Esbjörn Segelod

**LEARNING THROUGH GRAFTING IN
VENTURES IN NEW AREAS**

**FÖRETAGSEKONOMISKA INSTITUTIONEN
UPPSALA UNIVERSITET**

Department of Business Studies
Uppsala University
1996-02-09

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Esbjörn Segelod

Send correspondence to:

Esbjörn Segelod
Department of Business Studies
Uppsala University
Box 513
S-751 20 Uppsala
Sweden

Tel: +46-18-18 25 00

Fax: +46-18-55 53 86

e-mail: Esbjorn.Segelod@fek.uu.se

Uppsala universitet
Reprocentralen HSC
February 1996

Abstract

Much has been written about how the members of an organization develop new knowledge and competencies; far less about how organizations can acquire knowledge through grafting on new members. Nevertheless this is a very important vehicle for learning in Western firms. This is an empirical study of learning through grafting in 13 major ventures in new areas. The study is based on interviews with top-management and conveys their image of the learning process. It shows how the companies have acted to acquire new knowledge, and develop new competencies, together with the factors affecting the process of learning.

1. Introduction

The rate of learning is now a key competitive advantage and, during the last decade, organizational learning has become a topical subject in academic journals. There are today a good many publications on how organizations increase their store of knowledge through acquiring and integrating new information. There are a number of theories and models of knowledge development and management on different theoretical levels (Daft and Huber, 1987; Stata, 1989; Senge, 1990; Kim, 1993; Bohn, 1994; Hedlund, 1994; Nonaka, 1994; Nevis *et al.*, 1995), empirical tests of such models (Nonaka *et al.*, 1994; McGrath *et al.*, 1995; Sullivan and Nonaka, 1986), case studies (Benghozi, 1990; Hobday, 1990; Hamel, 1991), and analyses of the concept of organizational mind and memory (Sandelands and Stablein, 1987; Walsh and Ungson, 1991; Stein, 1995) and of the connection between individual and organizational learning (Klein *et al.*, 1991; Kim, 1993). There are also several reviews of the literature on organizational learning (Hedberg, 1981; Fiol and Lyles, 1985; Lewitt and March, 1988; Huber, 1991; Dodgson, 1993), on learning in new ventures (McKee, 1992), in marketing (Sinkula, 1994) and in human resource management (Dixon, 1992).

Organizations can increase and change their knowledge-base both through the learning of their members and through acquiring new members and the knowledge they possess. Huber (1991) terms the latter way of increasing an organization's store of knowledge learning through grafting. Although such grafting seems to be an important way of learning for companies in Europe and the U.S. (Hedlund, 1994) there are few studies thereof. Research has been concentrated on the learning by already acquired and

integrated members. Hobday's (1990) study of learning in the Brazilian telecommunications industry, and Nordhaug's (1993) analysis of human capital in organizations are exceptions. However, there are many studies of learning through a specific mode of grafting, e.g. acquisition (Miles, 1982; Jemison and Sitkin, 1986; Pennings *et al.*, 1994), joint-venture (Lyles, 1988), technology acquisition (Granstrand and Sjölander, 1990; Granstrand *et al.*, 1992), licensing (Killing, 1978), cooperation with customers (Rosenberg, 1982; von Hippel, 1988; Håkansson, 1989; 1990), strategic alliances - which may involve both joint-ownership and looser forms of cooperation (Doz, 1988; Lorange and Roos, 1990; Hamel, 1991; Lei and Slocum, 1992) - and learning in discontinuous innovations and reorientations (Normann, 1971; 1977; McKee, 1992).

As industry has become more knowledge intensive, the rate at which new knowledge is generated and the cost of developing new knowledge have increased. Therefore it has become necessary for companies to concentrate on those parts of the transformation process in which they can develop a competitive advantage, and to outsource peripheral elements. This has aroused interest in the resource-based view of the firm (Penrose, 1959; Wemerfelt, 1984; Prahalad and Hamel, 1990; Bamey, 1991; Conner, 1991; Lado *et al.*, 1992; Mahoney and Pandian, 1992; Amit and Shoemaker, 1993; Peteraf, 1993; Prahalad, 1993; Lado and Wilson, 1994; McGrath *et al.*, 1995) and in outsourcing (Bettis *et al.*, 1992; Quinn and Hilmer, 1994; McFarlan and Nolan, 1995); moreover it has made learning through grafting a more important vehicle of learning especially when major changes in the knowledge-base are needed.

The purpose of this article is to contribute to this growing body of knowledge on organizational learning by analysing how organizations build up competencies in new areas when grafting is an essential source of new competence. The analysis is based on interviews with the managers in charge of 13 major such ventures and their image of this process, supplemented by analyses of written documentation of the cases, and literature on learning and ventures in new areas.

2. A few definitions

Since there is a confusion of terms in the literature on organizational learning we shall begin by defining the key concepts used in the article. One of these concepts is competence. Competence is derived from the Latin word "competentia" which means "meeting together, agreement", and in everyday speech has come to signify the "ability to do what is needed" (Longman, 1987). Selznick (1957) introduced the concept of

distinctive competence to denote those things which an organization does particularly well in comparison with its competitors. Other scholars who have used the term competence in this sense are Snow and Hrebiniak (1980), Grønhaug and Nordhaug (1992), Roos and von Krogh (1992), Nordhaug (1993) Lado and Wilson (1994), McGrath et al. (1995) and we shall follow in their tradition. Examples of more or less accurate synonyms used by other scholars are core competences (Prahalad and Hamel, 1990), firm-specific competencies (Pavitt, 1991), organizational capabilities (Ulrich and Lake, 1991; Stalk et al., 1992), human capital (Becker, 1962; 1964), organizational capital (Tomer, 1987), skill-base (Klein et al., 1991), knowledge-base (Spender, 1994), knowledge (Hedlund, 1994; Nonaka, 1994), and firm-specific knowledge (Eliasson, 1990).

