, and ceiling were painted. Thereafter, not only did people want to work with the new product; the factory also became a showcase for customers. Second, Cheri Shepherd took the whole team out to play golf and make them more relaxed with one another, but only once they had passed an important milestone. An additional motivator was the introduction of the "Alliance baseball cap", which was only given to the team members and to a limited number of other people who had contributed greatly to the development effort.

Late in 1994, prospects looked better than for a long time. Cheri was confident that the team would reach the March introduction target. All 14 members of the team reported directly to her, and finally everyone was committed to making Alliance a success. She had also begun taking the technical team members out to road-shows with customers. The
suggested retail price of the washer was now set at 799 dollars. A marketing group that met weekly had been set up. To improve contacts with the Italians, Mr. Sburlino had been brought back to the latest design review. Moreover, it had been decided that one engineer was to live and work with Zanussi personnel to obtain knowledge for future development efforts. Webster City had also expressed a wish to have one Italian come to work there. However, amid all the positive developments, Electrolux was no longer alone in its aspirations to rejuvenate the North American market for washing machines.

Standards for energy levels of washers in the US are set by the DOE (Department of Energy). The traditional procedure has been that all the producers sit down and discuss what targets are reasonable and reachable in relation to initial DOE suggestions. A proposal is developed and presented to DOE representatives. The washer manufacturers had never really disagreed upon the message to communicate to the standard-setting body - until now.

The DOE demanded a 65%-increase in energy efficiency by 1999. If approved, this requirement would most certainly mean the demise of the vertical-axis washer. For the first time in the history of the US washing-machine industry, the manufacturers could not agree on how they should respond to this proposal. Whirlpool and GE took opposite stands. A little more than a year earlier, GE had almost left the industry. Finally deciding to stay in, they had invested heavily in new facilities for vertical-axis washer production. The proposed DOE regulations, if enacted, would mean financial disaster for the washer division. Accordingly, GE argued for a two-class solution - one set of standards for vertical-axis washers, and one for horizontal-axis machines. Whirlpool, on the other hand, was the company most in favor of a one-class solution. Using technology from the European part of the company (formerly Philips), Whirlpool had started to develop its own horizontal-axis washer. Frigidaire people suspected that the first machine, probably a top-loader and possibly with a slant (tilted) drum, would be put on the market in late 1995 or early 1996. Most of the other companies were inclined to favor a two-class solution. While more supportive of the Whirlpool proposition, Frigidaire was not quite sure whether it was wise to push for a one-class standard.

There were a number of reasons for doubt. The company had never taken the lead before. Would it be able compete with Whirlpool, or would it lose all sales when it no longer had an outlet for its vertical-axis washers? Frigidaire feared that it would take all the blame from the other companies, which would not dare to defy Whirlpool. Would it be wise to stir up relationships with these firms, and thereby risk attack in other product areas? Was it
appropriate to seek a solution by regulation? Frigidaire was wary of letting government decide - what would be the next step? Still, most Frigidaire personnel believed that Whirlpool was so powerful that the DOE would follow its recommendations. Furthermore, Frigidaire was ahead of the other companies. Its horizontal-axis washer would soon be ready for market introduction, and Sears had already made contacts with the firm to source the machine. While Maytag was known to be developing a similar washer, all other companies lacked the required knowledge, and would need considerable time before they could place a competitive product on the market.

Nevertheless, during the spring of 1995, new and unexpected events occurred again. Whirlpool suddenly announced that it would suspend its development of a horizontal-axis washer. According to Whirlpool executives, a new and different approach would be better suited for responding to future US energy regulations. However, that company did not give any hints about the details of this "next generation".

Internally, the Alliance team was beginning to experience problems reaching the quality targets. Thus, it was decided to postpone market introduction to September, 1995. During the summer of that year, Mr. Hans Stråberg was appointed VP of operations in North America. He realized that the Alliance washer needed further testing on a sub-system level. The appliance could not be launched with the quality problems still experienced. It was decided to delay market launch for a few months. However, testing took more time than expected, as new problems were encountered when standard European methods for quality assurance were used. Some components wore down too rapidly as a consequence of the larger size of the North American machine. Moreover, the technical organization at Webster City still lacked extensive knowledge of the horizontal-axis concept.

By the summer of 1996, 400 washers were finally ready for test marketing in California. Official market launch was planned for September. The Alliance washer would be a niche-market product, priced at 999 dollars. The company hoped to sell some 100,000 units during the first year of production.

The 3rd tap

In May 1991, development of the water purifier came to a grinding halt. A functioning prototype, Mark 6, was ready, but it had not been determined where Electrolux should
manufacture the new product? Management at Home Comfort appeared to stand by the earlier decision to transfer the prototype and drawings to the Castellbisbal manufacturing unit in Spain. It was planned that Mr. Delby would follow the product to manufacturing and be responsible for technology transfer. However, since the beginning of the year, discussions had been going on within the Electrolux top-management team about the future of this factory. The facility was losing money, and HC management realized that Castellbisbal was probably not the best location for the r/o product. Nevertheless, in light of the delicacies involved in decreasing capacity or closing down units in Spain, management did not want to share its thinking with the development team, fearing that the developers in turn would stop communicating with their Spanish counterparts, who then might suspect that something was going on.

The technical project leader, Mr. Peter Hagquist, objected strongly to the decision to transfer the product to Castellbisbal. Just as HC management, he argued that the technical skills at the Barcelona factory were unsatisfactory, and that the best place for future development and production would be in Germany or Sweden. When Mr. Hagquist had visited the Spanish factory, he felt that he had encountered a "manana, manana" attitude, and he feared that the competence needed to produce the r/o purifier was virtually non-existent at the Barcelona company. According to Peter Hagquist, the Spanish engineers were not worried about 1/10 millimeter more or less, while for this product deviations of only 1/1000 millimeter mattered significantly. Moreover, the experience from production of the Aqua Guard and the GW 130 was not favorable, and only 8 out of the 600 employees at the manufacturing facility were to work with the new water purifier. The other members of the project team feared that the Spanish factory was not willing to face the costs which would stem from taking over responsibility for manufacturing. Meanwhile, time was passing, and by September of the same year, members of the project team were becoming increasingly frustrated. Costs were accumulating, and future revenues were still far away.

Mr. Hagquist wrote a letter to the CEO, Mr. Leif Johansson, discreetly suggesting that Spain was perhaps not the best place for manufacturing the r/o machine. Although uncertain of the impact of the letter, he was gratified to learn within a month that technology transfer to the Castellbisbal factory had been canceled. However, it appeared as if the decision in reality had already been taken in June, 1991, by the HC Business Area Board. In retrospect, everyone, including the management team at HC, seemed content with this decision. Mr. Adeberg explained that he had been aware of the problems, but that HC as a new business area had no
mandate to tell any manufacturing units what to do; all relevant units belonged either to “Wet”, “Hot”, or “Cold” products. For a number of reasons it was difficult to close down plants in Spain. If these people had been told about the plans to transfer the water purifier to another location, the process would have become even more problematic.

A first step toward resolution of the situation was taken in October, 1991, with the preliminary decision to transfer the technologies to the factory in Torsvik, Sweden, a manufacturing facility belonging to the “Wet” product area of Electrolux. Torsvik had been contacted some time earlier by Home Comfort. Personnel at this factory were knowledgeable in “water”, as the facility was one of the European dishwasher centers within the Group. It was also anticipated that Torsvik had several engineers who could work with the product. In contrast to the Spanish factory, it was believed that this site had potential for specializing in “water”.

Technology transfer was planned to continue until June, 1992. However, no formal decision was taken that Torsvik would produce r/o products in the future. In addition to transfer of drawings, six prototypes, test results, etc., a major sales-channel analysis and a marketing study were to be conducted. Moreover, a business plan was developed as a basis for a final decision half a year later. Production was anticipated to start around May/June, 1994. Mr. Hagquist, Mr. Delby, and Mr. Fonser were to transfer the technologies to Torsvik personnel, who would also be responsible for cost estimates for procurement of parts, components, etc. However, Mr. Hagquist, who was to act as project leader during the first six months of 1992, did not want to participate in this process. He had reserved 1 million SEK in the budget for technology transfer, i.e., for paying the RI consultants during the spring, but now Mr. Adeberg had allocated this sum to HC. Since it was clear at this point that all major decisions were to be taken by Mr. Adeberg, Peter Hagquist left the project team.

In February 1992, a new overall project leader was appointed; Mr. Jan Marstorp, the new product manager for water products at HC, took over operational responsibility for project management. However, many of the strategic decisions still rested with Mr. Adeberg and with Mr. Folke Andersson from New Products. To secure co-ordination between Stockholm and Torsvik, Mr. Marstorp decided that meetings with representatives from the project team, HC, and the Torsvik facility would be held every two weeks.

During the spring of 1992, Mr. Delby and Mr. Fonser alternately visited the Torsvik factory for one week at a time. Mr. Delby, who previously had been set to follow the product to Spain was no longer committed to leaving Stockholm for any longer period of time. While his
reluctance was partly due to family reasons, he was not as enthusiastic about the prospects of moving to Jönköping, located in the “Bible belt” of Sweden, as he had been about an international position in Spain. It was planned that 4-6 employees at the Torsvik factory were to receive the new technologies. However, initially only the project leader in Torsvik, Mr. Christian Lundberg (purchasing manager), and one construction engineer (on a 50% basis), worked with the representatives from Stockholm. Moreover, Mr. Lundberg left Electrolux in June of the same year; some maintained that local management had already known of his coming departure when they appointed him. As a consequence, in the summer of 1992, much work still remained. For instance, several tools were lacking, the production process had not been planned, the product was still being redesigned, and offers from a number of component suppliers had not been obtained.

At the same time, a detailed business plan for the water purifier was being developed, the plan was ready in August. Market research of primarily two kinds was conducted. First, a study of the different segments that might be interested in a high-performance water purifier was undertaken by external consultants. Second, an internal study of future distributors was conducted by the English sales company; England had been chosen since the need for a water purifier was believed most urgent in this country. In connection with this study, four different designs for the machine were developed by Mr. Per Börjesson at the central design laboratory.

One month before Mr. Lundberg left the project, one of the construction engineers, Mr. Torbjörn Pettersson, assumed his position as local project manager. Furthermore, one person from construction and design, and another one from product lay-out joined the project. In August, 1992, the formal decision that Torsvik was to produce the r/o water purifier was taken. Manufacturing costs were to be borne by the Torsvik factory, and later to be charged to HC by the use of internal transfer pricing. To some extent this decision helped to increase efforts at Torsvik, but the project was still far behind schedule.

The mission of the Torsvik team was to prepare the product for industrial-scale production, and in doing so to incorporate changes proposed by marketing. Adjustments included changing the cabinet from metal to plastic, and adding graphic displays to make the appliance look more like an ordinary household product. In addition, Torsvik was to decrease the level of noise caused by the water purifier.

As it turned out, from the start of the project, no one had bothered much about product safety. For personnel at Torsvik, used to working with dishwashers, this aspect was a natural
one to consider. Thus, they started adding features to detect leakage, to signal when to change the filter, etc. In doing so, they used certain dishwasher components. These additions, which included making the machine “smarter” by using more micro-electronics, added about 300 SEK to the cost, but they also greatly increased the safety and performance of the water purifier.

The main problems experienced by Torsvik were related to a perceived lack of information within the organization, and to the fact that they had been involved in the development project at such a late stage. Some individuals also claimed that marketing was working with imprecise ideas and concepts. It was difficult to get substantive input from foreign sales companies which did not know what customers wanted or were willing to pay. Moreover, a number of the foreign sales companies seemed to want all possible features, but still a low price.

As for relations with the former development personnel, there was considerable co-operation during the first six months. However, one of the managers at Torsvik believed that they would have liked to continue refining the water purifier. He sometimes sensed that these persons were not willing to change their designs and were less concerned with helping out than with defending their own solutions. Some changes were also made in the product without Torsvik’s being notified. Among these, the width of the purifier was changed from 200 to 225 mm. Moreover, one project member said that the technical specifications had not been very clear. In general, most people agreed that more intimate collaboration should have continued for a longer period of time.

Another complaint mentioned by some of Torsvik personnel, was that their top managers were not willing to appropriate all the resources necessary. One of the project members claimed that six months had thereby been lost. His impression was that these managers believed that the resources satisfactory to put a dishwasher into production would also suffice for a water purifier. However, without any standards, or certainty as to which materials or components to use, this process would inevitably take longer.

Nevertheless, in April, 1993 it was time to move into a phase of field tests. The suggested retail price of the purifier was now estimated at some 12,000 SEK (approximately 1,500 dollars), and production costs (including input goods, for which the membrane accounted for some 230 dollars) amounted to some 4250 SEK. According to one of the Torsvik managers, all foreign sales companies were satisfied with the transfer price. With this
pricing, the product would be positioned to capture professional users, rather than a genuine consumer market. Some held that this result had been inevitable from the start, given the product specifications, and that the product had never been designed for a consumer market.

On the other hand, some people claimed that the local sales companies did not understand the product, and that the appliance would risk ending up “stuck in the middle”, between consumer products, for which the psychological price limit was anticipated to be in the area of 7,000-8,000 SEK, and professional products, which were usually priced at 30,000-100,000 SEK. Moreover, it was considered questionable whether the company would be able to use the existing white goods marketing and distribution channels for this more sophisticated and expensive product. The water purifier would also be more difficult to install, and the consumer would probably need professional help. Furthermore, how would salesmen be able to convince customers of the advantages of the product? Did people really believe that the quality of their water was not good enough?

Amid this criticism, other people at Torsvik insisted that designing the “real” consumer product would not be that difficult. Three principal measures had to be taken. First, it was necessary to scale down the membrane to a less sophisticated one. Second, by using less and simpler electronics, costs could be reduced. Third, if differentiated products could be designed on the basis of a system of a standardized module; these could share and reduce costs. Moreover, further internal development within the membrane area was regarded as critical to reducing prices and increasing performance. In the short run, it might be necessary to add competence; in the long run, possibly also to produce this critical component internally. The former project leader, Mr. Hagquist, was now exploring the membrane area more deeply, and he had started to co-operate informally with the Torsvik team again.

What still worried some of the project members at Torsvik in late 1993 and early 1994, was that the facility was still a “Wet” factory. These people feared that sooner or later “wet projects” were going to start imposing on this project, and “stealing” resources. Some even claimed that it would be better to transfer the product to the Wet division, which had greater authority, knowledge, and resources. On the other hand, since the acquisition of AEG, people believed that Torsvik management had started taking the water purifier more seriously. It was considered not unlikely that this product would determine the future fate of the factory, since AEG was likely to become the future strategic center for dishwashing within the Group.
Concurrently with the work carried out at the manufacturing site, a number of marketing studies were undertaken. These were focused primarily on the Swedish market, for which the company was collecting data concerning the geographical distribution of houses with their own wells (at that time, there were some 800,000 wells in Sweden), and on studying different water qualities and problems throughout the country. These studies revealed that considerable demand also existed for a so called “point-of-entry product”, as opposed to the “point-of-use” one under development. These potential consumers wanted a water purifier that would clean all water in the house at one time and location.

Marketing studies were also carried out in the UK and in the USA. The UK study was related to different designs; it also researched questions regarding the channels through which people wanted to buy a water purifier. Efforts in the USA were aimed at finding out customer expectations about price, performance, etc. The local sales companies were also contacted. The main conclusion from these discussions, everyone agreed, was that the mass-market water purifier should cost no more than 5,500-6,000 SEK, almost irrespective of the geographical market(s) in question.

A center for “water” had been set up in Torsvik in 1993. The mission of this “center of excellence” was to develop new products for industrial production, and to support factories in Sweden and the Philippines in solving specific problems with existing products. In addition, Torsvik was to act as a knowledge base for: a) water chemistry and biology, b) mechanical and electrical design of water purifiers, c) water purifier technologies, and d) competitor-product analysis. It would also be responsible for training sales and service personnel. The project leader, Mr. Marstorp, moved to Torsvik in January, 1995, to direct the water center and manufacturing of the new machine. Employed at the center were some seven people. Home Comfort also recruited a product manager for the water purifier to support marketing and sales activities on an international basis. HC management realized that this process would be lengthy, since both sales personnel and customers had to be “educated” about water and the purification process. The Swedish sales organization had also assigned one person to the “water” product area.

In March, 1995, the RO 400 water purifier was introduced at a single appliance store outside Stockholm. The product was positioned with owners of private wells as the main customer group. The price was finally set at 13,700 SEK (some 1,850 dollars). If customers wanted help from Electrolux in installing the product, the additional cost would be 1,500
SEK. A month later the new product was be launched at 80 out of the 125 stores in Sweden which had completed special internal training of their personnel. Potential franchisees received a two-day training program at the water center in Torsvik, and a general file containing information on water and water purification.

After the summer, the next step would be to introduce RO 400 in the Baltic states, Poland, Ireland, Thailand, and Japan (where Electrolux already sold other water purifiers through direct channels). The UK and US markets could not be approached with this product, since it was anticipated that these markets would require a machine priced at approximately 50% of the RO 400. Home Comfort management hoped to sell some 5,000-10,000 units during the first year of production. As for product planning, a number of promising ideas were pursued. Products for both high-end and low-end markets were under planning and development. Particularly the so called point-of-entry products appeared intereting.

Holger

During 1991 ABB Process Automation began releasing a common plant network for MOD and Master. Moreover, the first common engineering station for internal use was launched. Late in 1992, the ABB “Advant” technology, with workstation-based products for operator interfaces, information management, batch control, and engineering tools, was introduced. The BA held an internal kick-off meeting at which marketing personnel were provided with information about the new products and sales arguments of a more technical nature. Moreover, major customers were flown in to the annual industry exhibitions in Germany and the USA. Thus, the first two steps of the evolutionary merger had been realized, and management anticipated that some time later they would also be able to introduce common platforms for hardware. Few problems had been experienced during the initial transfer of these products to manufacturing.

Nevertheless, employees of the American organization were troubled by being totally dissociated from production, since all manufacturing was in Sweden, where the most modern production facilities for circuit boards were located. Yet, many critical parts and components were still sourced locally. Furthermore, when more efficient arrangements for buying the “Swedish” components could be created elsewhere, these transactions were permitted once the suppliers had been certified by the Swedes.
Still, a number of crucial problems were slowly beginning to emerge. Management started to realize that the technical problems of moving further toward a common system were more serious than originally anticipated. In effect, the Holger project was beginning to run late. The major difficulties were related to the technical aspects of developing the common platform, and not to the transfer of certain parts to manufacturing. Time after time, deadlines had to be postponed as the teams in Europe and the USA struggled with intricate technical issues. In addition, it proved complicated to incorporate new hardware and software applications brought in from outside vendors.

One individual argued that the company had been trying to take too many steps at the same time: merging two separate systems while substantially upgrading them technologically, and simultaneously relying more on outside hardware and software companies than before. Perhaps the overall objectives for the Holger project had been too ambitious, particularly since the project could also be regarded as an effort to integrate not only the platforms, but also the BA as such. A number of people also held that the venture should be considered in the light of the fact that the different units had never worked together before. On the other hand, the stages of development were intertwined, and several persons emphasized that it would have been difficult to approach the problem in another way. Finally, the international dispersion of the project did not make the task any easier, although no one claimed that this factor was the main reason why so many problems had arisen; it was generally agreed that the technical problems would have been as evident in a more local project.

Apart from delaying the Holger project, this situation led to a number of other difficulties. First, it created a crisis of confidence between R&D and marketing. The marketing units had been promised new releases which were now being delayed. Customers had to be told that additional improvements were not yet ready for the market. Second, since the project was running late, the BA received fewer orders than it had hoped for. The major costs associated with the delays were thus related to lost sales and having to compensate customers by lending them equipment or paying some of the costs for their upgrading, rather than to the additional development expenditures.

Nevertheless, development work gradually progressed, problems were slowly resolved, and efforts to improve existing solutions were continuously undertaken. New products were introduced, although increasingly behind schedule. First, Master versions were put on the market in Europe, later to be followed by similar MOD applications in the USA.
However, in view of the technical difficulties encountered, BA management finally decided to postpone the last step of the merger of the two platforms, so that Holger would not really result in one common system.

Despite the difficulties encountered, people argued that the project could be considered a market success. The principal price/performance goals in the product specifications had been met, and management claimed that the company was gaining market share. Some minor improvements in speeding up certain aspects related to the customer interface remained, but in general, the customers appeared satisfied. Old products were more or less in the process of being entirely phased out. The main problem in the late spring of 1995 was to meet increasing demand by producing at full capacity.

Orders were generated through a combination of: a) superior local presence, b) close customer interaction, and c) specific knowledge in the different applications. Thus, the sales process was based on trust and long-term relations, even though superior performance and a reasonable price were also important variables for customers. Because of the complexity of the product, most sales and marketing personnel had a technical background. As the new systems were introduced with major customers, sales staff from these projects were brought in to the research units to run verification tests and to feed back information from the end users. By mid-1995, some 30-40 people from several countries had already stayed for longer and shorter periods of time with their R&D colleagues.

**M2000**

Late in 1992, models 200, 225, and 250 of the new product generation were introduced by the Finnish Motors team. However, these motors were not sold under the M2000 brand, the main reason being that management wanted to wait for the completion of motors in the other ranges so as to co-ordinate market introduction of the new generation. No information on customer reactions was transferred to the other markets, since management did not believe that this step was necessary. Moreover, the test series did not consist of real M2000 motors; rather there were some modifications, so that the Finnish motor was a hybrid between the old Strömbergs design and the M2000 design. Test manufacturing had begun two weeks prior to market launch, and no real problems had been encountered. For this modified version, the changes in relation to the former manufacturing process in Finland were so small that
management had not really expected any problems. What was troublesome, however, was the
fact that all tools had to be ordered six months ahead of test production. Not until the product
was manufactured could it be known whether it functioned satisfactory in all respects.

The Swedes were to follow the Finns by April, 1993. Management expected that
production of real M2000 motors would commence thereafter. At the same time, management
began to work more actively on realizing step two in the restructuring of ABB Motors. The
most important decision was to reduce the number of European manufacturing units from six to
five. By this point, the German unit had started to take a more active part in the project, and the
German market was seen as having the greatest potential. Also the Spanish unit could supply
the South European markets with a limited product range. Together, with the Nordic centers of
excellence, the German and Spanish units were to form the future manufacturing structure of
ABB Motors (ABB Motors central stock was already located in Germany).

A consequence of this decision was that primary responsibility for CI motors in the 200-
250 range was transferred from Finland to Germany. However, the Germans were less than
enthusiastic about using the Finnish design, arguing that their market would require the
development of a new one. Thus, they started a major redesign effort as soon as responsibilities
had been transferred. Another problem that arose as a consequence of changes in the
manufacturing structure and in project responsibilities was due to the fact that the French
manufacturing unit could not be told about the upcoming changes until right before it was to be
closed down. It was therefore difficult to plan for the transfer of its products. Consequently,
ABB Motors later began losing market share in France. The new and final responsibilities for
the basic types of motors are displayed in figure 7.2 below. Prime responsibility for motors
within certain ranges was still only given to the Nordic countries. The German and Spanish unit
received either critical components or the entire design from the Nordic centers.

The transition to production was planned as a sequence in which products within
ranges already demanding new investments in tools were given priority. Further, resource
constraints in the various manufacturing facilities were also taken into account. The first real
M2000 motor to be put into production, excluding imports from China to the German unit of
CI motors in the 63-132 range, was the 112 Al motor. Late in 1993, production started in
Sweden. However, the move into manufacturing was not unproblematic. The most
fundamental difficulties concerned adjusting the new tools and machinery and learning how
to handle them. Previously, the motors produced by the Swedish unit had not been based on a
loose-core principle; therefore, relatively significant changes in the manufacturing process were called for.

![Diagram of product responsibilities within ABB Motors](image)

**Figure 7.2:** Product responsibilities within ABB Motors

According to some of the technical staff, the initial learning-curve problems led to delays of about one year, and made it difficult to phase out the old generation. However, they also created related problems. Most of the learning from problem-solving in ramp-up manufacturing could only be utilized locally. Some argued that the production equipment at the various units varied to such an extent that transfer of experiences from the Swedish unit, for example, to the others would not be very meaningful. As a consequence, similar mistakes and problems arose at all locations where new tools and machinery were installed. At the Danish unit, where relatively minor changes had been made in basic design and construction, and thus also in the manufacturing process, relatively few of these problems occurred so that production and market launch were not substantially delayed.

Other problems experienced in moving into production were due to the fact that some units were overworked. Sometimes responsibilities were transferred to other units where slack resources existed, but difficulties ensued, for example, some held that the German unit still did not always follow ABB Motors policy and was not receptive to the experience of the other units. The German unit had tried simultaneously to prepare five product sizes for industrial production. In some cases, they had also called for major changes and deviations from the M2000 design guidelines. The Germans claimed that they had to accommodate to different customer preferences on their home market. However, one manager argued that what the German unit really wanted was a motor design more similar to the one of Siemens,
the market leader in Germany. When problems of this nature occurred, in Germany or elsewhere, the R&D manager of the BA explained that the only reasonable response was to visit the local units and talk to people there. They had to explain their reasons for wanting a certain solution and the basis of their decisions. It was not always easy to find a mutually satisfactory solution. In terms of overall learning, one of the managers concluded that the certainty was that nothing would ever work out as planned; it was necessary to keep this caveat in mind and to be respectful of the many wills involved in managing an IIP.

Early in the spring of 1995, some 75% of all basic product types had been put into production and introduced on the market. The remaining motors would be launched continuously, and it was anticipated that the entire series would be ready by the spring of 1996. Table 7.1 shows an estimate of when and where full range deliveries of each M2 motor (the new official name) had been realized, as well as the phase-out time of old products. Compared to the product specifications, the main objectives had been reached in terms of both performance measures and price. Costs had been lowered by an average of 12%. On the other hand, this area had never been the subject of much internal questioning. Product design and construction were not seen as very difficult, since these aspects were well known. It was more difficult to become accustomed to the new tools and machinery in the manufacturing facilities. This factor above all else explained the delays.

<table>
<thead>
<tr>
<th>IEC Size</th>
<th>Country</th>
<th>M2 Full-range delivery</th>
<th>Phase out time</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 63-80</td>
<td>Denmark</td>
<td>November 1994</td>
<td>4 months</td>
</tr>
<tr>
<td>A1 90-100</td>
<td>Denmark</td>
<td>October 1994</td>
<td>4 months</td>
</tr>
<tr>
<td>A1 200-250</td>
<td>Sweden</td>
<td>February-April 1995</td>
<td>approx. 1 year</td>
</tr>
<tr>
<td>A1 280-355</td>
<td>Finland</td>
<td>February 1994</td>
<td>5 months</td>
</tr>
<tr>
<td>C1 71-132</td>
<td>Germany</td>
<td>April 1993</td>
<td>n.a.</td>
</tr>
<tr>
<td>C1 160-250</td>
<td>Germany</td>
<td>March 1995</td>
<td>approx. 1 year</td>
</tr>
<tr>
<td>C1 280</td>
<td>Finland/Germany</td>
<td>September 1993/May 1995</td>
<td>5 months/n.a.</td>
</tr>
<tr>
<td>C1 315-400</td>
<td>Finland</td>
<td>September-November 1993</td>
<td>approx. 1 year</td>
</tr>
</tbody>
</table>

Table 7.1: M2 full range deliveries as of spring 1995
To market the new concept, the company focused on conveying an image based on the highest performance possible, combined with reliability, flexibility, and an extremely high level of service. Products were introduced on a local basis, since different products were put into production at different points in time. As noted earlier, the market could be segmented according to motor use, such as in marine environments, petro-chemical applications, ventilation, etc. A code list was developed for some 200-300 variants of adaptations within the different areas.

A core component of the new marketing strategy was represented by the central stock, located in Menden, Germany, which would guarantee customers anywhere in Europe deliveries within 24 to 48 hours. The Spanish unit was also to serve some of the South European countries. The marketing message focused on establishing a dialogue with the customers. People claimed that in this industry, sales were won on the basis of trust and relationships. ABB Motors should be seen as willing to help the customer anytime with any problem. Special emphasis was put on proving continuity and stability as a major competitor on the electrical motor market. The technical personnel also took great pains in providing the local sales force with good arguments as to why the M2 motor should be the natural choice. In addition, sales personnel received training in the technical aspects of the new product range, and customers were brought in for kick-off meetings.

In terms of sales volume, people argued that it was still quite difficult to say whether the M2 series was a success. BA deliveries of motors had increased by 20% in 1994, and many markets showed an annual growth rate of 20-30% during the first months of 1995. Thus, it was hard to say if the rise in sales depended on the current state of the market or on the introduction of the new generation. Nevertheless, early in 1995 the company sold all it could produce, and, at least according to technical personnel, very few, if any, negative points about the M2 series had been raised by local sales companies or external customers.

The next step for ABB would be to move further into the second phase of M2000. There would be greater uniformity in drawing and planning systems, so that everyone used the same terminology. An additional benefit would be more efficient purchasing routines. The other major objective was to better utilize electronic data exchange, a necessary step in integrating efforts in the Motors network. Improved communication was seen as critical for the future. Also customers wanted more and more information; and it was vital to assure that this information was presented in the same professional way for the entire business area.
Managing the transfer to manufacturing

Apparent from the case descriptions is that the transfer to manufacturing was more problematic in the two Electrolux projects. Indeed, in the 3rd-tap case a planned international project turned out as a home-based venture, as unexpected events emerged; even though this project had become geographically concentrated, problems still arose. What seemed to cause some of the difficulties in both Electrolux cases was that the anticipated manufacturing locations had to be changed to new countries and factories. To a certain extent, it may even seem as if the projects were ‘kicked around’ in the organization. The reasons for the decisions to move manufacturing can be divided into two basic categories, both relating to the organizational architecture of the firm: a) asset-based, and b) administratively based.

In the first category, managers stated that the former locations lacked the necessary assets to begin manufacturing the products on an industrial scale. In the 3rd-tap case the lack of routines and skilled individuals was put forth as a reason. People in the Alliance case argued that the Canadian unit would lack financial resources. Moreover, changes in the asset structure, emanating from the acquisition of AEG, also appeared to play a significant role in the 3rd-tap case. It is our interpretation that the plans for this investment, and the consequent restructuring and specialization of manufacturing in Europe, were leading top management to consider the Swedish factory as an alternative. Undoubtedly, once the acquisition was a fact, and management at Torsvik realized that their future might not be in dishwashers, their attitudes and priorities in relation to the HC product shifted.

Second, changes in the administrative parts of the organizational architecture appeared to have an impact on the evolution of the projects. This influence was most obvious in the development of the new washer. The resulting “mixed” factory in Canada would be a departure from the company’s general policy of administration. Further, the fact that the administrative structures of the company were altered during the reorganization of Electrolux meant that the US subsidiary came to hold more formal authority than their Canadian colleagues. Thus, US management could also take important decisions from a strategic viewpoint to a much larger extent than before. Their logic became the dominant one, more or less by force in our case, and the top of the overall administrative hierarchy did not intervene.
Naturally, the resulting discontinuity had a number of negative consequences for the projects. (Ironically, since the future manufacturers had not been greatly involved in the 3rd-tap project the differences may not have been very great.) The interruptions made it more difficult to ensure the transfer of knowledge. This problem appeared to have two sides. First, the recipients were not always 100% committed to assimilating and accepting the concepts, partly since other matters seemed more important than the new projects "inherited" from elsewhere. Second, R&D personnel sometimes became defensive and unwilling to make any alterations in their drawings. Seldom did more than a few people from the previous phase work actively in putting the products into industrial production. Problems resulted, since these individuals not only had knowledge of solutions that worked, but also of what did not work and of past mistakes. From time to time, the wheel was therefore reinvented and the same errors made once again.

In general, and in all our cases, the relatively limited previous input from manufacturing now manifested itself in several ways. It seemed as if management did not always understand that it would take more time to industrialize an entirely new product than one more within the traditional scope of the factory's operations, as illustrated by both Electrolux cases. The problems related to working with new tools also often appeared to have been underestimated. The M2000 project is an example. Moreover, since manufacturing had seldom been actively involved at a prior stage, considerable efforts were often necessary building a basic understanding for the product, and commitment to the project in general. Accordingly, some projects seemed to enter a "waiting" period during the initial parts of the transfer phase.

The ABB projects also encountered some problems during this period. However, since in most cases R&D and manufacturing people were co-located, and the manufacturing locations did not change dramatically, the difficulties were slightly different. One group of problems were related to the question of when local units decided to enter or were forced to leave the projects. In the Motors case, the entry of the German unit was problematic. Using its access to critical assets, internal as well as external, this unit could demand considerable influence at a relatively late stage.
Different problems were encountered in closing down the French unit. Since the M2000 IIP was part of an overall drive to restructure the architecture of the entire business area, the project suffered from the fact that people in this unit could not be told about the changes planned. Therefore, almost by design, responsibilities had to be assigned in less than ideal ways. Moreover, after the French organization had been told about the decision that its factory was going to be shut down, it was said to have been less inclined and committed to transfer knowledge to the other units. Similar situations appeared in the two Electrolux projects when the location of production was moved.

Local differences in the manufacturing infrastructure also seemed to inhibit international learning, or were used as excuses not to transfer information across geographical borders. People claimed that since the factories were so differently equipped, partly for historical reasons, there was little use in transferring knowledge to the others. As a result, the learning process in the Motors case during this phase seemed relatively localized. Related to this problem were also the difficulties experienced in the Process Automation case, in which the US organization feared that its lack of local production was creating difficulties, and would do so even more in the long run. Their isolation from incremental design changes during ramp-up manufacturing, and from consequent process improvements, once again seemed to make them fear that their future impact would be limited, and that the unit would possibly be divested or closed down at a later stage.

However, the main difficulties in the two ABB cases were still related to the organizational and geographical design of the projects. Strong interdependencies existed between the specialized technical units. When the M2000 project entered the manufacturing phase, there were domino effects when delays in the Nordic countries also affected the units they supplied with components or entire designs. Thus, in a certain respect, the total system was no stronger than its weakest link. The international dispersion of resources did not help. Some individuals expressed that the reaction period was prolonged by the greater physical and cultural distances.
Developing the market introduction strategy

It is evident from the case descriptions that the projects were already regarded as completed by some individuals before market launch had taken place. As pointed out earlier, the innovation processes frequently seemed to comprise a development and a commercialization phase, with manufacturing drifting in-between. From a cross-functional perspective, all our projects were sequential "relay" efforts, rather than genuine "rugby" approaches, although some departmentally related activities proceeded in parallel. We would like to highlight three subjects relating to the development of a marketing strategy and the market-launch phase in general: a) the nature and consequences of the cross-functional climate, b) the use of intra-functional knowledge transfer across geographical space, c) the differences between industrial and consumer marketing approaches.

First, at this point it had become even more obvious that the relationship between the marketing functions and the more technologically oriented parts of the projects was often marked by a lack of trust. Secrecy prevailed. Once again, it sometimes seemed as if the different functions looked upon people from the other departments as enemies rather than allies. When products were delayed in development or manufacturing, marketing personnel started to bother their colleagues, who appeared to become even less willing to make any promises as to when the products were going to be ready for market launch, thus reinforcing the atmosphere of concealment.

To us, it seems that when blaming someone else, rather than sharing the problems, is the norm in a company, smooth transitions from the technical to the commercial sector are difficult. Instead, one consequence of sequentialism, combined with the lack of trust, may be that over time technical personnel learn not to make any promises at all to their marketing colleagues so as to avoid criticism in case deadlines cannot be met. They may not even tell marketing that a new product is under development, fearing that the marketing will demand to know when it will be ready for market introduction. We believe that organized sequentialism over time may be self-reinforcing. Unless a new climate of trust, mutual respect, and collectivity can be established to reverse this tendency, people will gradually drift further and further apart.
Second, in the previous chapter we suggested that market knowledge appears more difficult to transfer, since it was generally also more difficult to codify. This impression also held true during the commercialization phase, but from an intra-functional perspective. Some of the people we interviewed argued that: a) there was relatively little to learn from a market introduction in one country, in the sense of information worth transferring to others, and b) that even if the information were useful, the transfer would be difficult since people elsewhere could not easily make sense of the experience gained. While this attitude was also found in manufacturing, the lack of a simple and shared language for codifying and interpreting experience seemed to aggravate the problems in the marketing function.

In general, it also looked as if the technical staff belonged to a more international network of colleagues with whom they socialized (at conferences, technical meetings, courses, etc.) on a more regular basis. Accordingly, the problems encountered in codifying marketing knowledge could depend both on its specific nature, and on the relative lack of experience of marketing personnel in developing a shared language and "schema" for interpretation.

Third, the overall approach taken in developing the market-introduction strategy differed between the Electrolux and ABB projects. The difference is hardly surprising, since the new washer and the water purifier were intended primarily for consumer markets, whereas the new motor generation and the process-automation system were both designed for industrial markets. It appears as if the marketing strategies of the latter two products focused on "not disappointing" existing customers, whereas the former offerings had to "surprise" the market to attract new customers.

In both ABB cases the marketing approach relied heavily on strengthening the linkages to present customers of long standing. Elements of trust and interaction figured prominently in these cases. Sales also included much more than the product. The BAs had to develop systems, including services and support, which forced them to initiate further organizational changes to meet the total requirements of the customers. By contrast, the Electrolux projects were aimed mainly at capturing new customers, although an effort was made to utilize existing marketing channels. Thus, the marketing teams also suffered from the lack of clear points of reference for promoting the new products, e.g., for what specific set of customers,
using what arguments, etc. Often, the marketing strategy had to be developed on the basis of the de facto product. It was too late to adjust the offering in response to new customer requirements.

**The commercialization phase revisited**

In the commercialization phase it is time to reap what has been sown. Many potential problems that have been “pushed”, rather than solved, in the previous phases of the innovation process now become visible. Since all our international innovation projects were marked by rather little cross-functional parallelism during the development phase, several problematic issues surfaced when the products were (to be) transferred to manufacturing and marketing.

**Problem pushing across phases and functions**

In Chapters 4 and 5 we argued that the innovation process often starts with a “circular” problem generation / problem solving process. In the Electrolux cases the process seemed more of a garbage-can type, whereas the ABB projects appeared to develop more in an institutionalized business-plan fashion, i.e., the coupling of specific problems and solutions was more given. As innovation proceeded primarily technical problems were addressed and solved, whereas a number of other issues were postponed and pushed into the future.

As pointed out in the first chapter, there are at least three critical requirements for a viable product: a) the technical solution must be feasible, b) it must be possible to manufacture in an efficient way, and c) it must meet the specific demands of the target customers. All the projects which we studied in depth were dominated by personnel from the R&D function. In the previous chapter, we noted that these individuals tended to frame issues on the basis of their organizational location, so that they mostly generated and solved technical problems (a), while postponing or pushing many of the problems concerning the other two classes of requirements (b+c). This technical framing may be a result of their path dependent search routines, with limited knowledge in the other areas and unique skills in distinguishing
technical problems, or it could be the consequence of conscious attempts by these individuals to avoid conflicts, uncertainty, and complexity (for the time being) by focusing on only one set of requirements, so as not to stall the process.

Once the products had been transferred to production, these problems no longer seemed to exist for many of the R&D staff, who had now formally left the project. However, a number of critical issues soon became evident for the manufacturing organization. Trying to adapt the product to the specific characteristics of their factory, they often realized that it had not been designed with their requirements in mind. Thus, they had to address the problems previously pushed, and enter a new phase of problem solving (as well as pushing marketing-related issues in a number of cases).

When the products finally reached the marketing and sales organization, the innovation process was almost irreversible, as the majority of investments had already been made. Consequently, when marketing personnel also realized that a number of problems linked to their requirements had been pushed, and thus transferred to them, they could not easily go back and solve these problems. Rather, marketing had to work with the existing product to reposition it and to develop new marketing arguments.

It also appeared as if some of the problems realized during this phase of the innovation process were postponed to the development of a new model or generation - the problems would then serve as new marketing input. However, we believe there is an inherent danger to this approach. The firm may risk ending up in a situation where it only responds to the customer requirements of yesterday, not those of today or tomorrow. It could also be argued that the customers had to absorb some of the problems that had been pushed, in that the products still lacked certain qualities.

The cases which we studied in depth were primarily sequential efforts. In a more parallel innovation process we would expect fewer problems to occur when the process enters the commercialization phase. Most of these would have had to be sorted out earlier. However, as has been stressed in the previous chapters, strong forces seemed to prevent people in our cases from having these time-consuming and sometimes painful initial discussions and
‘negotiations’ aimed at creating a joint concept, and integrating views and experience. Moreover, an argument could be made that parallel development processes are not always better. First, some innovation processes, with a limited need for cross-functional creation, could probably be handled sequentially. Second, and more importantly, it is our belief that at companies whose organizational architecture does not support such "rugby" efforts, forced parallelism could result in many endless discussions and considerable political in-fighting.

In our opinion, the commercialization phase in a sequential innovation process can be portrayed as focused on solving problems previously postponed or pushed, as well as on genuine intra- (and inter-) functional creation of new knowledge. However, many of the intra-functional knowledge creation processes which we encountered appeared contingent on issues which had not been considered in earlier phases. These processes were thus inwardly reactive, directed at what previously had been missed, instead of externally proactive, focused on increasing customer value.

The influence of the organizational architecture

Just as in the previous phases, the impact of the organizational architecture was evident also in the commercialization of the products. Here, we will focus on the influence of the organizational architecture as it appeared, and as we interpreted it. As for asset structures, primarily the possession of strategic resources could be used as a power tool by late entrants, or by those already taking part, to affect the process at a late stage. Clearly, the strategy of the German unit in the M2000 case showed signs of this behavior. Likewise, arguments that units lacked critical assets could be used to exclude them from the project. Finally, when excess manufacturing capacity was freed up at other locations than where production was originally planned, manufacturing could be re-located (particularly if the unit where capacity was made available held more power, formally and in terms of access to other strategic assets, than did the manufacturing unit originally foreseen). The latter two points were perhaps most evident in the case of the Canadian and US units in the Alliance project.

From an administrative point of view, substantial changes in the overall configuration of the company, as in the Electrolux case, could have an effect on intra-project relationships, in that
formal authority is relocated. The distribution of power among participating units is in turn affected, and formally equal partners may end up in a more asymmetrical relationship from a power perspective. Policies for specialization of the manufacturing structure, such as focusing factories on only one product line at Electrolux, could be used as an argument to change the location of production in cases when manufacturing at the site originally foreseen would conflict with company policies. Once again, the sequential nature of the routines for innovation at both companies had an impact on the process. To a large extent, the work of the functions involved in the commercialization phase revolved around addressing and solving problems which previously had been pushed (or ignored) by the R&D organization. Lastly, heterogeneous functional cultures on the company level appeared to lead to an atmosphere characterized both by a lack of trust, and by considerable problems of communication between different departments. The relationship between engineers and "business" personnel was particularly problematic. As a result, transfer of information between their respective departments was limited. Our reasoning is summarized in the table below.

<table>
<thead>
<tr>
<th>Type of structures</th>
<th>Variables</th>
<th>Influence on innovation process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset structures</td>
<td>Possession of critical assets</td>
<td>Can be used as a tool to exert influence over the process, and thus to delay the project</td>
</tr>
<tr>
<td></td>
<td>Lack of critical assets</td>
<td>Can be a reason to exclude units from the innovation process</td>
</tr>
<tr>
<td></td>
<td>Excess manufacturing capacity</td>
<td>Freeing up of substantial production capacity in one location can lead to re-location of manufacturing</td>
</tr>
<tr>
<td>Administrative structures</td>
<td>Changes in overall configuration</td>
<td>Influence relationships between units taking part in terms of power</td>
</tr>
<tr>
<td></td>
<td>Policies for specialization of units</td>
<td>Can lead to changing location of manufacturing</td>
</tr>
<tr>
<td></td>
<td>Sequential routines for innovation</td>
<td>Affect process definition, causing processes of problem pushing across phases and functions</td>
</tr>
<tr>
<td></td>
<td>Heterogeneous functional cultures</td>
<td>Affect process interaction, causing a lack of trust and problems of communication between different functions</td>
</tr>
</tbody>
</table>

Table 7.2: Structures influencing behavior in the ABB and Electrolux IIPs
Summary of the chapter

In this chapter we have described and analyzed the commercialization phase of IIPs. We have focused on two primary questions. First, how did transfer to manufacturing proceed, and what problems occurred? Second, how was the market-introduction strategy developed, and what problems were encountered?

The transfer to manufacturing appeared most difficult in the two Electrolux cases. Partly, this can be explained by the shift of manufacturing location. We saw a strong connection between these decisions and the changes in the overall organizational architecture of the firm, i.e., the organizational level tended to interfere with the project level. In the ABB M2000 case, the relative neglect of the need to consider the requirements posed by more advanced manufacturing technology seemed to prolong the process. So did the fact that the various units were to some extent limited by old and different tools which impaired international learning. In all cases, though to a varying extent, the sequential nature of the innovation process also necessitated the establishment of a new project organization, including once again building commitment and a basic understanding for the concept of the project. This factor also appeared to delay the process.

When the products were transferred to marketing, the process was made more difficult by the fact that the cross-functional climate was often characterized by distrust. People sometimes argued that it was better for the personnel of other functions not to know about what was going on, since then they could not complain about what had or had not been done. Further, once more it appeared difficult to transfer marketing knowledge across geographical borders. One reason may be that this type of information is in fact more difficult to codify and less likely to be given an inter-subjectively shared interpretation; another may be that the marketing organization was less experienced in international socializing, and did not share a common language and interpretation schema.

Given that the Electrolux products were intended for partly new consumer markets, whereas the ABB projects were aimed at an industrial market, there were differences in marketing approach. In the latter cases, the BAAs sold not only the products but also a whole system of
services and support to existing customers with whom relationships built upon mutual trust had long existed. The Electrolux approach included elements of surprising potential customers, who had to be educated and whose perceptions had to be changed.

We described the commercialization phase as one in which the personnel involved had to address problems that previously had been pushed or ignored. In our view, the R&D domination during previous phases had led to a focus on technical requirements, whereas those related to manufacturing and marketing had not been considered. When the products were transferred to other functions, it soon became clear that the concept had to be redesigned. This problem was particularly acute for the marketing organization, since the process was almost irreversible after the majority of investments had been made during ramp-up manufacturing. The knowledge-creation processes in marketing were thus limited to developing new sales arguments, and to finding an appropriate position (segment, marketing channel, etc.) for the product. Many of the problems experienced by marketing personnel had to await the development of a new model or generation, and some were absorbed by the customers directly in that the product failed to meet their requirements in some respect.

The impact of the organizational architecture was noticeable, in terms of both asset and administrative structures. The possession or lack of critical resources was used as an argument to affect the process and the composition of the project. Re-location of production could follow after manufacturing capacity had been freed up at other, more powerful, units. Administratively, changes in the overall configuration influenced the distribution of power among units, and new policies for specialization of the manufacturing structure could be used as arguments to exclude units which had originally been planned as manufacturing locations. Finally, the existence of heterogeneous functional cultures on the company level lead to a lack of trust and to problems of communication between the departments taking part in the projects.
Notes to Chapter 7

1 Veckans Affärer, nr. 35, 1993.

2 The Appliance Consumer Connection Web site.

3 See Antonelli (1994) for a discussion of localized technological change.

4 Takeuchi and Nonaka (1986).


6 Cyert and March (1963) argue that people have a tendency to keep on looking where they have looked before, i.e., that search is path-dependent.