We shall also distinguish between competence and competency. Grafted-on new members are carriers of competence, which must however be integrated and developed into a competency for the venture and the firm.

The competency of a firm is built up of several different components (Snow and Hrebiniak, 1980; Ansoff, 1984; Nordhaug, 1993; Lado and Wilson, 1994; Sandberg, 1994; McGrath et al., 1995). Lado and Wilson (1994, p. 702), for instance, state that "[o]rganizational competencies include all firm-specific assets, knowledge, skills, and capabilities embedded in the organization's structure, technology, processes, and interpersonal (and intergroup) relationships". We shall depart from Sandberg (1994) and distinguish between theoretical knowledge, practical knowledge and conceptions.

Theoretical knowledge "is of an intellectual and descriptive character and includes theories, methods and facts that the worker needs to know about the work" (Sandberg, 1994, p. 21). Practical knowledge consist of skills, defined by Nelson and Winter (1982) and Sandberg (1994) as regular sequences of coordinated behaviour which lead to achievement of goals in a given situation, and other forms of knowledge which is learnt through practical experience. Many scholars (Eliasson, 1990; Hedlund, 1994; Nonaka, 1994) make a similar distinction when they base themselves on Polanyi's (1966) differentiation of explicit from tacit knowledge. Explicit knowledge can be codified and communicated in speech, writing and instructions, whereas tacit knowledge has to be learned through socialization and practice.

The third component, conceptions, refers to the frame of reference, attitudes and values, i.e. the mental models of the actor which give meaning and guide action. This mental model is partly explicit and partly tacit (Senge, 1990; Ekstedt et al., 1992; Sandberg, 1994). The distinction here made between knowledge and competence encourages us, as Morgan (1988) argues, to think not about knowledge alone, but about how knowledge and skills are put to use.

3. Method

Companies may investigate and implement ventures in new areas representing new strategies without letting this be known to the public; it is therefore difficult to compile a complete list of such ventures from which a representative sample can be selected for study. However, major banks generally have good information about major investments. Therefore, two senior bank directors with long experience of Swedish industry assisted in drawing up a list of ventures in new areas which were implemented through internal development. From this list 13 of what seem to be the principal entries were selected for study as representing different industries and types of ownership. All 13 entries are large and, several of them, also well-known ventures in Sweden, having featured in annual reports and in the business press. Eight were current and five had been wound up. Today that figure is reversed. They represent some of the main ventures in new areas, which have been executed in Sweden in the 70s and 80s, and none had to be abandoned due to problems of access. See Table 1 for a list of the cases. Observe that in some cases, the companies studied are parts of larger corporations. The Table shows whether the venture was developed at the head office of the corporation, or by a subsidiary Company. Note, however, that major investments in new areas require approval by the group board (Jemison and Sitkin, 1986; Mukherjee, 1988; Segelod, 1996).

Data were collected both from written sources, e.g. annual reports and articles in the business press about the ventures and companies studied, and longer interviews with 30 senior managers by other managers identified as sponsors of these ventures and strategies. The written sources enabled preparation of the interviews with the managers who belonged to the core group of the companies at the time of the entry. They were managing directors of the companies studied, managers responsible for the ventures, and their close associates. All interviews were taped and subsequently transcribed, and in some cases additional information was collected at a later interview. Those interviewed have had the opportunity to read a compilation of the research findings. Many did so and commented on the sections dealing with their venture.

When several managers were interviewed about one of the cases they gave a very similar picture of the course of events, perhaps because they had all belonged to the core group and therefore had had opportunity to talk themselves together about one image of the course of events. Other images would probably emerge from interviews with the top managers who later wound up some of these ventures, or with managers on lower levels. However, the study was only intended to describe and analyse one image of what had happened, namely that held by those top managers who were identified by others as having

sponsored these ventures and strategies; it is therefore their image of the course of events which will be analyzed in this article.

Table 1. *Cases studied.*

<i>Case</i>	<i>Corporation</i>	<i>Entrant company</i>	<i>Core area of entrant Entry into</i>	
<i>Surviving ventures</i>				
<i>A</i>	Holmens Bruk	Holmens Bruk	Newsprint	Nonwoven plastic fiberweb
<i>B</i>	KF	OK	Oil distributor	Refinery
<i>c</i>	Saab-Scania	Saab Aircraft Division	Military aircraft	Civilian aircraft
<i>D</i>	Statsföretag	Frövifors Bruk	Unbleached pulp	Cardboard
<i>E</i>	Sydkraft	Sydkraft	Electrical power	Gas distribution
<i>Discontinued ventures</i>				
<i>F</i>	Electrolux	Bröderna Brodd	Street-sweeping machines	Multi-purpose vehicle
<i>G</i>	Ericsson	Ericsson	Telecommunications	Communications systems for offices, personal computers
<i>H</i>	Itera (Mbo from Volvo)	Itera	Cars	Plastic cycles
<i>I</i>	KVAB	KVAB	Rolling stock	Postvan, heavy articulated trucks
<i>J</i>	Mora municipalny	Mora Energiverk	District heating	Wooden pellets
<i>K</i>	Saab-Scania	Saab Aircraft Division	Military aircraft	Submarine robot
<i>L</i>	SKF	SKF Steel	Steel	Mini-steel works, chromium planta
<i>M</i>	Statsföretag	GVA	Shipyard	Rigs, esp. semi-submersible rigs

The respondents were asked to assess the competencies of their Company in the new area before and after the venture as determined on a five-point Likert scale. The assessments pertained to the functions (1) general management; (2) financial management; (3) marketing/selling; (4) market research; (5) product research and development; (6) engineering, basic and applied; (7) production; (8) distribution; (9) legal affairs; and (10) personnel, a functional division earlier used by Snow and Hrebiniak (1980) to measure distinctive competence. These assessments were then used to discuss what the companies had done to achieve these changes in competence. To harmonize the discussion all respondents were presented with a definition of competence as consisting of the three components; theoretical knowledge, practical knowledge, and conceptions.