7 We would point out that the relationship between the architecture and the project is not a totally deterministic one. Thus, the architecture tends to guide behavior in a certain direction, rather than automatically causing specific effects. The components of the architecture are inter-connected; thus, simultaneous changes in different structures may reinforce one another, or cancel each other out. For instance, units may gain in formal authority, but lose in terms of critical assets, leaving their power position more or less constant.
CHAPTER 8

ORGANIZATIONAL ARCHITECTURE
AND THE INTERNATIONAL
INNOVATION PROCESS

Introduction

In this chapter we will summarize and further develop the more theoretical findings from our study of international innovation projects. Here, we hope to move from the somewhat fragmented description of the phases in Chapters 4-7, to cover issues visible also during the entire innovation process. We will seek to outline a conceptual framework for interpreting the nature of international innovation processes. Of particular importance will be the influence of the organizational architecture on these processes.

Interpreting international innovation processes

The last few chapters have dealt with the phases inherent in the innovation process. Throughout these sections, a few observations and arguments have surfaced and re-surfaced more regularly than others. Our focus will be on one particular finding. We have argued that IIPs are not conducted in a vacuum. Time after time, we notice how the asset- and administrative structures inherent in the organizational architecture of Electrolux and ABB seem to induce certain behavior, which in turn contributes to the outcome of the cross-border processes.
Architecturally determined search activities

The impact of the existing architecture, including the accumulated patterns inherent in previous structures, appeared to have a significant effect on the innovation process already from the very outset. As argued in Chapter 4, the search for / enactment of new ideas for innovation projects seemed influenced by the prevailing asset structures, with duplication of resources, particularly in manufacturing, playing an important role. These structures served to set off the search process. The situation arising from the mergers and acquisitions of ABB and Electrolux was marked by the general problem of “underutilization” of manufacturing resources (slack), or “wrong utilization” (lack of specialization) of the same.\(^1\) To be sure, the search appears to have been problem driven, but these problems were primarily internal and often linked to the manufacturing structures of the firms. Naturally, this phenomenon was built into our research design, in that we included two companies which were involved in restructuring their asset structures after a period of intense international growth. However, the internal logic is still noteworthy.

Moreover, in both companies the direction of the search loops appeared strongly affected by administrative structures. The historical configurations guided efforts in either a “capacity close” or a “factory fill” direction. The product dimension at ABB had more power than that at Electrolux, where the geographical dimension had been used as the traditional structuring principle. Therefore, capacity close seemed more likely to occur at ABB, whereas factory-fill attempts made sense in Electrolux, according to the architectural logic. The co-ordinative heritage resulted in either an ad-hoc “garbage-can” or a more institutionalized “business-plan” type of behavior. Given their respective structures, Electrolux had a preference for the former process, and ABB for the latter.

Accordingly, our interpretation of these processes suggests that different types of search behavior could evolve in organizations with disparate architectures. In our view, factory-fill behavior is more likely to occur at companies with a traditional parent-subsidiary configuration, than in those with global product divisions or a matrix. In the latter two structures, search oriented toward capacity close is more likely than in the former organizations. Moreover, a garbage-can approach is more probable at firms which historically
have resorted primarily to socialization to co-ordinate activities globally, than at those companies where formalization has been the preferred vehicle for cross-border integration. In the latter firms, business-plan behavior appears more likely than in the others. Our interpretation of the search process is summarized in the figure below.

<table>
<thead>
<tr>
<th>Nature of the search process</th>
<th>Factory fill</th>
<th>Capacity close</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garbage can</td>
<td>Parent-subsidiary configuration</td>
<td>Global product division/ Matrix configuration</td>
</tr>
<tr>
<td></td>
<td>Co-ordination by socialization</td>
<td>Co-ordination by socialization</td>
</tr>
<tr>
<td>Business plan</td>
<td>Parent-subsidiary configuration</td>
<td>Global product division/ Matrix configuration</td>
</tr>
<tr>
<td></td>
<td>Co-ordination by formalization</td>
<td>Co-ordination by formalization</td>
</tr>
</tbody>
</table>

**Figure 8.1:** Characteristics of administrative structures and the nature of search processes

Finally, in all our qualitative cases, the top of the administrative hierarchy was a driving force in initiating the innovation processes. We attribute this phenomenon in part to the fact that these individuals were the only ones with a sufficiently global perspective to: a) couple problems and solutions extending over different countries (geographical space); b) have enough formal power at the company to move an initial idea from individual thinking to organizational action. The international administrative structures at ABB and Electrolux did not seem available to the same extent to people further down in the hierarchy. Thus, more pull-oriented search appeared unlikely.

**Framing of issues determined by sequential routines for innovation**

One principal theme in Chapter 5 was that the dispersion of complementary assets led the firms to set up international projects rather than local HBIPs or LIPs. Access to these strategic assets could then be used as a power base to exert influence over the process.² Since the
relevant strategic assets were geographically dispersed, the variety of interpretations and goals inherent in the project coalition provided the basic premises for a potential negotiation game across functions and nations. For instance, we suggest that both the functional (horizontal) and the positional (vertical) location of individuals in an organization affect the logic followed in these processes. The international scope of the logic increases with the geographical concentration of the function, i.e., the less dispersed a function, the more global the logic, and with the level in the administrative hierarchy, i.e., the higher the position, the more global the logic. Simply put, top management and personnel belonging to the R&D organization (and to a certain extent the manufacturing function) generally displayed more of a global-standardization logic than did more local managers and marketing personnel at our case companies. As we see it, the latter individuals were more inclined to suggest locally adapted solutions.

Traditional and sequential routines for innovation, apparent in the administrative structures of both companies, were superimposed on this new process. We interpret this phenomenon in terms of uncertainty reduction, or avoidance of complexity and conflict. To move into development, the team had to reduce uncertainty as to some key variables, several of which would later constitute the product specifications. The theory of rational decision-making would hold that organizations collect the necessary information about each single alternative and its consequences. Since preferences are given and stable, an optimal solution can be calculated. In reality, however, the response to uncertainty was often to let one function take charge, thus delimiting goal variety. Another consequence appeared to be that the process was made less complex, as the requirements of those functions not taking part could be ignored, or at least downplayed. If multiple actors and goal variety still existed, as in both ABB projects, in which more than one R&D unit took part, the teams agreed on a limited core set of goals across national boundaries after a process of “concept peeling”, or developed a compromise solution to meet the requirements of both parties. Once again, time-pressure played an important role, since management did not want seemingly endless discussions with few tangible results. The M2000 project was characterized largely by the first solution, whereas project Holger was closer to the second. Constructive conflicts, or genuine integration of interests across functions, seldom occurred.
Thus, the organizational architecture did not lead to solving the dilemma inherent in the goal variety of the international and multifunctional coalition under formation by a 'simple' process of "sequential attention to goals". Rather, it led to "sequential framing of issues" (problems and/or solutions) by certain units (functional and/or national), and over the phases of the innovation process. Only after a particular actor had been given the right to frame the issue could goals be addressed sequentially. Then it was possible to sort out which goals were most urgent for the particular function. A set of relatively homogeneous and compatible goals, and a common frame of reference, were needed for the process not to be prolonged. To some extent, this situation, which often resulted in R&D domination, could be countered by strong marketing companies, such as the US organization in the Alliance case, which used their control over major output markets to exert influence, thus adding a greater element of negotiation to the process.

Problems were generated and solved, although mostly within the confines of a limited R&D logic. Other issues, relating more to the requirements of manufacturing and marketing, were pushed or ignored, and potential conflicts merely quasi-resolved. Thus, as long as the top of the administrative hierarchy did not intervene, who was able to frame the issues and define the tasks initially depended on both: a) past experience, embodied in organizational routines, and b) possession of strategic assets, in relation to what the organization, more or less explicitly, defined as strategic given the task. The R&D organization took lead in this process since a) at both companies product development was basically regarded as an R&D task, and b) in this initial phase the R&D function controlled what the organizations appeared to define as the most critical asset in relation to the most immediate problems to solve, i.e., knowledge about technical solutions of the past, present, and the future. The process displayed signs of a self-fulfilling prophecy - the primacy of technical issue-framing gave rise to a situation in which technical knowledge was considered most critical. Furthermore, in our opinion, the fact that market introduction, and the necessity of securing commitment from other actors in the organization, were still rather remote in time, contributed in shaping the issue-framing process. Given the "technical" definition of the task, it appeared more urgent to solve the short-term problems in order to proceed with development. Our analysis of processes leading up to sequential attention to goals is summarized in the figure below.
Designing task interdependency structures - reproducing the organizational architecture

Our central argument in Chapter 6 was that also the organization of the development effort, in terms of division and co-ordination of tasks, was heavily influenced by existing structures on the organizational level. The dispersion of complementary assets forced the firms to consider
issues of integration across both geographical and organizational borders. However, rather than creating structures objectively adapted to knowledge-creation or information-processing requirements within and across functions and nations, as much of established theory would suggest, management seemed to reproduce relationships apparent in, and implied by, the organizational architecture. Tasks were divided so as to minimize cross-border interdependencies, most notably between functions and therefore also in some cases between different countries. This division of labor appeared to be almost rule-based, i.e., a more or less unconscious effort to minimize co-ordination costs and to rely primarily on standardization and planning, rather than the more costly integrative mechanisms of mutual adjustment. The geographical dispersion of the projects appeared to reinforce this tendency, since mutual adjustment would become more costly and difficult with greater physical and cultural distance.

In consistency with their respective administrative heritage, the ABB projects were much more formalized than the Alliance and the 3rd-tap ventures, in which the reliance on socialization among the (international) top management team was the main co-ordination mechanism. Moreover, the co-ordination mechanisms made available to the teams shaped the interdependencies realized. If only the mechanisms of standardization and planning were present, few, if any, reciprocal relationships could evolve over geographical and/or organizational distance. In our view, managers of international innovation projects face a paradox. If interdependencies across functions are minimized throughout the entire process, the project is perhaps more manageable, but it may encounter serious problems toward the end. On the other hand, if more reciprocal dependencies between the different departments characterize the process, most relevant information and knowledge may flow throughout the entire network, but the co-ordinative task risks becoming so complex that the project becomes very difficult to manage, unless extreme slack in time and resources can be established. The potential problems inherent in the first, more sequential ("relay") approach, were perhaps most notable when the project was passed on to manufacturing or marketing, as discussed in Chapter 7; these problems were still relatively distant when the project organization was being set up, at least by comparison with the more direct co-ordinative dilemmas inherent in the second more parallel ("rugby") approach. It is our impression that the short-term benefits associated with the sequential approach may lead managers to prefer processes and
structures in which continuous interaction across organizational and national borders is avoided.\textsuperscript{12}

The nature of interdependencies in dynamic processes

On closer examination of the patterns of dependence throughout the entire innovation process, a number of interesting observations stand out. First, we believe that in dynamic processes, such as IIPs, interdependency structures are best described as \textit{unstable} over time. Even within a certain phase, interdependencies between two units may change in degree or kind. Second, interdependency structures, even between two units, appeared \textit{diverse} rather than uniform. The relationship is better characterized as a hybrid of multiple dependencies than represented by a single arrow in one or both directions. Third, interdependency structures seem to have been enacted by individual managers and groups, and thus \textit{subjectively interpreted}, rather than objectively clear. Although interpretations were influenced by the belief system(s) inherent in the administrative structures of the firm, these beliefs were often heterogeneous enough to allow for many interpretations. Moreover, the single individual (or in some cases the local team) belongs to so many different cultural groupings influencing how a task or situation is read that identical interpretations seem rare, even if the element of free will were ignored. Thus, a situation can very well arise in which unit A considers the relationship to unit B as primarily sequential (A passing on the task to B without receiving any input from B), whereas B believes that the interdependency is more reciprocal in nature, and that he feeds information back for A to take into account. People at unit A later disregard this information, to the dismay of individuals at unit B. Fourth, interdependency structures appear to have been \textit{created} by managers and groups in their enactment of the situation, and \textit{not given}. Often, there was no simple or natural way allocating tasks. By delegating responsibilities to units, or permitting the units to assume responsibilities, and by \textit{supplying} a certain portfolio of co-ordination mechanisms, e.g., by limiting or extending the use of mutual adjustment in controlling traveling expenses or the access to interactive and continuous electronic data-exchange networks, management let a system of interdependencies gradually evolve. As noted above, the nature of these co-ordination mechanisms, was in turn largely determined by the existing architecture.
From a theoretical standpoint, our four principal observations clearly have a-hierarchical implications,\textsuperscript{13} as will be discussed in more depth in the final chapter of this study. Moreover, our suggestions also cast doubt on the appropriateness of the existing language for describing interdependencies between units. The dominant "Thomsonian" apparatus\textsuperscript{14} appears suited for describing stable and uniform relationships between two actors, with an identical and objectively given interpretation of the relationship. However, portraying dynamic systems, in which patterns are created and may be differently interpreted, becomes more complex. Interdependency structures are continuously being designed and redesigned, interpreted and re-interpreted. Moreover, we believe that the nature of the task is not the primary determining factor for the creation of interdependencies and co-ordination mechanisms; instead the structures inherent in the organizational architecture are often reproduced. The co-ordinative structures in place determine the interdependencies realized, fully as much as the opposite holds true.

Managing hybrid interdependency structures

The traditional prescription for managing "hybrid" interdependencies, or even reciprocal ones, has been to group activities so that relationships between them are confined within one "self-contained" organizational entity.\textsuperscript{15} In fact, this rational is one of the principal ones for the creation of a project as a unit for handling specific boundary-transcending activities. Thus, some authors talk about "team dependence".\textsuperscript{16} As long as this unit, called the "team", "project", "group", or whatever, was co-located, the question of how and with whom to co-ordinate could probably be handled on an organic, ad-hoc basis.

However, the geographical separation and dispersion of formal decision-making authority and strategic assets, not evident in traditional local- or home-based innovation processes, appear to create an innate tension, particularly when the various sub-groups do not yet share a relatively homogeneous frame of reference for interpreting reality. Two critical problems can be identified. First, it was not always clear with what other individuals people should ideally communicate. Who possessed the relevant complementary knowledge? Furthermore, would they be willing to share it? Second, it was not easy to resolve the question of who was to be
responsible for establishing the infrastructure necessary to facilitate the transfer of knowledge.

We believe that inter-team co-ordination within a project is particularly problematic when the project is only quasi-autonomous, in other words indirectly (or sometimes even more directly) dependent also on other actors within or outside the larger organization. These “external” actors provide formal decision-making authority, co-ordination mechanisms, or strategic assets in one form or another. Dependency on outside actors might range from being specific and concrete, i.e., physical dependence, such as relying on external manpower, financial resources, or information, to being more general and abstract, i.e., psychological dependence, in that all individuals bring a certain frame of reference into the process.

The latter type of dependency is perhaps more difficult to grasp, and also less emphasized in existing theories. However, during the course of our study we came to realize that the project members were often thinking about their ordinary tasks while participating in the international venture. Moreover, they were also considering the future reactions of their operational managers before taking action in the project. Whatever they did in the IIP could later be held against them. In effect, the project actions of “today”, were implicitly affected by and discounted against the operative reality of “tomorrow”. Though belonging to the overall team, people still often identified with their traditional functional and/or geographical colleagues.

**Bounded rationality and bounded interpretation**

Since people not only seem subject to bounded or intended rationality, i.e., limited information-processing capabilities, but also to bounded interpretation, i.e., limited and biased information-interpretation capabilities, the “ideal” division and integration of tasks according to the law of the actual situation or task may be an impossible dream. Interdependencies are enacted and understood on the basis of individual and collective experiences or structures, rather than calculated on the basis of an objective evaluation of the specific situation. Temporarily and locally satisficing solutions, similar to those used before and now embedded in the organizational architecture, rather than “optimal” solutions, were
often reached. One consequence was behavior characterized as problem pushing, i.e., increasing process certainty and simplicity for the time being by more or less ignoring the requirements posed by the other functions.

However, our concept of 'bounded interpretation' also means that what constitutes a satisfactory solution for A, may not be interpreted as such by B, even when aspiration levels are identical, and aside from the fact that A and B may have quite different agendas and goals. Depending on where groups or individuals are located, positionally, geographically, or functionally, they may interpret the same situation quite differently. Earlier, we emphasized that the solution at ABB and Electrolux seems to have been to utilize innovation routines which gave one sufficiently homogeneous group (the R&D function in most cases) the first opportunity to frame the issue. Only at a later stage were the other departments permitted to add new features, which would make the total solution "satisfactory" to them as well. As a consequence, we described their tasks during the commercialization phase as marked by addressing postponed problems, solving problems, and postponing certain problems as well.

The influence of the organizational architecture revisited

We would like to summarize this part of the chapter by re-emphasizing that our leading theme in describing and analyzing the management of IIPs at ABB and Electrolux, has been that these processes are greatly influenced by existing and accumulated structures in the organizational architecture. These structures appear to have had a strong effect on how managers enacted certain critical issues and events throughout the entire process. Thus, the organizational architecture contributed substantially in shaping decision-making and behavior in the international projects. Let us briefly recapitulate the impact of the asset and administrative structures, respectively.

The duplication of assets, resulting from growth by mergers and/or acquisitions at ABB and Electrolux, led to an intensified search for ideas for innovation so as better to utilize the potential of the new manufacturing structures. However, since not only a considerable international overlap of resources existed, but also complementary resources were geographically dispersed, the firms had to set up international projects, in which issues of co-
ordination across both functional and geographical borders needed to be considered. The control over, or access to, strategic assets could then be used to influence the process. Units lacking strategic assets often experienced problems in managing their effort; they could even be excluded at a subsequent stage, for instance when manufacturing capacity became available at other locations with access to more strategic assets (or more formal authority). Particularly for those functions relatively concentrated in geographical terms, primarily R&D, the initiation of IPs made sense. Other functions, such as marketing, with more dispersed locational structures, seemed more inclined to favor solutions involving local adaptation. Consequently, there were differences in goals and interpretations among departments.

The administrative structures had an impact even during initial search efforts. The configurative structures affected the direction of search loops. At ABB, a product-based firm, search could be characterized as a capacity-close effort, whereas the two ventures at the more country-based Electrolux were at least in part initiated as factory-fill attempts. Search seemed to obey the law of least resistance, in tending to follow the logic implied by the central structuring principle of the configuration. The nature of the search process was also influenced by the co-ordinative heritage of the organizations. At ABB, with its more programmed and formalized structures, the process followed a business-plan approach, whereas the non-programmed and socialization-oriented structures of Electrolux resulted in processes of a garbage-can type. Moreover, at both firms strategic decision-making was centralized, and local access to international administrative structures was limited, so that the search process was one of top-management push, rather than an overall organizational pull. With their location in the administrative hierarchy, these top managers also appeared to display more of a global-standardization logic than people further down in the organization.

Throughout the new-product development process at ABB and Electrolux, sequential routines for innovation were superimposed on the projects. These routines affected process definition, as well as what representatives from the different departments would take part in the projects, and when. For the most part, the routines gave the overall right of framing the issue to the technical function(s) involved in the IIP. This function could then largely disregard the requirements of the others when developing product specifications. In doing so they were able to produce solutions which were temporarily and locally satisficing; they thus reduced
uncertainty, complexity, and avoided many conflicts for the time being, by pushing certain problems into the future. When the other functions had joined the innovation projects, and particularly during the commercialization phase, these problems had to be addressed and solved. Further, differences between the functional/professional cultures, logics, and languages of R&D, manufacturing, and marketing, respectively, often led to distrust and difficulties in communication.

The organization of the international effort was also dependent on the nature of the administrative structures. Traditional co-ordination mechanisms were utilized. In consistency with the historical heritage of the firms, the ABB projects relied on formalization, and Electrolux primarily on socialization among the top executives in the administrative hierarchy. These mechanisms, in turn, shaped the nature of the interdependency structures, rather than these being contingent on the nature of the tasks to be performed, and the uncertainty and knowledge-creation requirements implied. Finally, major changes in administrative structure, such as those resulting from altering the overall configuration of the firm, or from introducing new policies for specialization among manufacturing units, appeared to have an impact on the units involved in the projects by re-distributing formal decision-making authority or the location of manufacturing.

To some, the influence of the organizational architecture on the process of organizing and managing IIPs may seem “irrational”. However, we would propose the opposite. In a way, it is rational for an organization to apply the structures of the past, since a) these appear to have worked well before, and b) they economize on the limited cognitive capacity of managers (i.e., they take into account that people are subject to bounded rationality). Therefore, rather than searching for the ideal design, companies settle for satisficing solutions, similar to those used before. Routines and other structures inherent in the organizational architecture function as heuristics. The predicament, however, when applying old solutions to new problems, is that the characteristics of the present and the future may not be the same as those of the past. It may also seem as if our main argument has a deterministic bias. Indeed, the overall architecture provides an organizational frame, influencing how decision makers and other participants in the process enact tasks, issues, problems, and solutions. It should not be considered an “organizational straitjacket”, however. Nor should we conclude that management does not
The architecture is better viewed as a 'meta-structure', affecting cognition and behavior of individuals within the firm. Moreover, we have thus far left the question of individual freedom of interpretation and action unanswered. The table below attempts to summarize our interpretation of architectural dependence in the ABB and Electrolux IIPs.

<table>
<thead>
<tr>
<th>Organizational architecture</th>
<th>Influence on the international innovation processes at ABB and Electrolux</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset structures</td>
<td>Duplication of strategic assets leads to intensified search activities.</td>
</tr>
<tr>
<td></td>
<td>Dispersion of complementary assets requires international formation, and forces the firm to consider issues of cross-border co-ordination.</td>
</tr>
<tr>
<td></td>
<td>The geographical location pattern affects the logic of the different functions.</td>
</tr>
<tr>
<td></td>
<td>- Concentrated: Global (standardization)</td>
</tr>
<tr>
<td></td>
<td>- Dispersed: Local (adaptation)</td>
</tr>
<tr>
<td></td>
<td>Control over, or access to, critical assets can be used to exert influence, and the absence of such assets can be used as an argument to exclude units.</td>
</tr>
<tr>
<td></td>
<td>Changes in the utilization of resources may lead to re-distribution of project responsibilities.</td>
</tr>
<tr>
<td>Administrative structures</td>
<td>The configuration guides the direction of search loops.</td>
</tr>
<tr>
<td></td>
<td>- Product-based: Capacity close</td>
</tr>
<tr>
<td></td>
<td>- Country-based: Factory fill</td>
</tr>
<tr>
<td></td>
<td>The nature of the co-ordinative structures influences the nature of the search process.</td>
</tr>
<tr>
<td></td>
<td>- Programmed/Formalization: Business plan</td>
</tr>
<tr>
<td></td>
<td>- Non-programmed/Socialization: Garbage can</td>
</tr>
<tr>
<td></td>
<td>The degree of centralization of formal authority, and the availability of international administrative structures on the local level, affect the locus of the search process.</td>
</tr>
<tr>
<td></td>
<td>- Centralization: Top-management push</td>
</tr>
<tr>
<td></td>
<td>- Decentralization: Organizational pull</td>
</tr>
<tr>
<td></td>
<td>Location in the administrative hierarchy affects the logic of people at various levels.</td>
</tr>
<tr>
<td></td>
<td>- Top: Global (standardization)</td>
</tr>
<tr>
<td></td>
<td>- Bottom: Local (adaptation)</td>
</tr>
<tr>
<td></td>
<td>Sequential routines for innovation give the right to frame the overall issue to the technical function(s), producing solutions which are temporarily and locally satisficing, and reducing uncertainty, complexity, and conflicts within the phases, but at the cost of &quot;pushing&quot; problems involving other functions.</td>
</tr>
<tr>
<td></td>
<td>The overall configurative and co-ordinative structures are reproduced in the architecture of the project, and the resulting design seems more contingent on the nature of the main integrating vehicles shaping the interdependency structures, than on the nature of the tasks.</td>
</tr>
<tr>
<td></td>
<td>Heterogeneous functional cultures cause distrust and problems of communication.</td>
</tr>
<tr>
<td></td>
<td>Major changes in the overall structures may lead to re-distribution of formal authority and project responsibilities among the units.</td>
</tr>
</tbody>
</table>

**Table 8.1:** The influence of the organizational architecture on the ABB and Electrolux IIPs.
Architectural dependence and zones of interpretation

Above, we noted that individuals not only seem subject to bounded rationality, but also to ‘bounded interpretation’. People seem to work within a ‘zone of interpretation’. Individuals have a free will, but are also affected by structures more “local” than those inter-subjectively shared in the overall organizational architecture. Particularly norm- and belief systems in the administrative structures of both ABB and Electrolux (as in many other multinationals, we expect) appear heterogeneous enough, across geographical space and organizational scope, to allow for relatively diverse social constructions of reality.22

This “group framing”, also contributes in shaping interpretations, decisions, and action. Out of all possible “group” factors, and excluding strictly personal physical and psychological differences in "individual framing",23 we would like to highlight the critical importance of national and professional/functional cultural belonging. Whereas organizational framing principally acts as a homogenizing force, group framing in general promotes heterogeneity in interpretations and actions, at least from an overall company perspective.

Multi-cultural man, rationality, and routines

Since the participants in an international innovation project belong to a large variety of different cultural groupings, the individuals and units involved answer to a number of different logics of action. First, they are influenced by an organizational logic. Second, people operate under a certain functional logic. An alternative in the case of innovation processes is to refer to a professional logic, separating people with a technical background (generally those in R&D and manufacturing), from those with a business background (marketing). Third, organizational members answer to one national or regional logic. Fourth, people follow a certain positional logic, depending on their location in the administrative hierarchy. Fifth, and finally, a project logic develops while individuals participate in the international venture. In our minds, these cultures all have their own particular traits, both in terms of terminal values, i.e., desired end states or outcomes, and in terms of instrumental values, i.e., desired modes of behavior.24
To understand issues of knowledge management in an international innovation process, we believe it is important to take seriously the notion of "multi-cultural" man. This more complex conception of man means that behavior may be rational from a variety of logics, rather than "irrational". Sometimes, these different logics of action may fit with the logic of the project, but in other cases they collide. People enter the new project with a culturally determined way of thinking which influences their enactment and behavior during the process. Another implication of our idea is that in the absence of a strong and inter-subjectively shared organizational- and project culture, people may more easily follow the rationales of the nations and functions to which they belong.

Moreover, in addition to the locational rationality of participants in IIPs, we believe our data also implies that they are subject to a more general psychological rationality. From past research we know that human beings are uncertainty reducers. Our interpretation of the cases suggests that people display a tendency to prefer solutions characterized by temporary certainty, simplicity, and harmony, over those in which uncertainty, complexity, and conflict persisted. Organizational routines at both ABB and Electrolux provided solutions which secured the former, while avoiding the latter.

We believe that two separate arguments can be made for the existence of such routines. An efficiency argument focuses on the fact that routines provide a ‘satisfactory’ way of handling our limited cognitive capacity, over time enabling people as well as organizations to travel further along the learning-curve. A deficiency argument takes the human inability to handle uncertainty, complexity, and conflict as a point of departure. This statement also suggests that routines may be culturally influenced, given geographical differences in attitudes toward the factors mentioned above.

Summary of the chapter

In this chapter we have summarized and developed our principal ideas regarding the nature of the international innovation process. A special emphasis was put on developing a conceptual
framework for interpreting how international innovation processes are initiated and conducted.

Even the pre-project search activities were promoted and guided by the architecture of ABB and Electrolux, respectively. While search was problem driven, the major problems appeared to be internal and caused by the fragmented manufacturing structures resulting from the numerous mergers and acquisitions. The firm displayed either ad-hoc "garbage-can" processes or more institutionalized "business-plan" behavior, depending on its organizational architecture. The configuration of the firm contributed in guiding search toward either factory-fill efforts, or capacity-close ventures, in asymmetrically distributing formal authority between products and countries, respectively. A few "global scanners" at the top of the administrative hierarchy were instrumental in these processes. With their formal authority and access to international administrative structures, they could develop the initial concepts and push them forward.

During, the conception and planning phase, differences in goals and belief systems across borders were managed by applying traditional routines for innovation. The result was a "sequential framing of issues", i.e., letting one relatively homogeneous group formulate the overall problem and potential solutions. Only after this process was sequential attention paid to goals, according to the issue-framing of that group. In most cases, R&D dominated this process as they possessed what the organization considered the most critical assets, in view of the nature of the task, and of the fact that innovation had traditionally been defined as an R&D responsibility.

The design of task interdependencies between the units was also heavily influenced by the organizational architecture. We suggest that rather than viewing the project task as unique and demanding a new and different design, managers tended to utilize those co-ordination mechanisms already present in the architecture of the firm. These mechanisms, in turn, shaped the interdependency structures. The geographical dispersion of the ventures also seemed to lead managers to avoid creating and managing reciprocal interdependencies across national borders, and to prefer sequential solutions, which offered more obvious short-term benefits.
We also believe that the interdependency structures were marked by four interesting characteristics. First, they were changing, rather than stable. Second, they were diverse, not uniform. Third, they were subjectively interpreted, in stead of objectively clear. Fourth and finally, they were created, rather than given. Our propositions clearly have a-hierarchical implications, and they cast doubt on the dominant “Thompsonian” apparatus which seems to lose much of its validity when applied to more dynamic systems.

The problems of managing these “hybrid interdependencies” were further aggravated by the greater geographical distribution of the projects, particularly since in most cases the teams were only quasi-autonomous. Physical dependence on the operating organization often still remained. Perhaps even more interesting, however, was the fact that psychological dependence also appeared to exist, since people regularly considered the reactions of the operative organization to their actions and behavior in the project.

It is our view that the process of designing the projects was not only subject to bounded rationality, but also to bounded interpretation, i.e., limited and biased information-interpretation capabilities. Together these forces yielded a situation in which locally and temporarily satisficing solutions very similar to those of the past were applied. This phenomenon led to processes of problem pushing. One difficulty caused by differences in interpretation of tasks and events was that what was constituted a satisficing solutions could differ from individual to individual, from function to function, and from country to country.

As we see it, our analysis supports arguments that organizations are “architecturally dependent”. However, people seem to work within “zones of interpretation”. Also more local framing contributes in shaping the process of innovation. Here, we emphasized the importance of more group-oriented cultures, such as national and functional/professional. While “organizational framing” acts as a homogenizing force, “group framing” leads to heterogeneity of interpretation and action, at least from a company perspective.

Participants in an IIP belong to several different, though sometimes overlapping, cultural groupings, each with its own distinct logic. We speak of organizational, functional, professional, national (or regional), positional, and project logics of action. Since the project
is a fairly temporary arrangement, and little time was spent building a separate culture in our cases, people often appeared to retreat into their traditional logics. Thus, we speak of locational rationales for interpreting and initiating action. Factors of a more psychological nature were also at work. In all our cases, people tended to prefer structures in which uncertainty, complexity, and conflicts were temporarily avoided. The organizational routines provided such arrangements. We believe the concept of “multi-cultural man” to be critical. This also means that behavior may be “rational” from a variety of different logics, rather than “irrational”.
Notes to Chapter 8

1 Our argument of "problemistic search" is consistent with the reasoning of Cyert and March (1963), but we believe the process to be less intentional and goal-oriented than suggested by these scholars (see pp. 121).

2 In the literature, a number of different sources of power are identified. The ultimate source of power in a corporation is legally granted authority (see Weber, 1947). Administratively generated power is also apparent in a unit's ability to control the integration mechanisms, and consequently also the infrastructure of decision making processes (see Lukes, 1974; March and Simon, 1958; Perrow, 1979; and Pettigrew, 1973). Standardization of work processes, output, skills or even norms and belief systems is often manifest in written rules and policies which grant power to those who issue them (see Crozier, 1964; Hickson et al, 1971; March, 1995; Perrow, 1979, 1984; Pettigrew, 1973; and Pfeffer, 1981). Control over the planning process, and therefore to some extent the preferences and identities of the firm, will offer opportunities to influence others and the decision-making processes in general (see March and Simon, 1958; and March, 1995). Finally, those who control meetings, agendas, traveling, information, and telecommunication systems, etc., can dominate and direct the information flows of the firm. They may position themselves centrally in the information network and transmit or withhold material selectively, thus being able to exert power over more peripheral actors (see Hickson et al, 1971; Pettigrew, 1973; and Pfeffer, 1981). Access to and control over a variety of assets are a source of power. Resources, physical, financial, and human - all contribute in giving units power (see March, 1995; and Pfeffer and Salancik, 1974, 1978). However, the difference between access to and control over resources is vital to note; i.e., units can control resources outside their own domain, and not all resources which they can access are under their control. Knowledge, in the form of competence possessed by certain individuals, or of supra-individual capabilities can also be used to influence the actions of other actors (see Crozier, 1964; French and Raven, 1968; and Pettigrew, 1973). Particularly when resources or knowledge can be regarded as non-substitutable, significant power can be exerted (see Hickson et al, 1971). Finally, we also consider the relevant unit's access to an external network (intra- as well as inter-organizational) as an asset from which power can be derived. By finding allies and tapping into their assets, the focal unit may increase its power in relation to other actors in the organization.

3 See Cyert and March (1963) for a similar argument. Also see Nelson and Winter (1982).

4 See March and Simon (1958), and Cyert and March (1963).

5 For an outline of the rational school of decision making, see Harrison (1995).


8 See Cyert and March (1963) for the original idea. Also see March (1995).

9 Ibid.

10 Ibid.

11 See Takeuchi and Nonaka (1986) for a discussion of "relay" and "rugby" approaches to product development.

12 See Cyert and March (1963) for a similar argument, i.e., that short-term benefits are more highly valued than long term effects.

13 See Hedlund (1993b) for a more thorough discussion of the assumption behind the administrative hierarchy.

14 Thompson (1967).

15 Ibid.


18 See Simon (1947), March and Simon (1958), and Cyert and March (1963).

19 Ibid.


21 See Nelson and Winter (1982) for a similar argument.

22 See Berger and Luckman (1966).

23 See Moorehead and Griffin (1989, Ch. 3) for a discussion on, and summary of, theories on strictly individual differences.

24 See Rokeach (1973).

25 See Sjöstrand (1985) for a similar idea. Also see Nozick (1995) for a discussion of the concept of rationality.

INTRODUCTION

The principal objectives in this chapter are to discuss IIPs in terms of performance, and to identify the most prevalent and serious problems encountered in the management of international innovation projects. Our discussion of critical problems will be structured around seven key themes, primarily derived from the cases, but data from the survey will also be used. In addition, we believe that a number of more generic and structural issues need to be addressed. These underlying sources of problems must be considered. Thus, we will conclude the chapter by analyzing the question of why problems occurred, and why people in the company organizations behaved the way they did. ¹

PERFORMANCE OF IIPs

Were the IIPs included in our study successful? Naturally, this question is extremely difficult to answer. Perhaps, the more relevant question to pose, at least initially, is that of how success should be judged? One measure might be sales that have been generated in relation to costs incurred; another might be current sales compared with those of previous generations. However, since the projects studied had only recently launched the new products when we concluded our data collection, these measures appeared inappropriate. Instead, we focused on analyzing the subjective views of those who took part in the ventures, and on comparing the actual performance of the teams with the goals formulated during the initial phases.
Clearly, the performance of an IIP can be judged from both a short-term and a more long-term perspective. In the short term, all four projects can be regarded as successful in that they actually managed to introduce the products which they set out to develop. Given that only a very limited number of all development projects come that far, our projects were definitely not failures. All individuals to whom we spoke agreed that their respective project ought to be regarded as successful. However, this was also partly inherent in our way of selecting the sample, where only projects which seemed to be running according to plans were included; naturally, not all IIPs reach the commercialization phase. From a technology point of view, it appeared as if the products turned out as good as, or even better than, originally planned. On the other hand, all projects were delayed, and also consumed more financial resources than expected.

The survey data is consistent with our impressions from the cases. Also here, we focused on studying how the projects performed in relation to the goals that had been defined initially. As can be seen in Table 9.1, the projects were identified as most successful in terms of product performance and quality. Product performance scored significantly higher than time**, budget*, manufacturing cost**, and consumer price**. Quality reached significantly higher scores than time*, manufacturing costs**, consumer price**, and market share*. The overriding finding is that our sample of international innovation projects tended to perform better in technical terms than in terms of time and cost. With regard to market-related aspects, it is difficult to draw any firm conclusions, since our sample is very small. Another reason is that these types of goals were only included in some 50% of the projects.

In the longer term, it is even more difficult to interpret our data. Apart from the fact that the products could prove more or less successful on the market, we would like to highlight the organizational effects of these types of ventures. Theoretically, IIPs could lead to organizational learning which could either facilitate or hinder future efforts to work across borders. From the almost unanimous responses of those to whom we talked at the case companies, it appears as if they believed that the positive effects by far outweigh the negative ones. People agreed that such international processes would probably work much better the next time, if there was a next time.
To further analyze the IIPs, we asked the project managers included in the survey to list the advantages and disadvantages which they had experienced (for the full list see Appendix 7). In terms of benefits, four primary groups of advantages can be identified; a) increased knowledge, b) increased creativity, c) increased internal acceptance, and d) increased internal learning. In terms of disadvantages three sets of variables stand out; a) communication problems, b) increased time needed, and c) increased costs. The following tentative figure captures the essence of our discussion of IIP performance.

![Figure 9.1: Effects of IIPs on multiple levels](image-url)
Critical problems in IIPs

After this brief and general analysis of IIP performance and the effects of international participation, we now turn our attention to the principal problems encountered. The following discussion and analysis will be structured around seven key themes, capturing those issues which seemed difficult to handle, and which caused what we consider the most serious problems. Under each heading we will diagnose the difficulties in more detail. Stated as an index of problem issues, the list is as follows.

1) Lack of organizational linkages and procedures
2) Lack of resources and process "balance"
3) Fragmented conception and design
4) Insufficient co-ordination and communication
5) Discontinuous process
6) Weak and unclear leadership
7) Weak development architecture

Lack of organizational linkages and procedures

It is critical for any development project to have firm linkages to the overall organization, and perhaps even more so for international innovation projects. Our first point is more indirectly related to the management of IIPs, in that these ventures compete with other development projects, as well as with more ordinary operations of the firm, for scarce resources. In our opinion, a number of problems are related to the fact that the projects were not always consistent with the company's asset base, experience, and the guiding vision or strategy. The screening-process appeared to display certain flaws, in these respects.

In our view, it seems a common phenomenon that the number of organizational commitments undertaken tends to exceed the development resources at the company’s disposal. It is our impression, although we lack solid empirical evidence, that organizations in general have a tendency to launch too many projects, demanding more resources than those available to the organization. There was no systematic screening of project ideas of the kind suggested by
some of the models evident in the literature; rather, the launch decision, at least in the two Electrolux cases, often seemed heavily dependent on the initiative of single managers.

Sometimes, priorities were not established, or at least they were not clear to those taking part in the ventures. For instance, the project leader in the 3rd-tap case was forced to manage another project in parallel. The Italians, and the US personnel in the Alliance project often seemed to have more important matters to attend to, and seemingly competing projects were conducted in parallel with both Electrolux ventures. Thus, in the Electrolux projects these problems appeared greater than in the ABB projects, where no other development projects competed for scarce resources.

People also argued that priorities were needed for another reason - to create a sense of urgency. Unless the firm (i.e., top management or the relevant units developing and agreeing on the general direction collectively) is clear in providing a guiding vision, or sometimes even more precise recommendations, it was difficult for people further down in the organization to set priorities and to know how to allocate their time and competence. What further seemed to create problems in this context was the lack of stakes and incentives for all parties. Seldom did all functions and all countries taking part in the project have a substantial interest in the outcome of the venture after it had been transferred elsewhere (if and when this was the case). In the Electrolux cases, future sales of the washer would not affect the Italians, nor would future sales of the water purifier have a financial impact on New Products.

Lack of resources and process “balance”

Our second theme is partly a consequence of the first. It was our impression that since so many projects were launched, and/or the units also had other matters to attend to, some of our IIPs were “under-resourced”. The Alliance case illustrates one danger inherent in IIPs - that of ‘marginalism’; the project may risk becoming insignificant to many of the units taking part in the venture. However, our main point is that often too little time and only limited resources seem to be allocated to the beginning of the innovation process. Also, from the IIPs included in the survey, we know that most resources were assigned to engineering and pilot production
The number of people involved in the beginning and at the end of the innovation process was relatively limited.

![Bar chart showing percentage of people involved in different phases](image)

**Figure 9.2**: Relative number of people involved in the different phases

We believe that since so little time was spent in these initial phases, people often did not get acquainted, and many local "taken for granteds" were not articulated; moreover, a shared interpretation of the task and product concept across functions and nations seldom had a chance to develop. As evident in the M2000 case, a "world-class product", or a "high-end offering", can have many meanings depending on one's location and previous experience. Finally, it is also our impression that the speedy start contributed to problems of distrust, and to the lack of commitment. A danger with a pushed or forced international project may be that the company avoids the NIH (Not Invented Here) syndrome, only to encounter the NIA (Not Invented Anywhere) one. The global project risks becoming "nobody's baby" on a more local level, where the real work needs to be done.

An interesting comparison can be made with studies of product development at some highly successful Japanese companies. There, it seems as if top-management and team members are much more ready to let conception and planning take time. Part of the reason may be the Japanese consensus oriented style of decision making (ringi), which generally demands more time.
A second aspect of staffing concerns the extent to which project members are entirely dedicated to the project. An indicator of dedication, particularly in view of the fact that different activities compete for scarce attention and resources, is the time spent on the project in relation to other duties. For a team to be as autonomous and self-contained as possible, the people involved should work 100% for the project. However, in the four cases, we found few examples of these 100%-ers, who were said to be so critical in speeding up time to market, increasing commitment, and improving communication efficiency and effectiveness. Rather, as outlined earlier, some argued that from a political/power perspective it was better to have many individuals working part-time to be able to “outnumber” the others at meetings, etc. We also asked the project managers in the survey to indicate how many project members worked full-time and part-time, respectively. Figure 9.3 shows that the percentage of people working solely on the IIP varied considerably among the projects studied. On the average, in terms of the total number of man-hours spent to complete the project, the majority stemmed from 100%-ers. On the other hand, some two thirds of the people involved in the "typical" project were also working on other tasks in parallel.

![Figure 9.3: Distribution of people working full-time (mean=.405; median=.333; n=24)](image)

Naturally, there are also less political reasons not to have all individuals working 100% on a project. People have other important duties. The supply of so called “core competents” constitute a crucial bottle-neck. These few individuals often seem to possess knowledge that is unique and critical not only to one particular project. Consequently, the demand for these people is often much greater than the supply, especially when conducting (too) many projects.
in parallel. The problems created in relation to units taking part, particularly those far away and with which there has been no prior collaboration, are indeed great when the turnover of project members is high. Time and effort spent on socialization, which increases information-transfer efficiency by providing less expensive channels of communication, are, if not wasted, at least potentially destroyed by a high turn-over of group members.

What also seemed to create difficulties was the insecurity concerning the location of the future manufacturing site(s) until the actual transfer was to take place. Once again, this problem was most notable in the two Electrolux cases, but also to some extent in the ABB projects. It could be argued that these four projects are rare cases, and that they were carried out at a time when the manufacturing structures were undergoing substantial change after all the acquisitions and mergers during the 1980s. However, we believe that also for other modern multinational companies, and particularly those originating from small home countries like Sweden, this situation may illustrate the rule rather than the exception. Currently, international acquisitions and mergers have become the preferred growth strategies for many MNCs, and the consequent restructuring is normal.

Fragmented conception and design

Another important aspect of any project is the mix of people involved. What appeared to create problems in our IIPs was the relative fragmentation of the efforts, across countries and functions. The first type of problems was related to communication difficulties resulting from the greater physical (and cultural) distance, whereas the latter problems were also closely associated with the conception and definition of what constitutes an innovation project. From Chapter 5 we recall that in some 50% of the survey projects, market-related goals were not incorporated in the project definitions. This fact suggests that innovation projects are often narrowly defined as “technology” projects, or divided into sub-projects.

In the survey, we wanted to know more about the particular mix of people from different functions and countries over time in each international project. Respondents indicated which countries and which functions were involved in each phase. The trend is that the average IIP starts out fairly national and uni-functional, to become more international and multi-
functional in the later phases, although the average number of functions involved drops dramatically in the market-launch phase.

![Diagram showing degree of multi-nationality and multi-functionality](image)

**Figure 9.4: Degree of multi-nationality and multi-functionality (n=10-23)**

As to the specific mix of functions per phase, our principal findings are summarized in Figure 9.5. Although the first two phases were dominated by people from R&D, in some 50% of the cases these worked in parallel with colleagues from other functions. During the product/process-engineering and the pilot-production phases, personnel from manufacturing and R&D generally worked together. The role of marketing became important, at least in quantitative terms, only during the launch phase, when some 2/3 of the project members had this type of functional background.

As indicated earlier, much theory suggests that it is important to involve all the functions, and possibly also principal suppliers and customers, which sooner or later will have to take a more active part in the innovation process, from the very start. Above, we noted that one major reason for so doing may be to increase socialization and commitment, rather than to search for the perfect plan or product specification. In the first chapter, one central assertion was that the difficulties inherent in the international innovation project pertained to the need
to give simultaneous attention to co-ordinating activities across geographical or cultural borders and among different functions or departments. Our impression is that a part-by-part conception, resulting in a fragmented project design, causes many conflicts and the perception that certain types of knowledge are lacking.

![Percentage of people from different functions involved in the innovation process](image)

**Figure 9.5:** Percentage of people from different functions involved in the innovation process

The general impression from the cases was that although problems between countries were perhaps more frequent (partly since problems between functions were avoided and pushed by the absence of continuous inter-functional contact), the most devastating conflicts actually occurred between functions. Table 9.2 suggests that also in the survey companies, conflicts between countries were regarded by the project leaders as significantly less evident than between people from different functions**.

<table>
<thead>
<tr>
<th>Conflicts</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std Dev</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- countries</td>
<td>3.21</td>
<td>1</td>
<td>7</td>
<td>1.86</td>
<td>29</td>
</tr>
<tr>
<td>- functions</td>
<td>4.00</td>
<td>1</td>
<td>7</td>
<td>1.69</td>
<td>31</td>
</tr>
<tr>
<td>- business areas</td>
<td>3.76</td>
<td>1</td>
<td>7</td>
<td>1.72</td>
<td>29</td>
</tr>
<tr>
<td>- project/line</td>
<td>3.26</td>
<td>1</td>
<td>6</td>
<td>1.90</td>
<td>31</td>
</tr>
<tr>
<td>- phases</td>
<td>2.97</td>
<td>1</td>
<td>7</td>
<td>1.68</td>
<td>29</td>
</tr>
</tbody>
</table>

**Table 9.2:** Conflicts between different organizational entities (1-7 scale, 1=low and 7=high)
Moreover, in terms of what competence was perceived as lacking, responses from the project leaders indicated that marketing knowledge was most obviously missing. It scored significantly higher** than the gaps in R&D, project management, and cross-national collaboration competence. Compared to project management skills, competence in cross-functional collaboration was seen as significantly more* absent, a finding consistent with our observation that particularly cross-functional co-operation was perceived as problematic.