4. A model of learning in ventures in new areas

The interviews and the analyses of the material collected made it possible to identify a set of important factors and connections affecting learning in the type of radical ventures studied, and to build an empirically grounded model of learning in such ventures (see Figure 1). This very simple model is composed of two processes, viz. the reorientation process and the new venture process(es). Furthermore, a distinction is made between the acquisition of new competence, the development of new competencies, and five factors affecting these processes of learning. Note that Figure 1 also serves as an outline to the next three sections in which we shall discuss some of the components and concepts of the model on the basis of empirical examples taken from the study.

In most of the cases it was possible to distinguish two separate processes; one top-management process, termed the reorientation process, and on lower levels one or several new venture processes. The ventures were usually developed and implemented by a Company or unit in a larger corporation, see "Entrant Company" and "Corporation" in Table 1. The new venture processes were paralleled by a process of strategy and organizational structure development. The processes evolved in interaction and the reorientation process supported the development of the new venture processes partly by supplying a suitable organizational structure for the ventures, partly by providing the competence and resources needed for the ventures and good preconditions for learning in the venture processes. Top-management involvement in the new venture processes was necessitated by the initiation, control and approval of the change of domain of the entrant companies, and the adjustment of the organizational structure to cater for these changes.

A distinction is also made between the acquisition of new competence, and the development of new competencies. New competence has been acquired from external sources through acquisitions of minor companies, joint-ventures, patents and licences, and the hiring of key managers; through cooperation with consultants, customers, and other firms, some of which were already established players on the new market; and through the learning of earlier employees, and training programmes to give the old workforce the skills needed for the new type of production and market. We shall give examples of the choices made by the companies, and the factors governing the decision to buy or to develop new competence.

	<i>Acquiring new competence (section 5)</i>	<i>Developing new competencies (section 6)</i>	<i>Factors affecting learning (section 7)</i>
<i>The re-orientation process</i>	Approving a reorientation and changing the structural context to support ventures in new areas.	Developing a new strategy, a suitable organizational structure for the ventures, integrating (6.4), wound up or sell off the venture.	The extent to which the system of ideas and organizational structure of the firm have been adjusted to learning through grafting (7.5)
	Supervising that the ventures are supplied with the necessary resources and competences and the outward-looking absorptive capacity needed to acquire the lacking external competence.	Supervising that the preconditions for learning in the new venture processes are good e.g. that they have relevant feedback and that learning is focused	Other factors affecting learning in the reorientation and new venture processes are: <ul style="list-style-type: none"> – the existence of inward- and outward-looking absorptive capacity (7.1); – the supply of relevant feedback for the learning processes (7.2); – the focusing of the learning processes (7.3); – the context dependent nature of competence (7.4).
<i>The new venture process(es)</i>	New competence can be acquired through grafting-on new members (5.1), cooperation (5.2), or learning by existing members, a choice affected by (5.3) the existing internal resources and competencies, the availability of external resources, and the time factor.	Three factors that have affected the development of new competencies <ul style="list-style-type: none"> – structure follows strategy (6.1), – tacit knowledge (6.2), – degree of control (6.3). 	

Figure 1. A model of learning in ventures in new areas

The development of new competencies has been affected by the nature and control of the type of competence developed. Tacit knowledge and dependency on the

contribution of other firms to the development needed are two factors which have caused difficulties. We shall also give examples of the changes in the production, market, and administrative sides of the firms consequent upon the implementation of the ventures. Major changes in the production or market side have made it necessary to develop new administrative routines and structure has thereby come to follow strategy.

The reorientation and venture processes have been processes of learning which developed in mutual interaction. Their success depended on the ventures having had relevant inward- and outward-looking absorptive capacity, the actors having received relevant feedback, the process of learning having had a clear focus, the extent to which the new competences have been context-dependent, and the learning structure of the Company. We shall define these concepts in section 7 and discuss how they have affected the learning.

5. Acquiring new competence

A distinction is usually made between entry by internal development and acquisition (Yip, 1982). Moreover it is often assumed that "[i]nternal diversifiers develop their own knowledge while acquisitive diversifiers purchase this knowledge" (Kazanjian and Drazin, 1987, p.344), and that entrants do not mix methods when acquiring competence (Roberts and Berry, 1985).

However, internal development is a vague term covering everything from minor product extensions to radical innovations (MacMillan and George, 1985) and very little of the competence necessary to implement a major venture is bound to have been developed internally. The ventures studied are good examples of this. Although all can be termed internal developments the bulk of the competence used in the ventures has been acquired externally, in one way or another. Instead of starting by buying an existing business in the new market these entrants have to a greater or lesser extent bought the elements needed and moulded them into a new unit.

Table 2 shows the methods or sources for acquiring new competence which the managers interviewed considered to have been of the greatest importance. Observe that the total number of minor acquisitions, joint-ventures, purchases of patents and licences, and cooperation partners, is therefore greater than the Table indicates.

5.1. Grafting on new members and competence

The interviewees mentioned the importance of the competence grafted on through acquiring certain companies, patents and licences, or entering joint-venturer,, and in particular the significant role which certain key managers with long experience of the new business have played in the competence acquisition process; managers who were recruited, or acquired through the joint-ventures or acquisitions. They contributed not only with their knowledge and skills but also with their personal network and understarring of the new area. They were better able to assess the competence needed, they were acquainted with the key actors on the market, and they knew where such competence existed and could be acquired. Furthermore they were farmliar with the way of thinking that govemed the actors on the new market; this was essential for the understanding of how this market worked and how operations should be pursued therein.

Table 2. Important sources of new competence.

	A	B	C	D	E	F	G	H	I	J	K	L	M
<i>Grafting on new members and competence through</i>													
acquisitions							x		x				x
joint-ventures		x	x				x					x	
hiring key managers	x	x	x	x	x	x	x	x	x		x	x	x
patents and licences	x											x	x
<i>Acquiring new competence through cooperation with</i>													
customers				x		x		x	x		x		
consultants	x	x	x	x	x		x			x	x	x	x
othercompanies	X	X	X		x	x	x	x	x	x			
<i>Acquirrng new competencies through</i>													
majortrainingprogmmees	x			x	x								x

A good example is Frövifors Bruk AB's entry into the carton business. The managing director had been recruited just before the presentation of the plans for the first liquid packag-ing board project. During the next five years at least five further paper-machine projects were investigated and the whole top management team was changed.

There was no one among the executive staff at the sulphate factory, who was competent to take charge of the new plant. Blue collar workers and the engineers could be given training over the course of a year or so. But at the senior level external recruitment was absolutely necessary. We have pinched competence. We realized from the very beginning that we would never be able to teach ourselves everything we needed to know. We knew we would not be able to make the chief of our paper mill into the head of the new cardboard factory. It only took us a few minutes to decide that we could not manage to do that. No one from the old paper mill has an equivalent post in the new plant. (The MD Frövifors Bruk AB)

Only in a few of the cases were key managers actively recruited. More often did they them-selves show an interest in the venture. Involvement in the creation of a new organization, carrying out the biggest and most interesting project in the industry, seems to have been sufficiently enticing in itself. Later on these managers often recruited other managers who had previously worked with, or heard about, them, most often informally through personal contacts and recommendations.

5.2. Acquiring new competence through cooperation

Our entrants also used many consultants, especially on the market side, and entered into cooperation with various other companies to develop competence on both the production and the market side. As the cooperation and the consultants were not permanently integrated into the new venture, the main competence acquired was knowledge. These individuals also brought new conceptions, practical knowledge and personal networks but as they were merely temporary participants in the venture they could only assist in the learning process. The permanent members drew on their knowledge and help to develop their own competence in the new area.

The Fiberweb case can serve as an example. The decision had been made to produce a nonwoven plastic fabric that can replace paper and cloth in many uses. A weaving technique already existed for thicker material. Thinner material was produced by the newly-developed spunbond technology, for which a patent licence was needed. Five of the six companies developing this technology were not prepared to sell their expertise. The sixth Company was the U.S. Company Crown Zellerbach. They were willing to sell their expertise as they had no desire to enter the European market. The cooperation included extensive test sales of Crown Zellerbach's products on the European market, technical

assistance, and training of shopfloor employees. The venture developed well but was later sold to James River which by then had acquired Crown Zellerbach.

5.3. The choice between buying and developing

All 13 ventures were implemented as internal developments. The acquisition alternative was said to **have been** considered in 10 of the firms but immediately rejected; one underlying motive appears to **have been** lack of experience of growth through acquisition. Their **organizational structure** (Berg, 1973; Pitts, 1974; 1976; 1977) and system of **ideas** (Abegglen, 1985; Watanabe, 1987) were adjusted to organic growth. When it **comes to explaining** the choice between sources for acquiring new competence for organic growth three factors seemed to be **important**, namely the existing internal resources and competencies, the availability of external resources, and the time **factor**.

The existing internal resources and competencies One of the **factors** initiating the process of reorientation was, in **all but the Holmen case**, that the top management perceived a threat to the **core business** of the **company** from a decline in its present markets; or a threat of new entrants, a situation **earlier** described by Normann (1971; 1977), Miles (1982) and Allaire and Firsirotu (1985). Furthermore, **several** of the companies were concerned to avoid the laying off of workers and engineers; engineers who themselves became a **driving force** as they advocated and were given slack resources to develop possible new ventures.

Financial resources and the risks involved **also affected** the mode of learning. It was considered impossible or to **risky** in some cases to **finance** the acquisition of any of the existing companies, and therefore, **necessary** to execute the **venture** as a joint-venture, or to outsource **certain** parts of the **venture**. The two ventures which were later completed as Mbo's are good examples of the **latter**.

The Itera all-plastic bicycle was an offspring of Volvo's development work on the use of plastic in **cars**. The project was bought out by two employees. As they lacked **financial** resources they had to outsource most of the **venture**. They recruited a few key managers who could evaluate and cooperate with those companies to whom these parts of the project were outsourced. Most of the product development work was then done by Bayer, Du Pont and SKF; marketing by Volvo; and production by Vilhelmina Plast.

The availability of external resources Some types of knowledge are easily available from e.g. consultants, in other cases, these are the property of a specific firm which one then has to be able to reach an agreement with to procure that knowledge. Knowledge of old technologies, for instance refineries, paper machines and gas pipeline systems, has been easy to acquire. Rival consultant firms and suppliers of equipment are willing to take responsibility for a project on behalf of those who can pay for such a service. The situation was totally different in the aforesaid Fiberweb case where the technical knowledge was the property of those companies which had developed the new spunbond process. A technology transfer agreement like that of Holmen and Crown Zellerbach can only be reached if, as Hamel (1991) points out, both parties benefit from such a cooperation. A problem for a new, unknown entrant which has hindered some of the ventures is therefore, that they were unable to attract the most competent partners.

The time factor It is generally accepted that grafting saves time (Killing, 1978; Hamel, 1991) and some studies show that imitation therefore plays a more important role for organizational learning when a new type of production is started, than later on (Argote *et al.*, 1990). The Ericsson, GVA and SKF Steel cases are good examples of this. All started by buying licences and patents, with the intentions of effecting a rapid entry into the markets and of developing their own patents and models at a later stage. SKF Steel, for instance, began by purchasing plasma generators from Westinghouse. They then carried out extensive internal development work, and compiled a patent portfolio of their own, eventually becoming leaders in the field. There was then no longer any reason to purchase technology since no one was ahead of them.

6. Developing new competency

Related diversifications are thought to be more successful than unrelated (Rumelt, 1974; 1982; Grinyer *et al.*, 1980; Bettis, 1981; Christensen and Montgomery, 1981; Bettis and Hall, 1982; Porter, 1987). One definition of relatedness assumes that "[r]elatedness is directly proportional to the amount of knowledge to be generated during the process of diversification" (Kazanjan and Drazin, 1987, p. 347). Similar definitions building on the amount of new knowledge to be generated have been advanced by Teece (1980), Burgelman (1984) and Wemerfelt (1984).