<table>
<thead>
<tr>
<th>Competence</th>
<th>Mean</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Std Dev</th>
<th>(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing</td>
<td>3.73</td>
<td>1</td>
<td>7</td>
<td>1.74</td>
<td>30</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>3.00</td>
<td>1</td>
<td>6</td>
<td>1.55</td>
<td>31</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>3.13</td>
<td>1</td>
<td>7</td>
<td>1.68</td>
<td>30</td>
</tr>
<tr>
<td>Cross-national</td>
<td>2.93</td>
<td>1</td>
<td>6</td>
<td>1.36</td>
<td>29</td>
</tr>
<tr>
<td>Cross-functional</td>
<td>3.33</td>
<td>1</td>
<td>6</td>
<td>1.24</td>
<td>30</td>
</tr>
<tr>
<td>Project Management</td>
<td>2.90</td>
<td>1</td>
<td>6</td>
<td>1.27</td>
<td>31</td>
</tr>
</tbody>
</table>

Table 9.3: Perceived competence gaps (1-7 scale)

We believe that three different, but not mutually exclusive, interpretations can be given to these results. First, the relatively limited number of project participants from marketing may explain the perceived absence of this category of competence. Second, the surveys were filled out by the project leaders, who in most cases had a technical background. This fact may explain the relative focus on a lack of "external" competencies, and the relative satisfaction with knowledge in R&D, manufacturing, and project-management. Third and finally, there could be fundamental weaknesses in the sample companies' approach to the involvement of the marketing function in particular, and to cross-functional collaboration in general. In all, even though the IIP involves co-operation across much greater geographical distances than in the local project, it still seems as if conflicts are at least as intense and critical between the technical and the commercial sectors of the companies as between countries.

Insufficient co-ordination and communication

In many of our IIPs it seemed as if the co-ordination mechanisms in place, and the communication mechanisms utilized, did not match the requirements implied by the nature of
the task. Instead, we have argued that the integrative devices at the disposal of the project members were architecturally dependent and reproduced. The available co-ordination mechanisms appeared to determine the interdependencies between units, rather than the other way around. Implied "parallelism" and co-ordination by mutual adjustment were often pushed into realized "sequentialism" and co-ordination by standardization and planning, or no co-ordination at all. Some people in the ABB projects also claimed that these efforts were overly formalized. Since the rules for reporting were so complex, it was sometimes easier not to report problems to anyone, and to focus on working them out locally instead.

Insufficient face-to-face communication was mentioned as a problem generator by many of the people whom we interviewed. We have already maintained the importance of socialization during the early stages, but more continuous personal contacts also seem critical. There appear to be a number of reasons. First, as the outcome of the process is not given, and knowledge-creation processes across space are often called for, participants need to interact in iterating problems and solutions. Second, since it proves quite difficult to apportion tasks in a orderly and clear way, it may remain uncertain as to who should do what, far into the process. People argued that they continuously needed to sit down together to sort these matters out. Third, face-to-face communication of a more continuous nature seems particularly important when the turnover of project members is high. This situation necessitates a constant process of re-socialization across borders as time passes, in order to allow other communication mechanisms to function as well.

When cross-border interaction did take place, two factors seemed to limit the efficiency of these meetings. First, they were often limited to a few senior executives, rather than involving personnel on levels at which specific action and interaction took place; seldom was co-ordination forceful at the low and intermediate levels. Second, and partly as a consequence of the above, meetings seemed to focus on plans, rather than on problems. The few top managers who traveled internationally were constantly on the move. Moreover, at least in the Electrolux cases, some of them were involved in more than one project. To handle all issues, they needed to keep a tight schedule, and plan when to meet in the different co-ordinative bodies. We believe that this factor may in part explain why so few cross-border meetings were held. The time of those in charge of co-ordination constituted a crucial bottle-neck.
Finally, **information technology** was not always used as much as people would have liked to see. We may recall from Chapter 6 that only in a minority of the survey projects were these devices utilized. On the other hand, those that did use IT mechanisms found them very useful. Nevertheless, we would like to re-emphasize that it appears as if these mechanisms should be treated only as complements to more direct communication channels, such as traveling and co-location. It seems as if they can only be used for certain types of information, and in less iterative processes. Perhaps, one reason why IT was used to such a limited extent in our cases and survey, apart from the novelty of some of these mechanisms, was that a number of the case projects were among the first attempts to co-operate internationally. Thus, as firms and individuals become more accustomed to working across international borders, the significance of IT-based communication may increase, in terms of both frequency of utilization and perceived importance or utility.

**Discontinuous process**

Above, we touched upon problems created by the high turnover of project members. Taken as a whole, the innovation process in some of our cases is perhaps best described as discontinuous. However, in our view the high turnover of “ordinary” project members is only one of the causes; a number of other factors were also important. First, at least in the Electrolux projects, problems arose because some of the top managers who had promoted the projects initially were subsequently separated to a large extent from actual development and the commercialization process. This statement needs two qualifications. To begin with, these top managers were not necessarily detached because they were no longer interested in the ventures, but rather because they also had other duties, sometimes in connection with promotion to new positions as the IIPs proceeded. Regardless of explanation, these executives could no longer be present to: a) provide legitimacy, b) protect the projects from others trying to recover resources (for the line or for other projects), and c) to encourage and challenge project management and members to excel. Consequently, the projects lacked **continuous support from top management**. Particularly in those cases in which the IIP was partly an effect of the “top-management-push” processes described in Chapter 4, this sort of sustained nourishment appears crucial. It is also interesting to note that in the two ABB cases, it was easier to find continuity in top-management support, perhaps as a consequence of the smaller
operating units of this firm, compared with those of Electrolux. In effect, from the very beginning these managers were located “closer” to the projects. The two ABB projects were vital to the survival of the respective business areas, and therefore also to senior BA management, to an extent that did not seem to be the case with the two Electrolux projects.

Our second observation is that a high turnover in the core group of people and in the project-leader position throughout the process, contributed in causing problems. Not only were coordination and commitment more difficult, but no one appeared to be responsible for the totality of the project. Thus, few people were charged with ensuring that linkages were established to produce the best end-result for the future customer. It was also our impression that fragmented leadership had a tendency to yield solutions in which “local” change was minimized, or in which someone else could always be blamed. Moreover, the lack of continuity sometimes led to the same mistakes being made twice. When drawings or product concepts were transferred to entirely new groups, it was perhaps less difficult to convey knowledge of what worked and why, than to communicate experience about what did not work. This latter phenomenon was perhaps most notable in the 3rd-tap case when the water purifier was transferred to Torsvik.

Finally, the international projects at Electrolux were not protected against reorganizations of the overall firm. We have already touched upon the issue of promoting “fiery spirits” and critically important team members or managers to new positions. Not only the mobility of these individuals seemed to matter, however. The two Electrolux cases also illustrate the effect of sudden changes in the overall asset and administrative structures. The acquisition of AEG and the consequent transfer of dishwasher production from Torsvik to Germany appeared to have a direct impact on the 3rd-tap project. This situation also showed the difficulty for a new organizational entity to operate without “owning” any substantial physical resources (primarily factories). To a certain extent, Home Comfort was at the mercy of the others. Unexpected changes elsewhere also forced them to constant re-directions. The Alliance case depicts the consequences of the overall shift at Electrolux toward a triad type of formal configuration. Consequent changes in also other administrative structures, at least in part, appeared to be the immediate cause of the transfer of production from Canada to the
USA. International projects like these seem carried along by the overall architectural current, and are at worst dragged down into the depths by it.

**Weak and unclear leadership**

Related to the point discussed above is our observation that in some cases leadership of the processes seemed clearly inadequate. Leadership was not only discontinuous, but also often split and sometimes “surrounded” by other and more powerful actors. Both the Holger and the 3\textsuperscript{rd}-tap projects had at least one technical and one “managerial” project leader. All project leaders were encircled by a variety of other integrating bodies in which often the most important decisions were taken. In fact, some of the project leaders were only called coordinators. Current research supports the view that a powerful project leader, sometimes termed a “heavyweight”, is critical in bringing about success in innovation projects. We believe that in these international efforts, it is especially important that the project manager even have “sumo” qualities and extensive responsibilities. The international project leader not only has to “defend” the project against line management in the same country, but sometimes also against country- and/or functional management located elsewhere.

Somewhat more particular for the international context is the second point on leadership. In our view, problems arose when the project was not given a strong location. It seems as if project leadership, in a geographical sense, was not always determined on the basis of the unit’s competence or ”clout”, but in certain cases as compensation (for the removal of other responsibilities), to meet an overt commitment, or merely designed according to available (manufacturing) capacity. This finding would also imply that roles in the MNC, more generally, could be assigned, assumed, or allocated by a less “rational” approach than ordinarily recognized in the literature. Important to note are some of the consequences of these procedures. The Alliance case provides an illustration in the form of the difficulties experienced by the Canadian unit in managing the Italian and US personnel, who had more critical assets, and consequently more organizational power.
Weak development architecture

Our final overall theme relates back to our first major point, in that the overall systems and routines for managing product development appeared to display certain flaws. We will refer to these combined procedures (or the lack of them) as the firm’s development architecture. First, these systems were often complex and diverse, rather than simple and shared. We sometimes found organizational entities in which several different development tools, maps, gateways, etc., existed at the various local units. Consequently, each unit had its own formal way of framing the process. Some procedures were almost too complicated to be practically applicability. For instance, a particular development map at one unit which we visited measured 2x3 meters, or roughly 7x10 feet. Particularly in the case of multinational, problems appear likely unless the systems are simple enough to allow for a common interpretation across geographical and functional boundaries.9

Our second point relates to the need for establishing learning mechanisms. We think two points are relevant to raise in this context. Securing learning within, between, and beyond projects was often not considered as important as people would have wanted, and therefore sometimes no mechanisms to enable learning at levels other than the individual existed. Personnel at both ABB and Electrolux were eager to use their experience to improve future development performance. We believe the willingness of these companies to let us study IIPs and to feedback information to them illustrates this statement; it also shows the sincerity of these firms in their efforts to learn. However, since all four in-depth cases were among the first international projects within these organizational entities, there was a lack of effective routines for leveraging the knowledge accumulated during the process. Most learning seemed to take place at the level of the individual manager or project member. There were few organized efforts to bring together the experience gained, so as to formalize the project’s “legacy” to the rest of the organization. Moreover, in none of the projects was “learning” a mandatory issue on the agenda for major meetings during the process. Below, the major points are summarized.
<table>
<thead>
<tr>
<th>General problem issues</th>
<th>Examples in the cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of organizational linkages and procedures</td>
<td>- Lack of clear priorities&lt;br&gt;- Organizational resources do not match commitments&lt;br&gt;- Little sense of urgency and commitment&lt;br&gt;- Unsystematic screening process&lt;br&gt;- Unclear stakes and incentives for all parties involved</td>
</tr>
<tr>
<td>Lack of resources and process “balance”</td>
<td>- Little time and effort spent in the beginning&lt;br&gt;- No shared interpretation developed&lt;br&gt;- Few 100%ers&lt;br&gt;- Uncommitted and drifting manufacturing unit(s)</td>
</tr>
<tr>
<td>Lack of aggregate conception and design</td>
<td>- Part-by-part definition of process&lt;br&gt;- Primacy of “technical” goals&lt;br&gt;- Few functions (as well as key suppliers and customers) involved during conception and development</td>
</tr>
<tr>
<td>Lack of forceful co-ordination</td>
<td>- Few new co-ordination mechanisms added&lt;br&gt;- Limited face-to-face communication&lt;br&gt;- Weak co-ordination at low and middle levels&lt;br&gt;- Plan-determined meeting schedule&lt;br&gt;- Limited utilization of information technology</td>
</tr>
<tr>
<td>Lack of process continuity</td>
<td>- Temporary commitment from top management&lt;br&gt;- Few participants throughout the entire process&lt;br&gt;- Many project leaders throughout the process&lt;br&gt;- Project not protected against overall reorganizations</td>
</tr>
<tr>
<td>Lack of strong and clear leadership</td>
<td>- Few project leaders with “sumo” responsibilities&lt;br&gt;- Leadership located on the basis of commitment alone</td>
</tr>
<tr>
<td>Lack of a strong and cohesive development architecture</td>
<td>- Few systems that are strong, shared, and simple&lt;br&gt;- Absence of corporate-wide common &quot;language&quot;&lt;br&gt;- Little learning within, between, and beyond projects&lt;br&gt;- Little learning at multiple levels</td>
</tr>
</tbody>
</table>

**Figure 9.6:** Principal problems in IIPs

Much of our analysis on critical problems may not be very surprising. Many of these problems are discussed in most textbooks on innovation and project management. This fact is interesting in itself. International innovation projects do not seem that different. The greater physical and cultural distances appear to aggravate some of the problematic issues, and add some new issues as well. The difficulties encountered are sometimes great, but in our opinion they are not insurmountable. Moreover, since the four in-depth cases were pioneering attempts at two multinational companies with polycentric pasts, and newly formed asset structures, one would probably expect the international issues to be most prominent and urgent during the period when these IIPs were in progress.
Underlying sources of problems

Ideally, the IIP could be considered a superior mechanism for “cherry-picking” the best practices from all over the MNC. Thus, the best people, the most suitable routines, the most appropriate leadership styles, management systems etc., for particular tasks, could be brought in from anywhere in the firm to form one common project. During this process, knowledge would be created and leveraged across functional, national, and hierarchical borders, resulting in both increased depth and geographical dispersion of the company’s knowledge base. Accordingly, IIPs could be regarded as the international vehicle for knowledge transfer, transformation, and learning in the global firm. However, in our judgment, there exists a number of powerful restraining forces against this type of global learning to take place, at least for the time being and at the firms where we studied these processes in more depth. The types of problems which we would like to highlight pertain to the different cultural groupings taking part in the venture.

Boundaries to learning and knowledge transfer

A number of factors appeared to hinder effective cross-border learning and knowledge transfer during the processes. The factors worked as boundaries both in the sense that people did not always transfer critical knowledge, nor did they regularly interpret or try to incorporate knowledge transferred from others, although it would seem “rational” to do so from an organizational or project logic. As we see it, people frequently tended to retreat to either their functional/professional culture, or their national culture, or both, and to use these rationales when framing problems and solutions. As noted earlier, our interpretation of this phenomenon is that the problems generated by the “functional split” between individuals were at least as severe and common as those posed by differences in national culture. The following five factors - not necessarily in order of importance - were some of the more critical impediments to knowledge transfer in the IIPs which we studied.

First, problems related to language differences seemed to obstruct the learning process. Of course, the fact that people from different countries needed to communicate without speaking the same native tongue could make things troublesome. However, since most people handled
English fairly well, these problems could usually be solved. Worse effects seemed to be caused by the distinctive languages of the technical and commercial sectors, respectively. As noted before, the differences in terminology between the two professional categories created barriers, which from time to time appeared to block meaningful exchange of information.

Second, "territoriality" was an impediment to learning. Involving someone else more directly in a certain sub-process, could also mean giving up the preferential right to frame the issue, primarily in the short term but perhaps even more in the long term. As has been shown, the framing of issues was primarily a sequential process by function and over phases. The process started with R&D, whose personnel often seemed unwilling to let their marketing colleagues take part, fearing for their right to define the relevant problems and solutions. A joint interaction process would probably also prolong the conception and planning phase, and make the work of the technical staff more difficult.

Third, units and individuals sometimes seemed reluctant to transfer information to others since they feared the loss of the opportunity to exploit this knowledge themselves, or the possibility that the others would look better in relation to them. We refer to this factor as the preference for local harvesting. In general, it appears as if those possessing or controlling critical information would like to keep it, since this knowledge can be regarded an option on future revenues or benefits. Therefore, as long as the transfer was not rewarded, there was a tendency for knowledge to remain where it was, rather than being transferred internationally or cross-functionally.

Fourth, exchange of knowledge was inhibited because people were not always sure about whom to transfer information to, or who possessed the type of information they needed. Not only was the location of those demanding and supplying knowledge often unclear; individuals sometimes did not even realize that their information could be put to (better) use somewhere else, or that someone else had information that potentially could help them. Consequently, the knowledge base of the firm was used in less than ideal ways. These problems appeared particularly serious when the transfer of knowledge would have crossed functional (or professional) and geographical borders simultaneously, as in the Alliance case.
Fifth, and as argued earlier, information was sometimes subject to value judgment and seemed to include an affective component. Consequently, emotions sometimes hindered learning. Information was given a subjective interpretation by those receiving it, who appeared to give their own solutions or views preferential treatment. If someone presented a contesting idea, people often did not seem to interpret it fairly, without bias. Differences in opinion could turn into matters of prestige. Alternatively, people were not interested in listening since they already had a solution that was satisfactory in relation to their own goals. This factor could block learning across functional as well as national boundaries.

The nature of problems in IIPs

Thus, even though IIPs could be considered an excellent vehicle for utilizing the potential of dispersed and complementary assets, a number of significant obstacles to the effective management of global knowledge-creation and learning appear to exist. However, if so many of these problems were to be expected, and the approaches to managing them are relatively well known, why do they still cause difficulty? The interesting question is why people behave as they do in organizations? As we see it, the problems that occur are not necessarily due to poor management but more likely to intricacies at the general organizational level. We believe that the organizational architecture, and the propensity to reproduce it during the new international innovation process, may account for many of the problems encountered. In addition to the themes presented in the previous chapter, we want to highlight the difficulties caused by: a) differences in logic of action and "thoughtwords" across functional boundaries, and b) the simultaneous pursuit of exploitation and creation in firms.

Local logics of action over global logics of action

As argued in the previous chapter, people seem subject to both a general psychological rationality, and a more specific locational rationality. The former led to a preference for solutions in which uncertainty, complexity, and conflicts could be avoided; and the various logics of the latter type could sometimes collide, i.e.; seemingly irreconcilable differences in interests and goals appeared to exist across the organizational landscape. In our opinion, the strongest local logic in our cases, and the one creating the more critical problems, was the
functional one. The survey data also seem to support our view. As has been argued before, there are a number of reasons why the functions of a firm may follow disparate logics of action. First, these can based upon differences in geographical location patterns. In both case companies, R&D is relatively concentrated and marketing fairly dispersed, with manufacturing somewhere in between. One consequence was that the functions followed quite different rationales when specifying requirements for a new product. In general, marketing wanted to adapt the product to local needs, whereas R&D and manufacturing appeared more interested in international standardization. The differences between the functional logics sometimes made the behavior of individuals from other departments seem "irrational". Often, people did not realize that from the logic of the other function, the behavior made sense.

A second problem in involving people from more than one function or country relates to the different thoughtworlds of people, primarily those from the marketing and the technical functions, respectively. Distrust appeared to exist on both sides of the functional/professional border, and 'language' differences contributed in pushing people further apart. The prevailing thoughtworlds of course have many roots and are reinforced by the configurations of both ABB and Electrolux, which are best described as "multi-unitary", at least at the level where the work is actually performed. The limited rotation of personnel among functions in these organizations also contributes to alienation. Moreover, the apparent lack of truly multifunctional teams with continuous interaction may further cement the differences. These attitudes of negative stereotyping naturally worked as barriers to cross-functional learning and knowledge transfer. The different functional logics are more or less inherent in a hierarchical architecture which separates these departments. It may be argued that this specialization of labor is beneficial in many cases, but we believe that international innovation processes may constitute an exception to this rule. In sum, the fundamental cause of the problems observed may be that an architecture of static division was applied on a process requiring dynamic (re-)combination.
Exploitation over creation

The second underlying source of critical problems is the built-in resistance to the unknown and the uncertain in all organizations. The outcome of creation-oriented processes, such as IIPs, is less certain, more remote in time, and less obvious than with exploitation. In the short-run, adaptive processes generally improve exploitation more rapidly than creation, since the feedback loops of exploitation are quicker and more precise. The long-term consequences are that exploitation over time crowds out creation, unless countervailing forces are brought to bear. Finally, there is also evidence suggesting that the senior personnel of the administrative hierarchy have reached their positions on the basis of their knowledge in areas historically constituting the primary capabilities of the firm. There appears to be a danger in that the core competencies of the past can turn into the core rigidities of the future. Top managers may want to preserve the status quo, not to lose one of their power bases.

Still, most organizations need to uphold a fruitful balance between activities of exploitation and of creation, to ensure both short-term and long-term survival. Therefore, effective management of innovation oriented activities in general, and IIPs in particular, also becomes a question of how to design the overall structures of the MNC. Companies need an architecture which can harbor both types of processes. However, activities of exploitation and creation, respectively, seem to pose very different demands on the organizational architecture of the MNC. These inconsistent requirements are captured in several dichotomized models of organizations, such as in those describing mechanistic and organic solutions, and in those discussing bureaucracies and ad-hocracies. The predominant idea of the distinctions made in these contingency like frameworks has often been that the nature of the environment, e.g., in terms of uncertainty, complexity, change, etc., determines the appropriate strategy and structure. (Structure is generally used in a more narrow and positional sense.) We suggest that conflicting requirements are found more often than not, and that they are also internally contingent on the dual demand for the exploitation of givens and the creation of novelty. This paradox faces all organizations, almost irrespective of environmental characteristics. The traditional architectures of both Electrolux and ABB display more similarities with those focused on exploitation. In sum, the roots of the problems observed may be that processes demanding creation were conducted in an overall architecture of exploitation.
Summary of the chapter

In this chapter on the management of international innovation projects, we have focused on two subjects. First, we have discussed IIPs in terms of performance. Second, we have tried to outline and analyze the most serious practical problems experienced in our cases, and to elaborate on the underlying sources of these problems.

In terms of performance, we argued that the four case projects could be regarded as successful, in that they all managed to develop and launch the products for which they were established. It seemed as if the projects performed better in technical terms, than in terms of time and financial aspects. The survey data suggests that international participation leads to higher motivation, international networking, knowledge, and creativity, but also to communication difficulties. The products tends to come out well in terms of quality and performance, but the process takes more time and is more costly. As for longer-term effects, internal acceptance seems to increase, as does organizational learning.

Seven major problem areas were identified. First, we often found weak organizational linkages and procedures related to decisions on whether or not to initiate projects. Clear priorities were lacking, and available resources were not matched with commitments. Consequently, a sense of urgency and commitment was sometimes missing, as were stakes and incentives for all parties, at all levels. Second, the projects appeared to suffer from insufficient resources, and the process was "unbalanced" over time, as the beginning was often rushed. A shared interpretation of the project concept was seldom developed. Few participants devoted 100% of their time to the project, and the future manufacturing location was not committed at an early stage. Third, the IIPs were often marked by a fragmented conception and design, splitting the process into two projects, one for development and one for commercialization. Not all relevant functions, or all critical suppliers and customers, were involved from the start. Fourth, too little co-ordination and communication characterized the projects. New integrating mechanisms were seldom introduced, little time or resources were spent on face-to-face communication. Work was often not co-ordinated also at the intermediate and lower levels of the project. Moreover, the meeting schedule tended to be determined by plans, and IT was not utilized as much as people would have wanted. Fifth, the...
innovation process was often best described as discontinuous. Continuous commitment from top management was rare in some cases, and the turnover of members on the core team was often high. The projects sometimes changed project leader, and the team was not protected against the impact of overall corporate reorganizations. Sixth, project leadership was occasionally weak and unclear. Project leaders with "sumo" characteristics and very extensive responsibilities were rare, and leadership was sometimes allocated on the basis of compensation, capacity, and commitment, rather than competence and clout. Seventh, the development architecture of the companies appeared to be inadequate. Systems were often weak and not shared. Finally, few mechanisms for assuring learning within, between, and beyond project(s), at multiple levels, were introduced. Most of our problems and suggestions are perhaps not surprising; this observation is interesting in itself. In international innovation processes, the same problems found in more local projects may be aggravated, and some new ones encountered. Nevertheless it does appear possible to manage IIPs.

These international processes could potentially be regarded as a superior vehicle for "cherry-picking" the best practices from all over the MNC. However, there are also a number of strong obstacles to learning. These inertial forces seem to be at hand on both the level of the project and that of the overall organizational architecture as such. A number of problems were linked to differences in logic of action, which functioned as barriers to knowledge transfer and global learning across functional and/or national boundaries. First, "language" differences appeared to obstruct learning. Second, "territoriality" obstructed the exchange of knowledge. Third, units sometimes tended to prefer "local harvesting" to the international transfer of knowledge. Fourth, the location of those demanding and supplying knowledge was occasionally unclear. Fifth, there was sometimes an emotional block to effective cross-border learning. The most relevant question, however, is that of why problems occur? In terms of underlying sources, we suggested that: a) local logics of action interfere with more global ones, and b) the simultaneous pursuit of creation and exploitation is problematic. Exploitation tends to crowd out creation, and the two forms of activity pose very different demands on the organizational architecture of a firm. Therefore, successful management of IIPs is also contingent on the design of the entire MNC.
Notes to Chapter 9

1. More normative approaches to managing the critical problems inherent in IIPs can be found in Hedlund and Ridderstråle (1996).