To test this hypothesis the respondents were asked to assess the competence of their Company prior to and after the implementation of the venture on a five-point Likert scale

with regard to the 10 functions listed in the section on Method. The result was somewhat astonishing as the test did not indicate a correlation between relatedness measured as amount of competence to be generated and success, except for the personnel function. The key factor seems to be not relatedness *per se*, as also Utterback et al. (1992) found, but how well the Company managed to acquire, integrate and develop the missing competence.

Major advances in competence proved to be no more difficult to achieve than small ones. It was of greater significance if there had been a prototype, a source from which it was possible to buy the necessary competence, whether it was a component or system innovation, or whether it was necessary to develop new routines for production or marketing. Moreover new production and marketing arrangements often required new administrative arrangements and routines. These took time to develop; often so long a time that in many cases adequate administrative routines were not developed before they were discontinued.

6.1. Structure follows strategy

All ventures implied that the Company moved from a later stage of the product life cycle to an earlier; in the Ericsson, GVA, and KVAB cases also to another type of production technology. When, for instance, GVA went from producing tankers in large lot sizes to custom-made rigs they had to recruit project managers from the construction industry and to train the work force in several occupations, as welders, sheet-metal workers, pipe layers, and electricians etc., to achieve the flexibility necessary for project manufacturing (Ohlson and Trugarna, 1986). The project managers became

key people in the restructuring process. They were culture carriers and entrepreneurs in one and the same Person. (The Personnel Director GVA AB)

All the ventures except the Scanraff project also involved changes on the market side, mostly by the seller moving from a relatively passive to a more active role in the marketing process. The EIS case is a good example of this.

Ericsson had previously sold telephone exchanges to state-owned post, telegraph and telephone authorities, of which there was one in each country. These were knowledgeable buyers who specified what kind of product they wanted to buy. When entering the market for electronic office equipment and, to an even greater extent, later on

when entering the consumer market for personal computers, Ericsson had to decide what the market wanted to buy. This was a major change, going from one customer in each country with whom the management could develop long-term relationships to a consumer driven mass market where the customers became statistical figures.

The entrants which went from one type of manufacturing to another, from batch to assembly line or project manufacturing, soon realized that new administrative routines had to be developed to achieve competitive production. The old accounting system did not supply the information needed and work had to be organized in a different way. The same applies to those which turned to another type of customers. The accounting system did not provide adequate information and wholly new marketing organizations had to be created in six of the cases. Those who had chosen to enter a business wherein their old manufacturing and market competencies could be applied were able avoid many of these problems, but to others the need for administrative changes seems to have come as a surprise and, just as Chandler (1962) has described, structure always followed strategy.

Unless structure follows strategy, inefficiency result ... Yet structure often failed to follow strategy. In each of the four companies, there was a time lag between the appearance of the administrative needs and their satisfaction. A primary reason for the delay was the very fact that responsible executives had become too enmeshed in operational activities. (Chandler, 1962, pp. 314-5)

The companies began by trying to transfer their existing routines to the new area. Only when these failed to function, and with a not inconsiderable time-lag, did they develop new routines. The lack of administrative routines pushed routine decisions upwards; several of the respondents reported that they became engaged in issues and decisions which would normally have been decentralized and handled without them even thinking about that these decisions needed to be made. Meier (1963), Driver and Steufert (1969) and Simon (1973) have shown that such information overload can hamper effective interpretation and learning, and this seems to have been the case in some of the cases. Thus, senior management may have been "enmeshed in operational activities", as Chandler put it, when instead they should have developed new administrative routines.

6.2. Tacit knowledge

Market competence was measured in three dimensions: market structure, marketing/selling, and distribution. All the entrants used consultants to assist them in mapping the market. In retrospect they have concluded that this gave them a relatively good picture of the market structure and the new marketing conditions. They thereby attained an intellectual understanding of the differences between the previous and the new markets, but were unable to translate this theoretical knowledge into practical knowledge and action. In the Frövifors case, this was expressed as:

It's like trying to learn to drive a car from a manual. You think you've got the hang of driving, but once you get behind the steering wheel, you realize that you are going to need quite a bit of driving practice before you really feel you're in control. (The MD Frövifors Bruk AB)

Entry into a new market involves a process of learning, for both seller and buyer, and one thing that both successful and unsuccessful cases have in common is that it has taken a longer time to reach the market goals than anticipated. This is in line with Utterback et al. (1992, p. 29) who found that "significant degree of market newness prove more difficult to conquer than technological newness". One explanation advanced by the respondents was that most of the ventures were undertaken by engineers. Another is that marketing requires considerable skills and tacit knowledge which cannot be developed in any other way than through practical experience and a process of learning.

The acquisition of theoretical knowledge was in general no major problem. It was more difficult to acquire practical knowledge. It has taken time to train personnel, and to develop practical knowledge about marketing, production and R&D. Only to a minor extent has it been possible to develop practical knowledge prior to the decision to invest through trial sales and training at the plant of another Company. Then theoretical knowledge, practical knowledge, and conceptions, ensued, by and large, from interaction. The application of theoretical knowledge has yielded new practical knowledge and the experience thereof contributed to the development of more detailed and realistic conceptions.

6.3. Degree of control

Much development work is done in cooperation between different partners (Håkansson, 1989; 1990). The earlier case when Itera outsourced the development work offers a good although perhaps extreme example of this. However, when the development of a new venture and business is outside the company's control the future becomes more unpredictable and the time needed to develop the venture is typically underestimated.

A good example of the importance of control is offered by the distinction between component and system innovations (Andersson *et al.*, 1982). A new aircraft or car model is a component innovation, whereas the development of a new system of transportation is a system innovation. The pellets venture was a system innovation. It required one distribution system to provide the plant with raw material, and another to distribute the finished pellets to the customers; furthermore it was necessary for the customers to invest in storage and combustion equipment. This means that the success of the venture was dependent not only on the success of the project which the Company controlled but also on what other parts of the new energy system did and did not do, which added to the uncertainty. The multi-purpose vehicle, the submarine robot, and especially the EIS and the pellets ventures, and one of the plants within the SKF Steel projects, had such a character of being system innovations.

6.4. Integrating new ventures

Both the reorientation and the new venture processes were processes of learning (Normann, 1971; 1977; Jelinek, 1979; Miles, 1982; Burgelman, 1988) where the interpretation of what has happened on the other level was an important feedback for learning. When several ventures were started, as in the Saab-Scania case, resources had to be focused sooner or later on those ventures which had proven to be the most suitable for the Company (Normann 1977; 1984; Van de Ven, 1986).

One major problem consisted in the integration of the new venture with the system of ideas, business formula and power structure of the existing organization (Hlavacek and Thompson, 1973; Normann, 1977; 1984). Major ventures in new areas may, as did those studied, often need five to 15 years to become profitable (Biggadike, 1979; Weiss, 1981); and this renders them vulnerable to criticism from profitable parts of the corporation if plans and reality do not coincide, which is frequently the case due to the innovative character of such ventures.

Factors that has made integration difficult have been that the venture has encountered problems, have had to be run by administrative procedures different from those used in the old business, and the fact that the direction of the venture or company has changed and the company and venture drifted apart; a bleak future for existing business, successes for the new venture and large investments have had the opposite effect. It has been suggested that the cultures and structures of the new and the old businesses should be kept separate (Allaire and Firsirotu, 1985), and an independent project management organization created (Roberts, 1978; Galbraith, 1982; Lord, 1993), but none of these measures have guaranteed success in the cases studied.

7. Factors affecting learning

The interviewees and the analysis of the interviews identified five important factors which have affected learning in the reorientation and new venture processes; the availability of absorptive capacity, the availability of relevant feedback, focus in the learning process, the extent to which the new competence was context-dependent, and finally, the learning structure of the Company. We shall discuss these five factors in this section.

7.1. Absorptive capacity

Grafting on new competences presupposes a certain ability to identify and assess what kind of competence should be acquired and how to acquire it (Cohen and Levinthal, 1990; Hamel, 1991; Levinthal and March, 1993). Cohen and Levinthal terms this capability absorptive capacity and defines it as the

ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends (Cohen and Levinthal, 1990, p. 569)

Cohen and Levinthal's definition of absorptive capacity involves both an inward-looking and an outward-looking component. The inward-looking component is the ability to assimilate external competence and apply it to commercial ends. The outward-looking component can be developed internally through learning by observation and by trial and error, acquired through grafting on new members, or outsourced to organizations with such competence. The cases illustrate all three strategies.

Learning by observation “enables people to acquire large, integrated patterns of behaviour without having to form them gradually by tedious trial and error”, according to Bandura (1977, p.12), but it takes a long time. Much knowledge is tacit in nature so that prospective entrants have to study a market for many years to understand the logic governing its actors; this perhaps may have contributed to the ventures having a long period of planning being more successful.

One way of speeding up this process is, as pointed out by Andersson *et al.* (1982), Hobday (1990), Mills and Friesen (1992) and Nordhaug (1993), to recruit managers with long experience of the business. We can here recall the above-mentioned examples of how Frövfors, Itera and GVA recruited key managers to internalize such absorptive capacity. The Itera and Sutec cases are very illustrative on this point as almost the only thing they did not outsource was the technological and marketing competence needed enable them to evaluate and match the partners with whom they cooperated. They became system companies with a very clear idea of what type of competence they had to internalize.

Another enlightening example is the Pellets case in which the Company took yet another step and also outsourced the assessment of technical competence to a small forest Company and a well-known consultant group. However, the consultant group inaccurately calculated the content of energy of the wood chips and gave a key contract to a small firm which went bankrupt, so that the venture failed and was followed by legal proceedings on who was responsible for these miscalculations.

In this case, and in others in which they have outsourced any part of the absorptive capacity needed, the interviewees concluded that it is necessary to have at least a modicum of competence inside the company to be able to assess and match consultants and cooperation partners. That key competence must not be outsourced.

This agrees with empirical research showing that firms which undertake their own research are better at identifying and integrating external information (Cohen and Levinthal, 1990), and that those with a broad internal technology base are better at acquiring and applying new complementary knowledge (Granstrand and Sjölander, 1990; Oskamson, 1993). Firms practicing grafting need to have a certain inventory of competences (Levinthal and March, 1993) in the areas which they may need to acquire external competence in the future; a portfolio of flexibility options (Sharp, 1991; Bowman and Hurry, 1993) on which they can draw if a new type of competence is required. Such flexibility options can consist of knowledge about present and future markets, products, technologies, social and political contexts, networks of contacts with consultants, researchers, colleagues, and cooperation partners,

7.2. Feedback

Comparison of the length of the period of planning indicated a very distinct difference between discontinued and surviving ventures. The surviving ventures have on average taken six years from the first idea to the final decision by the board to invest, to be compared with two years for those which have been wound up. The companies which have managed to make their venture successful have in general devoted more resources and time to developing the venture before giving it final approval for implementation. They have not allowed the pressure of time to make them implement the ventures before these have received the feedback necessary to be evaluated, and management on all levels felt reasonably certain that they would be able to implement them.

Theories of learning stress the importance of negative feedback (Hedberg, 1981; Fiol and Lyles, 1985; Huber, 1991). Such feedback has been received from both internal and external sources. Internally from the learning systems (Shrivastava, 1983) offered by the practice of a project organization (Benghozi, 1990; Firth and Krut, 1991; Lord, 1993), the capital appropriation system and its means for pre-approval review, company and group boards, and the interaction between the reorientation and venture processes. Externally from owners, lenders, grafted-on new members and cooperation partners, where cooperation with future buyers has played a key role when such feedback has existed.