2. One of the more better known models can be found in Wheelwright and Clark (1992).


5. For instance, see Takeuchi and Nonaka (1986), and Wheelwright and Clark (1992).


7. At least if one is to believe some popular stories about innovation at a few highly prosperous companies in Japan and elsewhere, the role of top management figures prominently as a critical variable in explaining success. For instance, see Fortune, February 24, 1992, for an article on how Sony innovates.

8. For instance, see Bartlett and Ghoshal (1989).

9. One example of such a system was developed at one of the companies after our research had been completed. On a more general level, this product-development manual sought to translate a) company visions and values, b) customer needs and expectations, and c) major environmental trends and changes, into a business strategy linked to an integrated development approach. The latter contained a technology and a product-market strategy, as well as a technology- and a product-generation plan brought together in a product portfolio with both short-term and long-term implications for resource management. On a more detailed level, a number of check points related to specific purposes and project status reports were developed. In the initial phases of the development process, there would be targets for certain defined requirements of: a) functionality, b) manufacturability, and c) developability. For later phases, the manual included elements to assure process continuity and minimize changes, in terms of having a dedicated project leader, a core team etc.

10. See Twiss (1986), and Cleland (1994), among others, for an outline of project management models. In a recent review of the literature on product development, Brown and Eisenhardt (1995) emphasize that contemporary research agrees on a number of principal findings. To run successful projects it is critical to have a strong project leader and involve suppliers and customers at an early stage, and quite extensively. Moreover, most scholars argue for the importance of establishing a cross-functional team, which communicates intensively internally as well as externally. The supporting role of senior management is also highlighted. Finally, it is also a common assertion that the characteristics of the product concept, in relation to market needs and firm competencies, have an impact on project performance. All these results are in line with our findings. The key question for us, however, given these almost commonsense observations, becomes that of why firms do not do the "obvious".

11. In recent years, ideas of knowledge management and the organization as a learning system have attracted an increased interest. These concepts are anything but unproblematic, however. First, we can distinguish between learning and knowledge-transformation processes at different levels, from the individual, to the group, to the organization, or even in the inter-organizational domain. One body of research argues that only individuals can learn, while others hold that learning-processes are also at work on supra-individual levels (see Simon, 1991). Second, the interpretation of these processes and their outcomes is not indisputable. Some scholars suggest that most learning is ambiguous, since; a) what really happened is not clear, b) why it happened is not clear, and c) whether what happened should be interpreted as positive or negative is not very clear (see March and Olsen (1976: 59). Third, we can distinguish between different types of learning. One common distinction made in the literature is to classify learning as either incremental or revolutionary; according to whether the learning reinforces or breaks with the existing way of thinking and operating. This assumption is implicit in the framework of Argyris and Schon (1978). In reality there seems to be more of a continuum than two separate categories.

13 See Dougherty (1992), and Bowen et al (1994), for a discussion of the “thoughtworld” concept.


16 Ibid.


18 Parts of these arguments are further developed in Hedlund and Riddlerstråle (1992).

19 See Burns and Stalker (1961).

20 For the original outline of bureaucracies, see Weber (1947), and for an outline of adhocracies, see Toffler (1970), and Mintzberg (1979).

21 Lawrence and Lorsch (1967) are most representative of this view, whereas Woodward (1965), Thompson (1967), and Perrow (1967), are more internally focused.
CHAPTER 10

DESIGNING THE MODERN MNC
- Toward a new organizational architecture

Introduction

In this final chapter we will extend our discussion of innovation and self-renewal in the multinational firm to include the organizational level. Admittedly, this chapter will be more speculative than the previous ones. Nevertheless, we do believe that a number of interesting points pertaining to these issues can be found in our empirical material. So far, one of our main arguments has been that international innovation processes in MNCs are heavily influenced by the organizational architecture of the firm. Thus, assuring successful IPP performance is not only a question of managing the project itself, it is also subject to the general conditions provided by the organizational structures of the past and the present.

Previously, we have emphasized the importance of the fact that structures supporting functional specialization and global exploitation can at the same time hamper creation-oriented activities, such as product innovation. Consequently, those multinational companies seeking to combine exploitation and creation will need a type of organizational architecture that facilitates and can harbor not only one or the other type of activities, but both. In the following discussion, we will seek to elaborate on the nature of the organizational architecture, and to outline one possible future architecture for the modern multinational.

The nature of the organizational architecture

In Chapter 8 we outlined the basic properties of architectural dependence. Here we will add to the discussion three other, and related, ideas on the nature of the organizational architecture.
First, we will introduce the idea of the architecture as a selection regime leading to inertial learning. Second, we will describe the organizational architecture from an evolutionary perspective, and discuss architectural path-dependence, and organizations as a semi-open systems. Third, and finally, we will consider the concept of architectural equilibrium and the complementarity of organizational structures.

**Architectural selection and inertial learning**

One possible implication of our principal argument under the description of IIPs is that the organizational architecture may be viewed as a selection regime. Population-ecologist scholars speak of evolution as processes of "variation-selection-retention-modification". Mostly, these authors refer to a higher level of analysis, i.e., populations of organizations, although a few researchers have also tried to apply this framework on the level of the firm.2 Once again, consider the cases of ABB and Electrolux. The major acquisitions and mergers of the late 1980s gave rise to radical changes in the asset structures of these firms. The changes provided the conditions necessary for structural variation to occur. New problems/solutions arose almost automatically as a consequence of duplication of resources, or the lack of intended specialization. Alternatively, old solutions could be applied to new problems, as these were now simultaneously linked within the same system.

In our opinion, selection was largely an effect of the architecture of the organization, and it occurred incrementally throughout the entire innovation process. As noted earlier, these structures appeared to affect search activities in general, but also more specifically, the determination of which ideas moved into planning and development, the definition of the process, as well as the division of responsibilities and the co-ordination mechanisms in place. In effect, we suggest that the organizational architecture, rather than the environment or the individual manager, acts as the selecting mechanism, although organizational members are left operating within different ‘zones of interpretation’. Retention and modification signals can be envisioned as outcomes of the innovation process, in learning terms at least. Throughout the process, and after the project is terminated, information is automatically fed back to the organizational architecture. Let us use the following illustration of these processes to look at four different potential outcomes.
Retention

Modification

Organizational architecture

Success

Failure

Project

Figure 10.1: Organizational feedback in international innovation processes

On the assumption that the outcome of certain events, or the entire innovation process, can be interpreted as either a success or a failure, and that the result can be linked to the organizational architecture, the feedback loops in each case can take the form of either retention or modification signals. In the figure, dotted lines represent incremental or single-loop learning, whereas continuous lines symbolize more revolutionary or double-loop learning. Our premise is that incremental learning will generally work as retention, reinforcing existing structures. Thus, although people may judge the project as a failure, they will tend to blame either the specific situation or someone else, rather than question the existing routines or other organizational structures. A typical response in the case of IIPs would be to blame all the problems encountered on the international aspects, instead of analyzing the applicability of existing structures to the new situation.

We suggest that modification signals will require more revolutionary types of learning, irrespective of project outcome. In cases in which the project is deemed a success, people will generally not push for further improvements of the organizational architecture. Moreover, in cases of failure, attribution of poor results will generally not be linked to misread interdependencies, or to a lack of co-ordination mechanisms enabling mutual adjustment etc., and thus will not later lead to changes in overall structures. The proposition is that strong inertial forces exist against changing the organizational architecture, and that only the interaction of several conditions permitting more radical learning can lead people to question the existing ways of operating, particularly in more radical ways. In cases of project success, we believe architectural attribution will prevail, whereas failures will generally be followed
by situational attribution. Thus, organizational learning will not happen automatically. Indeed, we argue that architectural selection will tend to preserve the status quo, and that the learning process must be actively managed. Organizational learning takes place, but mostly within the domains provided by the architecture.

Architectural path dependence and organizations as semi-open systems

Our ideas of inertial learning and attribution of poor results to exogenous factors are not new. Still, we do believe that our study strengthens the argument that organizations are captives of their past. A relevant question is whether organizations are to be considered as closed or open systems, and if organizations can in fact change. From a theoretical point of view, the open-systems perspective would emphasize the importance of the environment. Here, the contingency line of research would claim that successful firms adapt to the environment when new challenges are presented, whereas population ecologists would point out that environmental changes select which companies survive, since firms are characterized by inertia and can hardly adapt. Representatives of a closed systems view would probably argue that organizations are autonomous systems of interaction, making reference only to themselves. Change is then largely the consequence of random action.

However, rather than viewing these propositions as mutually exclusive, we believe on the basis of our empirical material that organizations are neither totally open, nor entirely closed. Change is neither without friction, nor impossible. Organizations thus appear to be ‘semi-open’. Out of all the possible interpretations that could be given to task uncertainty and to knowledge-creation requirements, in our view the majority of managers will most likely give the situation an interpretation which fits their enactment of the past - their experience-based recipe of what works and what does not - and apply solutions quite similar to those used before. However, external chocks, or the introduction of new elements into the system, may lead managers to question existing routines and other aspects of structure. Therefore, we believe it possible for management and other organizational members to change the architecture - to break free from the structures of the past.
Consider the case of Percy Barnevik, who joined ASEA in 1981, thus introducing an element of variation in the system. Taking over a company of engineers and administrators, together with his fellow managers he succeeded in spreading a more customer-oriented message throughout the firm by “over-informing” his colleagues. An increased emphasis was put on R&D activities, as well as on new-product and market development. The new matrix organization was established. Staff was dramatically cut, and decision-making, together with profit and loss responsibilities, was radically decentralized and dispersed throughout the firm. At this time, new units were being added through the merger with Brown Boveri and through the numerous acquisitions, while businesses that did not fit the future vision of ABB were being divested.

This kind of “re-engineering”, i.e., initiating and implementing changes in the overall structures of the firm, to some extent transformed the architecture of the organization. However, after having studied the history of ASEA we interpret most of these changes as logical and consistent with the structures of the past, i.e., change and architectural evolution were path-dependent. Furthermore, particularly norms and belief structures, as well as organizational routines, appear extremely difficult to alter in more radical ways, and to change during a short period of time. Here, learning also means unlearning the recipes and solutions of the past. The process becomes one of internal “creative destruction”, destroying what previously constituted the basis for the competitive advantages of the firm.

Architectural equilibrium and the complementarity of organizational structures

Although management can and does try to rejuvenate firms, the process is anything but swift and frictionless. The present advantages of the firm are embedded in the organizational architecture, so that change often means killing the “geese that lay golden eggs” before they starve or are killed by competitors. As noted earlier, there is a risk that the core competencies of the past will be transformed into the core rigidities of the present and the future. Initiating and implementing change is especially difficult, since aspects of timing and sunk cost in the historical organizational architecture also come into play. In our view, the structures are nested, and often mutually supportive. Strong forces appear to drive organizations toward “architectural equilibrium”.
Let us illustrate our argument with a theoretical example on the use of competing routines for innovation. (Our reasoning also applies to other components of the organizational architecture.) Company A is using the X routines for developing new products, and is highly skilled in doing so. The entire organization, including its other structures, are adapted and accustomed to these routines. Concurrently, competing firms elsewhere in the world have started to use a new type of routines (Y) for developing products. In recent years, these firms have been more successful than our company A.

Now, the management of company A wants to imitate these new routines for innovation. Apart from the obvious difficulties associated with finding out specifically how the routines work, and in assimilating them without losing valuable information, management realizes that although the Y routines are more effective than the X routines (given identical experience and efficiency in following them) company A has invested heavily in the X routines. All their other structures support the use of these routines, and vice versa. Thus, when in equilibrium, the structures inherent in the organizational architecture are mutually supportive. The sunk costs of this entire arrangement must be taken into account when altering parts of the architecture.

As is illustrated in the figure below, all other things being equal, a shift to the Y routines would mean that product development would take longer time and cost more money, at least for some time, until the company has moved further down the learning curve and adapted the other structures of their architecture to conform with the new routines. Still, the company knows that long term they will continue to lose out to their competitors unless they adopt the Y routines or develop (alternatively imitate/assimilate) a new type of routines which are even better. In our opinion, there are more fundamental implications of changing the nature of a company's organizational architecture. Paradoxically, while radical changes in one structure may cause architectural disequilibrium and decrease the performance of the entire system, more incremental change efforts may be entirely blocked by the other structures. In the end, system-wide changes may be required.
Figure 10.2: Development time and cost using different routines for innovation

A new organizational architecture...

The modern MNC is operating in a time of rapid technological change and convergence. These firms daily have to face the pressures of increased and more global competition, while simultaneously trying to capture the attention of customers with ever higher expectations about new products. As we have noted, all these forces pose considerable challenges for the creation of a new and more effective organizational architecture. Currently, it appears to be a common assertion that the future MNC should be radically decentralized. For the long-run survival of the firm; strategic assets must be geographically dispersed, yet also globally coordinated, and regularly employed in creation-oriented ventures. However, if we are to understand the nature of a possible new organizational architecture, we must move beyond these sweeping descriptions.

One of the most important problems in managing complex organizations like the MNC, and innovation activities in particular, is the management of part-whole relationships. The main objective is to find a design in which the whole is greater than the sum of its parts. If we posit that the modern MNC can only survive if it out-innovates its competitors and creates temporary monopolies which allow for above-average profits, the basic notion of division as the primary design principle can at least be questioned. In Chapter 8 we suggested that in an innovation process, interdependencies between two or more units are; a) created, not given, b)
multiple, rather than of one type, c) changing over time, not stable, and d) subjectively interpreted, instead of objectively given. Since the output of these development processes is neither certain nor predictable, and the overall operating system can not be pre-specified, decomposition into an increasingly complex hierarchy may not be the obvious solution for the future MNC. Rather, the new realities seem to call for a design that allows for self-organization and spontaneous co-ordination to take place. Let us view the modern multinational as a complex system characterized by: a) unpredictable behavior, b) a multitude of interactions and feedback/feedback loops, c) diffused decision-making capabilities, and d) irreducibility, rather than decomposability. In such a system hierarchical solutions risk breaking down. 15

As a reaction against the inclination to consider the hierarchical principle of decomposition as the only conceivable method for organizing, a number of scholars have started to view the “organization as a brain”16, rather than studying the “brain of the organization” - i.e., management at the top of the administrative structure. The brain has been compared with a holographic picture, in that the parts reflect the whole.17 The call for holographic and more flexible design elements, for integrating units, and for people performing both activities of exploitation and creation, presents a number of consequences for the structures which make up the organizational architecture. It lies beyond the scope and ambition of this dissertation to outline a fully-fledged model of a possible future multinational firm. However, we would like to highlight a few tentative ideas which evolved during the course of the study. Above, we suggested that changes in the entire architecture may be needed, since the existing structures are mutually supportive, provided that they are in equilibrium.

Changes in the administrative structures

In our opinion, the new realities necessitate that the significance of the traditional administrative hierarchy be restricted to one of primarily symbolic positions. It becomes a home to which people can return, a map of people and units.18 What is critical in our view is that the formal structure be kept as simple and unambiguous as possible. By "simple and unambiguous" we mean intelligible and clear for those working in the company, not necessarily from the outlook of top management. Efforts to solve all organizational problems
by constantly re-arranging “the boxes and arrows” may cause more harm than good, as they could confuse the rest of the organization about the overall intentions of the top-management team. The impact of the configurative differentiation of roles should not be neglected, however. At both ABB and Electrolux it was clear that the historical and present formal structures sent strong signals to the organization, and contributed in distributing power asymmetrically across functional and national boundaries. In the future, we believe that this formal positional structure will (or should) have rather little to do with the management of the creation-oriented work-processes in the organization. It does not allow for the flexibility and ‘lateralism’ required. However, the sponsoring and coaching role of top management is worth re-emphasizing.

The rigid and static hierarchical positional structure is ill fit for creation-oriented processes. Indeed, the hierarchy is an architecture of exploitation of givens, not appropriate for the creation of novelty. Rather, we believe that many firms need to think and act in terms of a more flexible and dynamic process structure, in addition to the positional one. Thus, the company needs to work with parallel or collateral configurative structures. Time and time again, the positional structure interferes with this process structure in our cases. The authority inherent in the administrative hierarchy prevails over the knowledge held by critical actors in the more action-oriented structure of the innovation process. Moreover, changes in the positional structure, in the form of formal re-organizations or the promotion of key individuals, are allowed to affect the fate of the innovation process. The process structure will consist of several temporary projects staffed by flexible teams of personnel from the internal (and external) part(s) of the asset structure. However, since strong forces favor exploitation-oriented activities and the present architecture, we believe the autonomy of the process structures must be secured by the addition of other organizational arrangements.

Creation-oriented processes need to be sponsored and protected by top management. Another role to be filled by these executives is that of securing system-wide co-ordination by the establishment of a development architecture, as suggested in the previous chapter. Nevertheless, “real work” should be managed by project leaders or process owners. We believe it critical both to: a) select individuals with the right qualifications to become “heavyweights” or “sumo” project leaders, and to b) give them sufficient responsibilities and
autonomy to assume these roles. For instance, it could be that these process managers, rather than the positional managers (functional, national, etc.), should control the incentive structures of the firm, such as rewards, salaries, promotions, etc. Our impression from the cases was that ultimately personnel tended to be loyal with those managers who controlled their compensation and future career opportunities.

Together with the more specialized core competents, the process owners or project leaders form the cornerstones in a new architecture, although traditional top management still play an important role, albeit with somewhat different characteristics. From primarily being designers of “the grand master plan” and major decision-makers, their new role would be that of maintaining, supporting, and developing qualities in the other structures. In addition to sponsoring and overseeing horizontal processes, we would like to stress two primary tasks for senior management which will be discussed in greater depth below: a) supplying an overall organizational purpose as well as a pull-oriented infrastructure, and b) recruiting, rotating, rewarding, and training key people.

From the increased need for continuous combination and re-composition follows that the co-ordinative structures must support more horizontal integration. The structures should provide meaning and direction for the parts of the organization, not merely function as an additional procedure for securing vertical control. We believe that the firm needs a clear, common, and shared purpose, a meta-objective to which all employees can relate. Thus, this purpose must have properties that allows it to be broken down into “codes” which imply and symbolize something tangible for people further down in the organization. When people in the cases spoke of the difficulties in setting priorities, they often referred to the lack of an overall vision. We believe it is the task of top management to develop and communicate this purpose (at best involving the rest of the organization in the process to gain access to multiple perspectives, and to build commitment at an early stage). Without this common purpose, people in more local positions can not be expected to initiate co-operation more organically. Only once the organization has this super-ordinate goal can individuals relate the actions of the parts to those of the whole.
We also believe that the company needs a network in which information can flow so that all people may: a) observe the actions and reactions of the other parts, and b) gain access to knowledge located elsewhere. Otherwise, "top-management push" processes will tend to dominate at the expense of "organizational pull" oriented efforts. If the overall purpose is the force that binds people together and provides direction for the road ahead, the information network is the vehicle by which the company moves forward. In our view, top management must be responsible for supplying such an administrative infrastructure, which is a prerequisite for self-organization, spontaneous co-ordination, and the generation of new questions and ideas around the common purpose, but across organizational boundaries. To put it differently, management need to provide the "garbage cans" or "knowledge arenas" where solutions can meet problems and vice versa, rather than act as the cans or arenas themselves. While top management may be regarded as the "publishers", the rest of the organization will become "content providers" and "content subscribers". Modern information technology could play a pivotal part in this transformation.

The establishment of an "Intranet", a company-wide web, possibly also including critical partners outside the formal boundaries of the firm, is no longer an impossible dream. HQ would act as the systems engineers, providing the subsidiaries with a qualified infrastructure, as well as browsers or intelligent agents, while the latter continuously would have to update their "home-pages" and "surf the net" for new information and ideas developed elsewhere. However, the criticality of face to face communication in the future should not be downplayed. It is evident from our cases that these two types of communication should be regarded as complementary, not as substitutes. Moreover, in a slightly "de-personalized" IT network, socialization to secure sufficient degrees of "know-who" would be even more critical. Otherwise, it would be extremely difficult for people to judge the relevance and quality of information provided by others.

Our main point, however, is that the development which we have tried to outline would signify a shift from a situation in which the top of the administrative hierarchy informs the rest of the organization on a "need-to-know basis", to one in which the different parts are responsible for searching for information on a "need-to-find-out basis". We are basically speaking of transforming a push-system into a pull-system. Former lines of communication
and authority are short-circuited, as information no longer have to travel via the top of the positional hierarchy. Subsidiaries may interact directly with one another, or with HQ for that matter, if and when they see fit. Actions are carried out within the strategic realms provided by the overall purpose.

Changes in the asset structures

Like a real vehicle, the administrative infrastructure needs fuel. For this purpose, we believe the management of people in general and core competents in particular will be critical. Although the primary capabilities of a firm may be regarded as essential forces motivating self-renewal, these are often embodied in people. Individuals, alone or in groups, are responsible for the assimilation, transfer, transformation, and diffusion of knowledge. Thus, it should be no surprise that individuals possessing unique and strategic abilities are central in a knowledge-based system. The selection, rotation, compensation, and training of these core competents become important tasks for the top-management team. The core competents must be made the chief passengers on the information highways. However, they may also need to travel more extensively in a physical sense. Their trips could include both shorter and longer stays elsewhere, functionally and geographically, to meet other 'competents', to form new ideas for the firm to pursue, and to diffuse their knowledge to the other parts of the organization. Hence, the combination of a pull-oriented administrative infrastructure and the competencies of these individuals would be critical in assuring system-wide learning.

Moreover, some companies may also need a more systematic approach for managing their vital assets. A more detailed inventory of primary capabilities, as well as the location and characteristics of core competents, may be required. This "intellectual map or balance sheet" could, in addition to showing the stock of knowledge, comprise information concerning the magnitude of and changes in the transfer (flows) and transformation (creation and destruction) of knowledge. This system would also prove valuable in better matching available capacity and capabilities with organizational commitments, so as to avoid initiating too many projects.
One dilemma for management would be that of recruiting and training people who are different enough to allow for creation, but also willing to work within the overall domain provided by the organizational purpose. These critical individuals may not necessarily have to be permanently employed by the focal firm, however. They could also be brought in from the inter-organizational domain. Consequently, the boundary of the firm tends to fluctuate, and thus perhaps becomes less relevant to define generally, as it is shaped in relation to each specific situation.

The principal features in our attempt to outline one possible future organizational architecture for the multinational firm are illustrated in the figure below. We have tried to capture the idea that people simultaneously; a) are carriers of competence, b) have permanent homes in the positional structure, and c) work in specific processes. Each individual has responsibilities tied to his/her position, the personal knowledge-development, as well as to the projects or processes within which he/she is working. We foresee an increased use of an overall purpose and a pull-oriented infrastructure to manage this system. The architecture is similar to what others have described as a "hypertext" organization, or the N-form.24

![Diagram of organizational architecture](image.png)

**Figure 10.3:** Essential components in a new organizational architecture
Moving beyond the M-form: a change of degree or one of kind?

To find part of the answer to the question of whether the organizational changes we have outlined are only modifications of existing structures, or quite substantial deviations from the architecture of today, we need to view the evolution of the modern corporation in a historical perspective. During the 20th century, the large and complex firm has previously undergone one major organizational transformation. The transition from the U-form (unitary/functional) to the M-form (multi-divisional), initiated by a number of firms such as GM and DuPont in the USA during the 1920s, dramatically changed the face of the successful industrial corporation.

Yet, we have emphasized that the new architecture was fundamentally a “cloned” (or “mutated”) and multiplied U-form. Moreover, when discussing this transformation process, we are mainly referring to changes in the configurative structures. A number of explanations for this historical shift in architecture have been given. The sheer size of the organization, resulting from geographical and product expansions, produced control problems for managers. People further down in the organization began to behave opportunistically. The situation had grown beyond the cognitive capacity of top management. By breaking down the organization into smaller units, focused around products or countries, they were able to avoid some of these control problems.