If internal capital budgeting routines could not provide relevant feedback, then external feedback from the board of directors, providers of finance, customers and cooperation partners was even more important. Three MDs actually pointed to the lack of such feedback from their board of directors as a major reason for the failure of the venture.

The facts that resistance was encountered and that doubters had to be convinced did not mean that these parties were opposed to the venture. Most of them were favourably disposed to it, but did not uncritically and immediately accept the proposal in its original, vague form. Further information was demanded and those responsible for the project were thereby obliged to work carefully through all the aspects of the venture before receiving permission to implement it; "You have to prove your case before being given the go ahead" as the project leader of the civilian aircraft case put it.

7.3. Focus

The planning process had a sequential character. Attention tended to be focused on one or a few problems at a time, viz. a technical, market, administrative or financial problem, which the management thought had to be solved to bring the venture forward. Cyert and March (1963) call this

sequential attention to goals. ...Organizations resolve conflict among goals, in part, by attending to different goals at different times. (Cyert and March, 1963, p. 118)

The learning process runs more smoothly if the level of uncertainty is manageable; one way of achieving this is to focus attention on one or a few issues at a time and assume that other factors remain constant. Weick (1979) and Daft and Huber (1987) mention the need to reduce the equivocality which occurs when there are multiple and conflicting interpretations of information. In other words, at each stage of the venture the uncertainty should be kept at a manageable level.

Exactly, I think that is the secret of success. Instead of rumting all over the place, you should make progress in small steps, so that you feel that the ground is firm under your feet at every stage. That is what is different about this kind of project from normal projects in a Company, in which investments are made based on prior knowledge. Here we are starting from scratch. ... If the new step involves a number of unknowns, then you get into a crisis situation in which these risks first have to be structured and you have to put one foot forward at a time to try and reduce the level of uncertainty. You have to make sure that the parts work before you can nm the whole system. That was why we had to view the whole process systematically. (The MD Holmen James River Fiberweb AB)

The same principle applies to each new venture as a whole. Focused products (Meyer and Roberts, 1988) and entries tend to do better. The EIS venture, for instance, had a very broad approach:

[Y]ou should have a better focus on exactly what is being purchased. Don't get involved in too many things at the same time - at least, not in the way we did it. And you shouldn't try to do so many bloody things at the time, in getting into markets etc. We tried to get going, develop and stabilize a European market, at the same time as we were making energetic efforts to make a real break-through on the U.S. market, when our operations until

then had hardly been profitable, if profitable at all. Have a clear idea of your basic idea and then keep it in a really sharp focus, and don't allow yourself to be diverted. (Strategic planner EIS)

Ericsson? management was completely overexpanding with both the US venture and these bits [the EIS venture], and also really to restructure the group and put it on a more business-like footing. These led to conflicts, when business was bad

[The interviewer: It was too much at once?]

Yes, altogether too much at once. It's easy to see that now. And the major reorganization in 1983, that took five years to get to work reasonably well, and created so much insecurity, in-fighting and manoeuvring in the group. There were three large projects [Ericsson's restructuring, the EIS and the US ventures]. (The MD EIS)

Nevertheless it should be observed that the specialization which ensues from too narrow a focus might reduce the organization's absorptive capacity and the ability to give relevant feedback (Levitt and March, 1988; Levinthal and March, 1993). Specialization can also lead to more closed mental models of what and how the business should be run, and this can make it more difficult to integrate new competence. It is a balance between specialization and the holding of flexibility options, advanced by Henderson (1994) as an explanation of why the pharmaceutical companies founded in the 40s and 50s have managed to remain innovative and continue to dominate the industry.

7.4. Context-dependency

Dreyfus and Dreyfus (1986) studied competence acquisition among airplane pilots, chess players, automobile drivers and adult learners of a second language. Novices started by learning facts and features, and also some rules and procedures based on these facts and features. Then as they developed their competence in the new area they gradually acquired more and more knowledge and skills which were context-dependent. They created a way of viewing the area and solved problems through intuitively recognizing patterns in what was happening. When becoming experts the workers did not follow rules at all. The expert intuitively sees the whole complex of the problem and its solutions, or as Dreyfus and Dreyfus express it: "When things are proceeding normally, experts don't solve problems and don't make decisions; they do what normally works" (Dreyfus and Dreyfus, 1986, p. 31).

This context-dependent nature of competence has been demonstrated in studies of artificial intelligence (Winograd and Flores, 1986), learning at work (Sandberg, 1994), learning at shipyards (Argote *et al.*, 1990), and in strategic alliances (Hantel, 1991). The fact that competence cannot be dissected into context-free facts and routines makes it very difficult to describe its elements and to define precisely what competence is needed to implement a venture. It might, for instance, seem natural to assess the need for new competence, before embarking on a radical venture. However, although our entrants realized that they had to increase their competence in a number of areas, they could not specify in detail the competence that they needed;

we didn't know what would be required of us. ... Some things just have to be learnt by trial and error (Project kader SF340, the civilian aircraft case)

Saab Aircraft Division had no experience of the special requirements of the commercial aircraft market. Therefore, when their aeronautical engineers assessed the competence required, they drew on their own experience and ideas, which they had acquired from working with military aircraft projects. They realized that there were other requirements on the civilian market, but were unaware of the details and the requirements as far as competence was concerned. They had to learn these by working with the project, and since new aspects were revealed all the time, they also tended to underestimate the time and resources needed in those areas where they lacked experience.

7.5. The learning structure

One can, as Klein *et al.* (1991), assume that the new competencies built up in the course of a domain changing venture will generate new venture ideas when combined with old competencies and applied to new problems. These ventures will later need new types of competence to be implemented, which will change the bundle of competencies of the firm and cause still another cycle of learning. Furthermore, a firm carrying out domain-changing ventures can be expected to learn how to select and implement such ventures.

Saab Aircraft Division and Sydkraft, both of which have repeatedly acquired and developed competencies in new areas of technology, are particularly interesting in this context. Saab Aircraft Division proceeded through a policy of outsourcing and acquiring development work from companies which are more advanced in a specific technical field. Sydkraft had previously built up technical expertise to build hydroelectric power stations

and power lines, water pipelines, oil-fired power stations, and nuclear power stations. It was claimed that

[w]e have a great deal of experience of working on technical projects, constructing a facility, beginning with an unfamiliar technology and working our way through to a finished plant. Sydskraft possessed considerable competence in this area (The MD Sydgas AB)

This brings us to the question of where such knowledge or competence to implement domain-changing ventures is stored. It is well established that, for instance, companies growing through acquisitions and internal developments differ in structure (Berg, 1973; Pitts, 1974; 1976; 1977; Goold and Campbell, 1978; Hedlund, 1994). Organizational structure direct attention and growth, but can it be termed an organizational memory? Walsh and Ungson (1991, p. 61) define organizational memory as "stored information from an organization's history that can be brought to bear on present decisions"; they identify and analyze five such "storage bins" of organizational memory, namely individuals, culture, transformations, structure, and ecology. Other writers on organizational memory usually advance a narrower definition of organizational memory focusing on shared mental models (Normann, 1977; Argyris and Schön, 1978; Hedberg, 1981; Sandelands and Stablein, 1987; Kim, 1993). These mental models are a mixture of explicit and implicit knowledge (Sandelands and Stablein, 1987; Kim, 1993; Spender, 1994); the implicit element is often the larger (Kim, 1993). One reason for this focus on shared mental models as storage bins consists in the possibility that this part of the memory gives the other parts of Walsh and Ungson's storage bins an essential meaning and role in the conscience of the members of the organization.

Returning to our ventures the respondents have pointed to three types of storage bins that have helped them carry these ventures out, namely experiences of project organization practice, experiences of long-term ventures, and the individuals with experience of similar ventures.

Firstly, several of the companies have had a wide experience of evaluating and implementing investments through a project organization, experience which could be applied also to this type of venture. They have had the experience and the routines for operating large-scale projects and have regarded them as an asset. For a few examples of project organization to implement ventures in new areas see Benghozi (1990) and Lord (1993).

Secondly, four of the five successful cases were carried out by companies in the energy, the forest, and the aircraft industry. Major basic investments in these industries

often have a payback period not much shorter than ventures in new areas. Therefore, there has been a widespread understanding of the long-term nature of such ventures in these organizations and on the boards of directors, and also experience of and routines for pre-approval control of such ventures. The character of long-term ventures has been a part of their dominant ideas (Normann, 1977) or dominant logic (Prahalad and Bettis, 1986), and the control and feedback system of the Company.

The third storage bin comprised the individuals, and especially the project leaders and their associates with long experience of such ventures; If these key individuals were to leave the Company most of the competence in acquiring and building up competence in new areas would, allegedly, leave with them. This view is supported by the fact that very little of this type of competency, which could be termed the **core** competency of internal development, is articulated through written instructions and formal teaching. Instead it seems to be transferred mainly through work experience. Therefore Gluck (1985) is evidently right when he claims that

[t]he problem is that very few of our largest and most successful corporations have really worked out how to renew themselves when major shifts in the environment occur. (Gluck, 1985, p. 50)

One explanation is that domain changing ventures of the type studied are unique and seldom implemented by most firms. Another that **much** of the competence is **context-dependent** and therefore hard to articulate and **specify**; indeed this circumstance makes it difficult to study how such competence is transferred into new administrative routines and procedures.

8. Concluding remarks

The rate of production of new knowledge has accelerated. Industrial production has gradually become more knowledge-intensive, and knowledge an increasingly important critical resource. At the same time, and possibly as a consequence, we **have also** witnessed how companies **have** become more specialized; they **focus** on developing their competitive competencies and outsourcing assignments to others **better** equipped. This strategy has narrowed the competency base of Swedish firms and industries (Oskarsson, 1993) and emphasized the ability to **graft** on new competences when the competency base needs to be changed.

Theories of organizational learning deal mainly with how organizations acquire information and develop knowledge. Learning through grafting is still an underdeveloped area awaiting modelling notwithstanding that grafting is an important mode of learning for Western firms (Bolton, 1993; Hedlund, 1994). They have a structure which makes it easier for them than for Japanese firms to graft on new members (Hedlund, 1994). The strength of the latter rests more on their ability to develop new competencies through learning without grafting. In a world where changes come thick and fast and development costs rise the ability to learn through grafting could be a competitive advantage for Western firms. However, as Gluck (1985) pointed out, few firms have made plans for their renewal when major shifts in the environment occur. There is obviously a need to articulate this knowledge so that it can be easily transferred from one grafting opportunity to another, and for a holistic model of the role of grafting in organizational learning.

One key problem seems to be to integrate grafted on new members and ventures, another concerns how to transfer and disseminate experience from one grafting opportunity and domain changing venture to another.

The solutions seem to be several. First, it helps to choose ventures for which existing manufacturing, marketing, and administrative principles are valid. Secondly, one can choose ventures in which base technology can be applied in different contexts, so-called generic technologies. This lessens the problems of integration and adjustment in future ventures. Thirdly, one can invest in outward-looking absorptive capacity in the areas where the firm will eventually need to develop new competency, e.g. hold more flexibility options. It is a balance between specialization and flexibility (Levinthal and March, 1993; Henderson, 1994) and it is generally believed that Western firms underinvest in such flexibility options and investments which create new investment opportunities (Jacobs, 1991; Porter, 1992). Fourthly, one can try to diminish the integration problem by not insisting that the new business be run along the same lines as the old. There is a need to develop the art of administering heterogeneous group structures and a market for transferring new ventures to firms which may be better able to make them successful.

Acknowledgements

This research was made possible by generous grants from Jan Wallander's and Tom Hedelius' Foundation for Social Research. The article has benefited from the helpful comments of Gary Jordan.

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