A knowledge-management perspective on organizational design

Given our study of innovation in the large and complex MNC, we would like to introduce an alternative interpretation, viewing organizational transformation processes more from a knowledge-management perspective. It seems to us that it may have been necessary to break down these organizations into smaller units, since the disparate identities and logics of the functions in the growing U-form over time had become so dominant that knowledge creation across departmental boundaries was extremely difficult. After a while, people who are organizationally separated cease to share a common frame of reference or language - no longer able to communicate, they become alienated. Put differently, we believe that the ‘local’ goals and rationalities of the functions became dominant at the expense of an overall
organizational purpose. The fragmenting forces of the parts were more powerful than the integrating logic of the total system. As a result, the company’s ability to create new competitive advantages in cross-functional (or cross-national) efforts was stifled, and its capacity for self-renewal limited to a corresponding extent.

The beauty of the M-form lies in its relative “smallness” (at least as compared to the U-form). People have a common end, to which they can relate and commit themselves. By introducing this shared objective or purpose at a lower level, the integrating force of the newly defined sub-system can hopefully dominate over the more local logics of functions or countries. The drawbacks of the M-form lie in its inflexibility in managing change, and in meeting the need for continuously assuring the development of new combinations and relationships. The architecture which we have been describing manages this dilemma, not by constantly rearranging the formal configurative structure, but by adding new mechanisms and structures. We are not suggesting that there is less need for an overall managerial perspective, but like a number of other authors, we are arguing that existing formal arrangements should be complemented with more informal means of running the organization.

The nature of knowledge and the modern MNC

In our judgment, it could be contended that the ultimate aim of an organizational architecture is not so much to minimize transaction costs, or to optimize information-processing capacity, as it is to maximize the knowledge-creation capability of the firm. If we posit that this logic applies to the self-renewing MNC, the preferred architecture becomes contingent on the nature of the firm’s system of knowledge. Here, we want to highlight four dimensions of knowledge: depth, dispersion, diversity, and durability.

Knowledge depth refers to the firm’s dependence on highly skilled or educated employees, and its reliance on sophisticated technologies. Dispersion, relates to the geographical spread of the knowledge required. Diversity captures the extent to which the firm is dependent on only a few or on several different types of competencies; in its simplest form, diversity could be defined as the number of different technologies utilized. However, a broader interpretation also includes the extent to which competencies and capabilities in more than one functional
department are critical, individually and in conjunction. In other cases, interdependencies across product lines and among related brands may force the firm to utilize a more systemic approach.

In our opinion, the more the success of the firm depends on its ability to manage knowledge which is deep, dispersed, and diverse, the less appropriate is the traditional M-form architecture. For the hierarchy to be justifiable, it must be assumed that: a) the relevant knowledge and crucial decisions are and can be centralized to the top, b) critical competencies and capabilities are agglomerated in one geographical location (eternally), and c) the combinations of knowledge underlying the competitive advantages of the firm are predictable, and do not change over time.

We can add the fourth important dimension - the economic durability of knowledge. By this term we refer to the time period during which a specific knowledge combination is economically viable as a market offering, or during which specific sets of routines, capabilities, or competencies allow the firm to develop superior products or services. If this durability is becoming increasingly short, the hierarchical logic breaks down further. When patents, copyrights, etc. do not provide sufficient protection, or when the general rate of change in the industry is very high, technologically and/or in terms of customer needs, the firm may have to develop a new architecture to secure long-term survival. We believe that the combined impact of these forces is presently compelling many firms to look for new architectural solutions. The changing nature of the knowledge networks with which the modern firm has to interact can be argued to represent one, if not the, critical driving force for architectural change.

**Heterarchy and Neterarchy**

The new internal architecture which we have been describing is similar in many respects to what has been called a "heterarchy" (many hierarchies of different types) by other scholars. An alternative would be for the organization to reduce internal complexity by out-tasking a number of activities and processes. There might then be less need for geographical dispersion and knowledge diversity, and possibly also for knowledge depth. Currently, we hear a lot of
talk about the “hollow” corporation, or the “virtual” firm - the “hyper-specialist”. We prefer the idea of the focused firm, and to call this arrangement a “neterarchy” (to emphasize both its a-hierarchical and its network aspects). What then matters is the architecture of the total system of interdependencies with which the firm has to cope.

Although internal complexity may be reduced by out-tasking certain processes, we believe that the inter-organizational consequences of these procedures are often forgotten. Unless the newly externalized interdependencies are designed in ways that allow for co-ordination by standardization or planning, many of the problems could still remain. Indeed, some of the difficulties may even be aggravated once the network enters a phase of intensified creation in which more mutual adjustment is required. Architectural differences between the interacting parties, such as those present in the Holger case, could then surface and become problematic to manage.

Recalling our previous observation that interdependencies between the various knowledge bases can be described as uncertain, ambiguous, and changing, we would add that a highly structured and hierarchical configuration no longer seems fit to handle the all the intricacies of securing continuous knowledge creation. Thus, we believe that we are about to witness an organizational transformation process of kind, rather than one of degree. However, since we are proposing that one response to the new realities is to add other architectural elements, rather than trying to solve all problems with endless re-configurations, many of the basic properties of the M-form may remain visible far into the future, at least if looking at the organizational chart of a company. As we see it, the relevant changes are not likely to occur in the configurative (positional) structure alone. In the short term, the choice for many firms becomes one of changing internally toward a more flexible architecture, and/or trying to develop network capabilities to compensate for the intra-organizational shortcomings. Which alternative is appropriate in each specific situation still remains to be seen.

The partionalized firm

We believe the future architecture of the MNC is best described as “partionalized”, rather than being “divisionalized”. As opposed to division, partition implies that the different units
still hold something in common. In a partitioned room, the two separate entities are still communicating vessels. This “something” represents the indispensable substitute for hierarchical control. In this chapter, we have emphasized the importance of strong administrative co-ordination mechanisms, such as a common purpose and a “pull-oriented” infrastructure, which allow all units to search for information, self-organize, and self-co-ordinate.

Moreover, since one of the basic building blocks of the future multinational in our view is knowledge embodied in core competents, we also foresee greater reliance on integration through people. The organizational structures need to be adapted to these individuals, instead of the other way around. One manifestation would be an increased use of rotation mechanisms where core competents would be carriers not only of knowledge, but also of organizational purpose and action. For senior management it will become more important to manage the horizontal knowledge-creation processes which contribute to self-renewal, instead of “re-managing” the company vertically in efforts to secure exploitation of their current basis of competitiveness.

Finally, ”partitionalization” could also be “participatory”. The new architecture will demand a greater involvement by all units, and all personnel, at more than the top levels. All these individuals would participate in the building of competitive advantages, and also in the profits created by the firm; thus, rewards based on supra-individuals result, such as those of units, projects, or the entire company, would also be partitionalized throughout the firm.

**Hurdles in moving beyond the M-form**

Change is never without friction. Our main argument in the beginning of this chapter revolved around the tendency of the organizational architecture to work as a preserving mechanism, blocking learning and change. Moreover, in all organizational-transformation processes, some individuals and units will see themselves as losers, if only in relative terms. In our efforts to describe one future architecture for the large and geographically dispersed company, we have sketched a transition from a system based on authority to one based more
The discussion has outlined a move from organizational solutions in which top management pushes information "down" to the others, to an architecture in which the different parts of the firm actively draw on information from the entire corporate network. We believe that the future multinational firm must be "global" for more than a few senior executives. The strengths of an international network become fully evident only when the information residing in the entire system is also accessible to personnel further down in the organization. However, several difficulties in implementing the changes can be foreseen.

**Structural barriers**

In addition to the problems inherent in the exploitation/creation dilemma, powerful barriers exist within the traditional organizational structures. First, people at the top of the administrative hierarchy could interpret the changes as challenging their formal power base. Unless several senior executives are willing to support and protect those in charge of implementing the change process, it will be difficult to achieve significant and long-lasting results. Second, those controlling the co-ordinative structures may block the changes by denying access to critical information. Third, unless those in charge of managing the process can obtain enough financial resources, and support from a critical number of core competents, success seems unlikely.

These observations also illustrate the need for a re-definition of power within the organization, one of "power with", rather than "power over". The new architecture requires that power be generated through a process in which acceptance is voluntarily granted by the rest of the organization. In the administrative-pull system which we are describing, the ability to affect others is based on **attractiveness** rather than **authority**. Attractiveness, in turn, is determined by what one can "tell others", and not by what one "tells them to do".

**Mental barriers**

In addition to the structural hurdles, we can also identify a number of barriers which are more mental in nature. If the former subject concerns the management of power and political behavior, the latter relates to the management of attitudes, values, and beliefs among the
employees of the firm. Here, we would briefly like to emphasize two points. Both have to do with developing a climate in which characterizations such as “us and them” are avoided. First, from our empirical study we believe that there is a need for much greater tolerance for mistakes. Otherwise, people appear to prefer organizations designed so that someone else can always be blamed - separation, rather than combination or co-operation, becomes the favored solution. This situation can be avoided if those involved in the process feel that short-term failure is acceptable, as long as they learn valuable lessons for the future. In certain cases, it is better to fail and understand why, than to succeed without understanding why. When an overall sense of security characterizes the organization, people will start collaborating instead of blaming others and competing.

Second, we argued earlier that knowledge is worth more for the organization when it is shared throughout the entire system. However, as argued in the previous chapter, from the standpoint of the local unit, it may sometimes seem better to monopolize knowledge and use it for "local harvesting" at a later stage. Consequently, one problem with instituting a pull-system lies in the inherent risk of not obtaining enough quality content, and of the transfer of only trivial information; everyone may decide to keep his best ideas to himself or not to use knowledge from elsewhere in the firm (NIH). For the new infrastructure to work, formal arrangements as well as more subtle mechanisms could be used in rewarding not only knowledge creation, but also knowledge dissemination and assimilation. For example, one solution would be to measure and promote temporary or permanent "exports" and "imports" of core competents, or other contributions to the benefit of others, and thus also of the entire system. Over time this administrative infrastructure could also be self-maintaining, since those who put their most valuable knowledge on the “net” or actively work with others, would have a greater chance of finding collaborators in cross-border projects. As a prerequisite, however, efforts must be made to develop an overall climate of trust, and principles for deciding questions of "intellectual property rights". In the same way as firms may need a re-framing of attitudes in favor of collaborating rather than shifting the blame and competing, they may need to abandon a culture in which keeping knowledge is natural for one which emphasizes the importance of sharing ideas and concepts.
Finally, the future architecture which we have outlined may not always be appropriate. It is certainly not for all companies, from all countries; nor is it feasible in all industries. However, we would also like to emphasize that it may not be for all people. The pressures put on the single individual in a "partitionalized" organization are in some respects much greater than in an ordinary hierarchical firm. Although excessive bureaucratic control may no longer be present, the prospect of learning to co-operate, keeping an open and flexible mind, having many "jobs" (or no real job) instead of one, continuously developing new skills, traveling across the globe, and mastering IT as well as socialization, may sound thrilling to some, but probably also frightening to others. In the new architecture, the uncertainty surrounding tasks and activities is absorbed by people, rather than by the formal structures.

Suggested for future research

Throughout this project a number of questions for future research efforts have evolved. We will structure our discussion around the different levels of analysis referred to earlier, although most issues are interrelated. First, on the individual level, we believe that the concept of core competents needs more attention. Is it true that most organizations rely heavily on a limited number of critically important individuals? In that case, who are they, what do they do, where are they located, which different types exist, what skills do they possess, etc.? The larger question revolves around the implications for organization theory more generally. Are we focusing on the relevant issues when discussing organizational design without taking the existence of core competents into account? A new theory of the firm built around the existence of core competents, rather than / or in addition to core competencies or capabilities, might possibly develop quite different conceptions and ideas.

Second, on the project level we would like to emphasize question of building bridges between different logics of action and ways of thinking. It was evident that particularly the departmental or professional separation of individuals created many problems in our case companies. How do other companies handle the simultaneous need for functional specialization and inter-functional collaboration? Moreover, what are the implications for the educational systems, which produce people with degrees in either engineering or business
who rarely meet? Is there a greater need for a new type of company "renaissance man" with multiple skills and generalist capabilities, in an age of increased specialization? In this context the role, responsibilities, and characteristics of the "sumo" project leader could also be worth studying in more detail.

Third, as for the organizational level, we believe that the nature of the present and the future architectures of multinational companies is worth more attention. Can other empirical material also be interpreted to support our ideas of architectural dependence (as well as our more speculative notions of architectural selection, path dependence, and equilibrium)? How great is the freedom of the individual manager in various types of firms, and how do processes of architectural change evolve? We know from past research that the nature of historical configurations and the preferred co-ordinative structures vary across geographical space, between US, Japanese, and European MNCs. Do these differences in architecture produce specific types of problems in the implementation of cross-border projects, and do they produce different solutions for managing these processes? Finally, we would like to highlight questions relating to the nature of the knowledge networks with which the modern multinational has to interact. What differences in terms of depth, dispersion, diversity, and durability can be found among industries and organizations with different characteristics. Can a new type of contingency framework for organizational design be developed, with these knowledge-based distinctions, rather than with the more traditional ones of either the organizational task system (technology) or the organizational environment? Moreover, when and why do companies prefer changing internally or changing by out-tasking certain processes, respectively?

Fourth, a number of questions on the level of inter-organizational relationships may be worth exploring further. For instance, do companies manage these relationships differently depending on the type of interdependency created, or are these relationships also subject to architectural dependence; i.e., the available mechanisms for managing inter-organizational links are applied with relative uniformity, and contribute in shaping the nature of the interdependency? How do differences in organizational architecture between interacting companies create problems, and how can these difficulties be managed? Finally, we believe that a comparative study of the organization and management of international innovation
projects with strategic contributions from more than one organization, in the form of joint ventures or strategic alliances, could be interesting.

However, the most important suggestion for future research is addressed to the need which we see for more studies focused on analysis covering multiple levels. If we were to re-emphasize one finding of this project, it would be that these levels are interdependent. Particularly, we noticed the influence of the organizational architecture on the evolution of project conception, design, and management. Without studying the organizational level as well, we would not have been able to interpret the project data as we did. Thus, the most devastating critique of uni-level studies is their grievous lack of an overview; they can only give the phenomenon a narrow, part-by-part interpretation. These studies may not be less true, but they are definitely less complete. This argument does not mean, however, that we are pleading for a focus only on units of analysis with a higher level of abstraction, such as the organizational or inter-organizational domain. Just as we believe that it is more meaningful to interpret a project in its proper context, it is our opinion that a study of the organizational level is more meaningful if it also incorporates an investigation of processes in which organizational action takes place. To understand the whole, we must study the parts, and vice versa.

Concluding remarks

The multinational firm has witnessed and undergone vast changes since it emerged some hundred years ago. In this dissertation we have tried to address the relatively recent phenomenon of international innovation projects. One of our main propositions has been that these projects are inextricably linked to the rest of the system, both structurally and historically. We may seem to be saying that most managers are caught in iron cages from which they cannot escape. Their ability to exert an active influence on what happens in the organization is limited not only by their bounded rationality, but also by their bounded architectural mobility.
Our study indicates that organizations, like people, are captives of their past structures, practices, and habits. However, in our view, a number of MNCs are currently going through a period of more fundamental architectural transformation. The projects which we have studied arguably represent the first endeavors by a few highly sophisticated companies to utilize the potential benefits of having access to a variety of geographically dispersed knowledge bases. It should be evident that these international innovation processes pose great many managerial difficulties for the firms which undertake them. Yet, at the level of the individual project most of the immediate problems seem manageable. At the same time, the complexities inherent in IIPIs also expose some more fundamental issues facing all companies. The need for coordination among different functions and across national borders, in a process plagued by enormous uncertainty, is only an extreme manifestation. We have emphasized that activities of exploitation and creation do not easily blend, and that what has been separated in the configurative structure is not easily integrated, even in relatively autonomous projects. Still, most organizations have to address these questions on a daily basis.

Many of the more serious problems encountered in the product-development projects which we examined had their roots in these architectural paradoxes. Thus, the successful management of international innovation processes is far more than a question of project management. Just as a seed needs fertile ground in which to grow, the fate of IIPIs is contingent on the development of organizational structures which facilitate collaboration across organizational boundaries, and thus on an organizational architecture which in some respects is new. The perpetual dilemma lies in the requirement that this architecture be supportive of global creation, while simultaneously ensuring global exploitation.

A simple solution to this eternal problem is to say that it can never be solved, and that the vision of a future MNC relying extensively on global projects is merely an impossible dream. Certainly, some companies are bound to adopt this view after having tried and failed to deal with the initial difficulties. However, given the evolution of the competitive landscapes facing firms like ABB and Electrolux, and the nature of the knowledge networks which they are developing, our study suggests that for some companies, the only alternative more difficult than learning to manage cross-border projects, is learning to operate without them.
Summary of the chapter

In this final and more speculative chapter we have discussed the nature of the organizational architecture, and we have outlined one possible future architecture for the MNC. We started by suggesting that the organizational architecture could be considered as the selection mechanism in the modern MNC, in that it affects events and decisions throughout the entire innovation process. In our opinion, the presence of a strong organizational architecture leads to inertial learning; poor results are attributed to the situation, and good results to the nature of the architecture. We then argued that the evolution of the organizational architecture tends to be path-dependent. However, organizations can be considered semi-open systems, and external chocks or the introduction of variation in the system may lead to architectural change of a more revolutionary nature. Still, beliefs, values, routines, and other co-ordinative structures appear particularly difficult to alter in more radical ways. Finally, we suggested that the different organizational structures strive toward architectural equilibrium; when reaching that stage, they are mutually supportive. Thus, local changes in one type of structure may be blocked by sunk cost in the others.

It is our impression that the call for a new organizational architecture will demand adjustments in all the structures which we have been discussing. We briefly sketched the basic properties of one conceivable future architecture. The configurative structure evolves into a symbolic positional structure, and one more action-oriented process structure is added. However, the latter structure must be supported by additional arrangements so that exploitation does not automatically crowd out creation. The co-ordinative structures comprise a pull-oriented infrastructure, centered around a common organizational purpose. Finally, the asset structure should ideally be viewed as a people-oriented knowledge structure focused on capturing the essentials of primary capabilities and competencies. In our view, these changes in the organizational architecture signify a shift that would carry the design of the modern firm beyond the characteristics of the hierarchically structured M-form.

We believe that the future design must be guided by the principle of maximizing the knowledge-creation capabilities of the firm. Therefore, the future architecture is contingent on the depth, dispersion, diversity, and durability of the knowledge utilized by the firm in its
efforts to create sustainable competitive advantage. We claim that the deeper, the more
dispersed, diverse, and the less durable this knowledge the less appropriate a hierarchical
configuration would be. The solution seems to lie in a more flexible internal architecture,
called a "heterarchy", and/or in better utilizing the knowledge of an inter-organizational
network, referred to as a "neterarchy".

However, we do see a number of hurdles - both structural and mental - in moving toward
these less hierarchical structures. We conclude the chapter by re-emphasizing the overall
theme of architectural dependence. However, we would regard IIPs as the first attempts by a
few highly sophisticated multinational firms to break free from the logics of yesterday. The
projects seem manageable, but they are dependent on a context that facilitates knowledge
transfer and creation across boundaries. Yet, our primary impression is that many firms will
find that it is more difficult to operate without global projects than with them.
Notes to Chapter 10

1 See Hedlund and Ridderstråle (1992) for a detailed discussion of how the differing requirements of exploitation and creation, respectively, could be reconciled by sequencing activities over time, and/or by separation at various levels.

2 For examples of scholars more focused on the evolution of populations of organizations, see Aldrich (1979), and Hannan and Freeman (1977), and Freeman and Hannan (1983). Weick (1969/1979), and Miner (1994), use similar frameworks on intra-organizational processes.

3 See Argyris and Schon (1978) for a discussion of single-loop and double-loop learning.

4 Lindblom (1959), Weick (1969/1979), Cyert and March (1963), and March (1995) argue that people tend to look for solutions similar to those already existing and in use.

5 Attribution theory has been used mostly to explain individual behavior. For the core references, see Heider (1958), and Kelley (1971).


7 Contingency theorists (Burns and Stalker, 1961; Woodward, 1965; Lawrence and Lorsch, 1967), as well as population ecology scholars (Aldrich, 1979; Hannan and Freeman, 1977; Freeman and Hannan, 1983) would argue that environmental changes force organizations to adapt or be selected out, respectively. Closed-systems theorists like the Chilean scientists Maturana and Varela (1980), referred to in Morgan (1986), would claim that organizations are characterized by a) autonomy, b) circularity, and c) self-reference.


9 Further support for our idea of architectural path-dependence we believe can be found in the results of Stopford and Wells (1972) and Franko (1976), who discuss the historical evolution of the configurations of MNCs. Martinez and Jarillo (1989) also argue that over time the co-ordinative structures of multinationals have developed along a certain path, toward incorporating more subtle mechanisms.


11 The concept of creative destruction was originated by Schumpeter (1942). Although this scholar was using it on the level of an industrial complex, we believe it also appropriate in the context of the multinational firm. The geographically dispersed units can be regarded as competing (or co-operating) actors.


13 See Hedlund (1986), and Bartlett and Ghoshal (1989), among others.

14 See Van de Ven (1986) for a more thorough discussion of the parts-whole dilemma.

15 For a discussion of the differences between simple and complex systems, see Casti (1994).

When this way of thinking has been applied on firms, four interacting principles have been suggested as an alternative to the traditional hierarchical way of structuring organizations: a) requisite variety, b) redundancy of functions, c) minimum critical specifications, and d) learning to learn. This overall framework for a holographic architecture has been developed by Morgan (1986). However, the principle of requisite variety actually dates back to Ashby (1952, 1960). Redundancy of functions, as opposed to redundancy of parts, was first discussed by Emery and Triste (1973). Minimum critical specification derives from Herbst (1974). Finally, the importance of developing “learning-to-learn” capabilities is outlined by Argyris and Schön (1978) in their discussion of single-loop and double-loop learning. These principles all relate to improving the systems' capacity to self-organize.

See Hedlund (1994, 1996) for a similar idea.

See Sjöstrand (1987) for a discussion of the different roles played by the formal configuration.


See Barnard (1938), who argues that all successful systems are characterized by: a) a willingness to cooperate, b) a common purpose, and c) communication.


Hagström (1991) describes a similar shift from dissemination toward search.

See Nonaka and Takeuchi (1995) for an outline of the hypertext organization. However, the original reference is probably Hedlund (1994), who talks about structures of position, knowledge, and action, in describing the N-form. Also see Hedlund and Ridderstråle (1992), and Hagström and Hedlund (1994) for related discussions.

See Chandler (1962).

See Chandler (1962), and Williamson (1975).

See Davidson and Haspeslagh (1982).

See Martinez and Jarillo (1989). Also see Bartlett and Ghoshal (1989), and Hedlund (1993a).

See Williamson (1975) for the seminal reference. Consult Coase (1937) for the original argument on transaction costs.

See Galbraith (1973, 1977) for the basic ideas of the information processing paradigm.

The original idea of this qualification scheme was influenced by Hedlund (1996), who talks about knowledge intensity and extensity; intensity stands for depth, and extensity for dispersion. To these two categories we have added those of diversity and durability. The need for systemic innovations and continuous re-combination challenges the need for stability and predictability in a hierarchy.

See Hedlund (1986).

See Barnard (1938).

A problem remains, however, in that it may be difficult to know in advance what type of knowledge other units demand. However, to a certain extent this problem is compensated for by the existence of a clear and shared purpose.

See Bartlett and Ghoshal (1989).
References


Newspapers, Magazines, and Annual reports


Veckans Affärer, nr 2, 10 January, 1985.

, nr 16, 17 April, 1986.

, nr 45, 6 November, 1986.

Appendix 1

Interview guide

Stimulus

- How would you describe the innovation process in terms of market-pull, technology-push, imitation, or mixes of these factors?
- At what point in time did these signals occur?
- In geographical terms, where did they occur?
- Who, unit(s), function(s), and individuals, did notice them?
- Were there any opposing signals from different geographical locations?

Conception and planning

Innovation idea transfer and development decision

- How was the innovation idea transferred to other parts of the organization?
- To which other parts, geographically and organizationally, was it transferred?
- Who took initiative in transferring the innovation idea?
- In what fora were the innovation idea discussed, prior to the decision to go for development?
- Who took part in these meetings?
- Were there any conflicting views, and in that case what did they concern?
- How were these conflicts resolved?
- When and by whom was it decided to go for development?

Research undertakings

- What types of research efforts were undertaken prior to development?
- When and by whom was this research conducted?
- What were the major conclusions?
Appendix 1

Project definition

- When was the product planned to be introduced on the market?
- What milestones were set?
- How much money was allocated to the project - who would be responsible for financing?
- What product specifications were developed?
- For which markets was the product intended?
- How was the project leader appointed?
- For all the above, who made these decisions?
- How were people recruited?
- What philosophy was used when staffing the project?
- Describe staffing in terms of:
  - number of people
  - geographical location
  - years in firm (key people)
  - functional background
  - experience (functional, international, previous projects)
- What changes, if any, have occurred over time?
- Was it decided who should be responsible for the product in terms of:
  - management
  - production
  - sales
  - future development
- In terms of defining the project and product specifications, where did problems occur?
- How were these difficulties resolved?

Development

Task

- Which are the core technologies in the new product?
- Are these technologies subject to standardization or adaptation across geography and market segments?
Appendix 1

- How experienced was the firm in these technologies prior to the project?
- Are these core technologies critical or marginal to the businesses in a) your unit, b) the firm?
- What are the key differences between the new product and older generations?
- In a range from incremental to revolutionary, how would you position the innovation?
- Are market needs homogeneous or heterogeneous across geography and market segments?
- What prior experience existed in positioning the product on the anticipated geographical markets and market segments?
- Are these markets, geographically and segment wise, important to a) you unit, b) the firm (as % of sales)?

Organization

- How were development efforts organized - formal chart(s)?
- How was work divided?
- Who made this decision, and what was the rationale for it?
- How was co-ordination managed:
  - geographical borders
  - functions
  - time
  - the project and the rest of the organization
- How and by whom was the work of individuals and groups evaluated?
- What were the incentives for the individuals, groups, and units involved?
- What monitoring systems were used at the project level?
- How was reporting handled?
- Which formal integrating bodies were instituted?
- For all these:
  - Who participated?
  - How often did they meet?
  - Where did they meet?
- What rules and manuals (standard procedures) were used?
- What was the national origin of these?
- Were any new rules and manuals developed, in that case why and by whom?
Appendix 1

- On a more informal level, how did people interact?
- How much money was spent on traveling, per:
  - phase
  - unit
- How or by whom was traveling financed?
- Who were the most frequent travelers?
- Were people from different nations co-located for any longer periods of time?
  - If so, please describe who went where, for how long, how these people were selected, and who paid for it?
- What was the frequency and importance of more indirect communication channels:
  - letters
  - telephone
  - fax
  - e-mail
  - data-bases
  - etc.
- In what ways, if any, did the content of information transferred vary between these channels?
- In what ways, if any, did the content of information transferred differ between face-to-face communication and the indirect communication channels?
- Which problems were most difficult to handle in organizing the ventures?

Inter-organizational co-operation
- What important co-operative efforts were undertaken with actors outside the firm?
- Describe these other firms in terms of activities, location, etc.
- When were these efforts carried out?
- Did any prior experience in co-operating with these firms exist?
- Where was the decision to co-operate taken?
- How was the formal agreement arranged?
- How was the co-operative venture organized and co-ordinated?
- What major problems occurred?
Appendix 1

Commercialization

Manufacturing
- When and where did test manufacturing begin?
- What, if any, were the most serious problems encountered?
- Please elaborate on their reasons, consequences, and how they were solved?
- What changes, if any, were done to the original design?
- What information was transferred between the different units, in case more than one manufacturing location did exist?

Marketing
- When and where did test marketing begin?
- How was information from one market transferred to:
  - other marketing units
  - the manufacturing organization
- What, if any, were the most serious problems encountered?
- Please elaborate on their reasons, consequences, and how they were solved?
- What effects did test marketing have on:
  - the product
  - the marketing strategy
- When and where did sales begin?
- Why was this market(s) picked?
- Where is the product sold now?

Aftermath
- Who manages the product today?
- What were the real cost of development?
- Comparing the product with the original specifications, how would you describe it?
Appendix 1

- Estimate total global sales:
  - since introduction
  - this year
  - per country
  - per segment

- As you see it, what were the major problems during the innovation process?
- If anything, what should have been done differently?
- Would you judge the project as a success or a failure?
- What criteria do you think is relevant to use?
- What have you learned from the process?
Critical factors in international product development projects

This survey is part of a research program at the Institute of International Business at the Stockholm School of Economics. The purpose of the program is to examine critical factors in international product development projects. We know that you have earlier helped IIB with information about research and development and we would very much appreciate your participation in this project as well. We hope that the results will be useful to you and your company. A copy of the research report will be sent to you as soon as possible.

The questionnaire is sent to R&D managers at 30 Swedish multinational companies and is then forwarded to project managers in 2 - 6 selected projects in each company.

The information provided by this questionnaire will be published in aggregate form only, and in such a way that information provided by individual companies can not be identified. The material will be kept confidential, with access only to researchers at IIB.

The questionnaire is in English due to the fact that some of the respondents do not speak Swedish. However, you may answer the questions in Swedish if you prefer.

We would be very grateful if you agreed to participate and kindly ask you to follow the steps below:

1. Please select 2 - 6 product development projects where company personnel from units in at least two different countries have been actively involved. The projects should ideally have been carried out recently and have led to a commercially launched product. Please select 1 - 3 projects that has been commercially or otherwise successful and 1 - 3 projects that has not been as successful.

2. Please list the names and phone numbers of the project managers from the projects you have selected on the next page.

3. Please answer the questions in this form to provide us with background information about your company.

4. Please send us your form, including the list of project managers selected, to the address below.

5. Please forward one copy of the yellow forms to each of the project managers as soon as possible.

6. Please inform the project managers chosen which of their projects you wish them to participate with.

If you have any questions about the questionnaire feel free to contact us at the phone number below.

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Appendix 2

Respondent

Name: ________________________________
Company: ________________________________
Title and position: ________________________________
Telephone: ________________________________
Telefax: ________________________________

Successful projects:

1. Project/Product: ________________________________
   Successful in sense of: ________________________________
   Project Manager: ________________________________
   Title and position: ________________________________
   Telephone: ________________________________
   Telefax: ________________________________

2. Project/Product: ________________________________
   Successful in sense of: ________________________________
   Project Manager: ________________________________
   Title and position: ________________________________
   Telephone: ________________________________
   Telefax: ________________________________

3. Project/Product: ________________________________
   Successful in sense of: ________________________________
   Project Manager: ________________________________
   Title and position: ________________________________
   Telephone: ________________________________
   Telefax: ________________________________
Appendix 2

Not so successful projects:

1. Project/Product: 
   Not so successful in sense of: 
   Project Manager: 
   Title and position: 
   Telephone: 
   Telefax: 

2. Project/Product: 
   Not so successful in sense of: 
   Project Manager: 
   Title and position: 
   Telephone: 
   Telefax: 

3. Project/Product: 
   Not so successful in sense of: 
   Project Manager: 
   Title and position: 
   Telephone: 
   Telefax: 

Appendix 2

Company description

Please note that you do not have to answer any questions you feel are too confidential. If you are not sure of the answer to a question please provide us with your best estimate rather than no answer at all.

1. In how many countries does the company have R&D units? _________

2. How is the company organised today? Please note that more than one alternative may be possible.
   - Primarily by geography
   - Primarily by product
   - Primarily by function
   - Other, please specify: __________________________

3. Does the company have a matrix organisation? Yes □ No □

4. How was the company organised 5 years ago? Please note that more than one alternative may be possible.
   - Primarily by geography
   - Primarily by product
   - Primarily by function
   - Other, please specify: __________________________

5. If there has been a major change in the organisation form, when was it carried out? _________

6. With whom lies the responsibility for co-ordination of R&D activities within the entire company?

7. Please give an estimate of how many percent of total turnover that is spent on R&D within the entire company: ________%

8. Approximately what proportions of the R&D-budget are spent on product and process development, respectively?
   - Product development ________%
   - Process development ________%

9. Please give an estimate of how many percent of your product development projects that are international (i.e. with company personnel from units in at least two different countries)? ________%
Appendix 2

10. Please give an estimate of how many percent of your product development projects that were international 10 years ago:

_______% 

11. For each of the projects you have selected for this survey, please indicate which of the following statements that are true. The project was international because: (More than one alternative is possible, please indicate all relevant reasons.)

<table>
<thead>
<tr>
<th>Project</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project demanded other technological know-how than could be found in the base country.</td>
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<td>The project demanded more personnel resources than could be mobilised in the base country.</td>
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<tr>
<td>The project demanded co-operation with suppliers that could not be found in the base country.</td>
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<tr>
<td>The project demanded co-operation with customers outside the base country.</td>
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<tr>
<td>The project demanded market knowledge that could not be found in the base country.</td>
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<tr>
<td>There was a need to facilitate the local acceptance of the developed product. (Avoid Not Invented Here)</td>
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<tr>
<td>The project demanded manufacturing resources not available in the base country.</td>
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<tr>
<td>There was available capacity in other countries.</td>
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<tr>
<td>We wanted to encourage international collaboration in the company.</td>
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<tr>
<td>Other, please specify:</td>
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<td></td>
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</tbody>
</table>
Critical factors in international product development projects

Project Manager

This survey is part of a research program at the Institute of International Business at the Stockholm School of Economics. The purpose of the program is to examine critical factors in international product development projects (with personnel from units in at least two different countries). A project that you managed has been selected by your Research and Development Manager as an example of such an international project. We would be very grateful if you would answer the following questions and send them to the address listed below as soon as possible.

The information provided by you in this questionnaire will be published in aggregate form only, and in such a way that information provided by individual companies or projects can not be identified. The material will be kept confidential, with access only to researchers at IIB.

The questionnaire is in English due to the fact that some of the respondents may not speak Swedish. However, you may answer the questions in Swedish if you prefer.

We would like to take this opportunity to thank you for your co-operation and hope that the results of the survey will be of use to you and your company. A copy of the research report will be sent to you as soon as possible. If you have any questions about the questionnaire, feel free to contact us at the phone number below.

1. Respondent

Name: ________________________________

Title and position: ________________________________

Telephone: ____________________________________

Telefax: ________________________________________

---

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Appendix 2

Project description

Please note that you do not have to answer any questions you feel are too confidential. If you are not sure of the answer to a question please provide us with your best estimate rather than no answer at all.

2. Please give a brief description of the product developed

3. What were the objectives of the project?

<table>
<thead>
<tr>
<th>Product Objectives</th>
<th>Market Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a new product</td>
<td>Enter a new several-country market</td>
</tr>
<tr>
<td>Improve an existing product</td>
<td>Enter a new single-country market</td>
</tr>
<tr>
<td>Adaptation to local conditions</td>
<td>Strengthen position on existing market</td>
</tr>
</tbody>
</table>

4. Please indicate the size of the project?

<table>
<thead>
<tr>
<th></th>
<th>Planned (if applicable)</th>
<th>Real</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total time frame:</td>
<td>____________ months</td>
<td>____________ months</td>
</tr>
<tr>
<td>Number of man months:</td>
<td>____________</td>
<td>____________ months</td>
</tr>
<tr>
<td>Number of persons in the formal project team:</td>
<td>____________</td>
<td>____________ persons</td>
</tr>
<tr>
<td>Total costs:</td>
<td>____________ SEK</td>
<td>____________ SEK</td>
</tr>
<tr>
<td>Sales volume (so far):</td>
<td>____________</td>
<td>____________ SEK</td>
</tr>
</tbody>
</table>

5. Why was personnel from more than one country used in this project?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
In the following questions the time between idea generation and market launch is divided into 5 phases:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Example of activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept development</td>
<td>Product architecture&lt;br&gt;Conceptual design&lt;br&gt;Target market</td>
</tr>
<tr>
<td>Product planning</td>
<td>Model building&lt;br&gt;Small-scale testing&lt;br&gt;Investment/Financial</td>
</tr>
<tr>
<td>Product/Process engineering</td>
<td>Detailed design of product and equipment&lt;br&gt;Building/Testing prototypes</td>
</tr>
<tr>
<td>Pilot production</td>
<td>Volume production prove out&lt;br&gt;Factory start-up&lt;br&gt;Volume increases to commercial targets</td>
</tr>
<tr>
<td>Market launch</td>
<td>Marketing campaign&lt;br&gt;Sales start</td>
</tr>
</tbody>
</table>

Please observe that the phases not necessarily have to be performed sequentially.

6. Please indicate which of the phases above that the project covered:

- Concept development □
- Product planning □
- Product/Process engineering □
- Pilot production □
- Market launch □
Appendix 2

Organisation and Control

7. What decisions needed the control group's (or equivalent) approval?

- Change of time schedule ☐
- Additional resources ☐
- Hiring/Firing of project members ☐
- Change of product specifications ☐
- Choice of suppliers ☐
- Choice of manufacturing location ☐
- Choice of components ☐
- Others, please specify: ____________________________________________

8. Please mark what explicit goals that were set for the project, and how well were they fulfilled?

<table>
<thead>
<tr>
<th>Explicit goals</th>
<th>Not at all</th>
<th>Well over expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time schedule</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Budget/Cost constraint</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Product performance</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Quality specifications</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Manufacturing cost</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Final price to buyer</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Market share</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
<tr>
<td>Others, please specify:</td>
<td>1 2 3 4</td>
<td>5 6 7</td>
</tr>
</tbody>
</table>

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### Staffing

9. Who appointed the project members?

- Project Manager
- Other

10. How many persons worked actively in the project during the different phases? Please indicate the number of persons actively involved, their function and where they worked:

<table>
<thead>
<tr>
<th>Function (R&amp;D, Manufacturing, Marketing etc.)</th>
<th>Country</th>
<th>Concept development</th>
<th>Product planning</th>
<th>Product/Process planning</th>
<th>Pilot production</th>
<th>Market launch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. How many persons worked full-time/part-time with the project during the projects phases?

<table>
<thead>
<tr>
<th></th>
<th>Concept development</th>
<th>Product planning</th>
<th>Prod./Process development</th>
<th>Pilot production</th>
<th>Market launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time (&gt; 75%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time (&lt; 75%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Communication

12. What methods of communication were used for your communication with project members in other countries? Please indicate how often different methods were used and the perceived importance of these methods:

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Importance</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>Weekly</td>
<td>Monthly</td>
</tr>
<tr>
<td>Face-to-face</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Phone</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Fax</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Letter</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Newsletter</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Electronic mail</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Common database</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Common CAD/CAM-system</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Other, please specify:</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2

Project Manager

13. Please give a brief description of yourself and your career:

Personal characteristics:
- Age: ___________ years
- Nationality: ___________
- Academic degree(s): __________
- Languages spoken comfortably: __________

Experience:
- Employment with this company: __________ years
- Number of years in industry: __________ years
- Number of projects managed: __________
- Number of international projects managed: __________
- Years in R&D: __________ years
- Years in Manufacturing: __________ years
- Years in Marketing: __________ years
- Years in General Management: __________ years

International experience:
- Years working abroad: __________ years
- Countries worked in for more than 6 months:
  __________
  __________
  __________
  __________

14. Please indicate how important this project is/was for your future career:

<table>
<thead>
<tr>
<th>Not important at all</th>
<th>Very important</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>6 7</td>
</tr>
</tbody>
</table>
Appendix 2

15. What tasks were in your opinion most *important* for you as Project Manager, please rank them in order of importance (1 = Most important, 2 = Second most important etc.):

Planning of activities
Co-ordinating activities
Solving conflicts
Solving problems
Provide motivation
Running own activities
Provide communication
Others, please specify:

16. What tasks were in your opinion most *difficult* for you as Project Manager, please rank them in order of difficulty (1 = Most difficult, 2 = Second most difficult etc.):

Planning of activities
Co-ordinating activities
Solving problems
Solving conflicts
Provide motivation
Running own activities
Provide communication
Others, please specify:

______________________________

______________________________

______________________________
Aftermath

17. Please state which 3 factors that, in your opinion, were most critical for the outcome of the project?


18. What specific advantages did the international participation give the project?


19. What specific disadvantages did the international participation give the project?


20. Please indicate to what extent the following statements could be said to be true for this project:

<table>
<thead>
<tr>
<th>There were conflicts between personnel from,</th>
<th>Not at all true</th>
<th>Very much true</th>
</tr>
</thead>
<tbody>
<tr>
<td>- different countries</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- different functions</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- different divisions/business areas</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- project vs. line</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- different phases</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There were communication difficulties because of,</th>
<th>Not at all true</th>
<th>Very much true</th>
</tr>
</thead>
<tbody>
<tr>
<td>- different professional languages</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- different national languages</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- physical distance</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- different cultures</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>- lack of comm. equipment</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

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There were difficulties due to a lack of standardisation regarding:

- drawing standards
- computer systems
- quality standards
- project management systems
- other: ____________

There was a lack of:

- time
- money

There was a lack of competence in:

- R&D know-how
- Manufacturing know-how
- Market know-how
- Project Management
- international collaboration
- cross-functional collaboration

There was a lack of top-management support.

There were unclear goals/objectives

Goals were changed during the project

21. If you could do the project again, what would you do differently?

________________________________________

________________________________________

________________________________________

Thank you very much for your co-operation!
Appendix 3

Companies included in the survey

- AGA
- Alfa Laval*
- Eka Nobel
- Ericsson
- Gambro
- Pharmacia
- SCA
- SKF
- Tarkett
- Telia
- Tetra Pak*
- Volvo

* After the IIPs were initiated, Tetra Pak and Alfa Laval merged to form Tetra Laval.
Appendix 4

Project included in the survey

- Base-station for GSM
- Advanced personal communication system
- A series of medium size trucks for North America
- New dashboard for car
- New generation of spherical roller bearing
- Drug for use in hospitals
- Interior items of a car (rear-seats, dashboard, etc.)
- Market adaptation of a new vehicle
- (No description given)
- Base-station and switch for cellular system in North America
- Truck
- Telephone system for local exchange applications
- New heavy vehicle family
- New paper product for packaging industry
- Process to improve productivity in glass melting furnaces
- Process for production of cast iron already supplied by competitors
- New seal type of standard ball bearings
- Wood lamination floor-product family
- On-line safety system for chemical process
- Housed rolling bearing unit
- Centrifugal separator based on existing product
- Hub-unit with ABS sensors for cars
- Tunnel freezer for cryogenic freezing
- High-flux dialyzer
- Car-radios
- Plants for recycling dissolvers
- A sizing agent for cellulose fibers
- A wood floor with thicker surface layer
- Membrane for hemodialysis
- New intravenous nutritional support for critically ill persons
- Packaging system for milk and juice
- Fat soluble anesthetic agent
Appendix 5

Reasons for international participation - Project Managers

- Only suppliers abroad
- One product line originated from Sweden and one from Germany
- Local adaptation and sales support needed
- R&D and market not in the same country
- Resources not available in Sweden - market input needed
- Developed product is a component in a final product assembled in other country
- Competence/production facilities/resources
- Marketing and production in different countries
- Market in the USA/development in Sweden/manufacturing in France
- Knowledge and availability
- Development units with specific technological knowledge
- To launch product world-wide
- Multinational project
- Different regulations in different countries
- Knowledge/Capacity
- Local adaptation and production
- Local adaptation needed - production in several countries
- R&D in Belgium and Sweden/Assembly in the USA/Capacity in Belgium
- Market in Western Europe/Business Group management located outside Sweden
- Innovation and market in Scandinavia - theoretical knowledge and analytical capacity in the UK
- Different technological expertise in different countries
- Production in Italy/R&D in Sweden
- Suppliers and production abroad
- Competence and price
- RACE project (EEC-supported)
- Needed reference group from several markets
- Market investigation
Appendix 6

Reasons for international participation - R&D Managers

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number of projects</th>
<th>Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project demanded other technological know-how than could be found in the base country.</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>The project demanded more personnel resources than could mobilized in the base country.</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>The project demanded co-operation with suppliers that could not be found in the base country.</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>The project demanded co-operation with customers outside the base country.</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>The project demanded market knowledge that could not be found in the base country.</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>There was a need to facilitate the local acceptance of the developed product. (Avoid Not Invented Here)</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>The project demanded manufacturing resources not available in the base country.</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>There was available capacity in other countries.</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>We wanted to encourage international collaboration in the company.</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix 7

Advantages associated with IIPs by Project Managers

- Ideas from two different design schools could be emerged and evaluated.
- The project could not have been run without international participation as customers did not exist in Sweden and as the process was adapted in many countries at the same time due to demand from the market.
- Extra motivation and market information.
- Acceptance in the company.
- Learning of other ways of problem-solving.
- Easier market introduction.
- Acceptance within company.
- Improvement in inter-company co-operation.
- Learning of other working methods.
- Manufacturing competence.
- Market information.
- More know-how collected, time saving.
- Competence.
- Larger market.
- Sales in markets which we otherwise would have lost due to different regulations.
- Access to more experts.
- General experience.
- Specific market knowledge.
- Easier to prioritize features.
- International "eyes and ideas".
- Give the project new input.
- Could work parallel with different parts of the project - especially design.
- New ideas.
- Old factories were committed to the task.
- Certain amount of new thinking.
- Look at things differently.
- Availability of the right knowledge and capacity.
- Direct influence from the concerned markets upon the chosen solutions - fast feedback.
- Necessary for launching the product on several markets.
- Contribute to the distribution of knowledge.
- Concentration of specific knowledge/resources in one subject.
- Access to skilled and analytical personnel.
- Better understanding between people from different tech-centers
- No way of having all the people at one place.
- Projects like this create very strong networks between people.
- Necessary since suppliers that are critical are located abroad.
- Technology and manufacturing experience.
- Direct information to and from most important markets made it possible to get quick access to reactions, to changes in time schedule and product characteristics.
- Better technical solutions.
Appendix 7

Disadvantages associated with IIPs by Project Managers

- The rest of the team was not used to international work. A lot of problems arose due to cultural differences.
- Increased travel expenses.
- Some extra time is spent to communicate over language and cultural barriers.
- Communication difficulties.
- Difficult to co-ordinate dispersed resources.
- Difficult to communicate due to time difference.
- Different cultures with different values create problems.
- Longer development time.
- Longer communication time.
- Technical problem solving more time-consuming.
- Language problems.
- Changes in the local organization.
- More difficult to communicate (different languages and cultures).
- Meet too seldom face-to-face (informal contacts).
- Time and cost consuming.
- Takes longer time to learn how foreigners work.
- A little longer development time.
- Communication difficulties due to distance.
- Communication.
- Extra costs.
- Cultural differences took time to overcome.
- Communication due to distance.
- Language problems contributed to longer development time.
- Compromises due to local adaptation and production.
- In some cases double-work.
- Communication and languages.
- Compromises due to local design solutions (to be locally accepted).
- Geographical distances - traveling costs.
- Communication problems = language problems.
- Practical difficulties, such as more complicated planning and more expensive traveling.
- Distances meaning difficulties in daily communication.
- Increased time consumption for administration (planning of meetings, report writing, etc.).
- The geographical distance makes it more difficult to establish good flows of communication.
- Cultural differences make communication more difficult.
- Difficult to communicate, since face-to-face communication means extensive traveling, which is expensive and time-consuming.
- Difficult to understand languages.
- Language problems.
- Time losses
- Hard to make everyone work at the same time.
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