

Dynamic Capabilities for Entrepreneurial Venturing; the Siemens ICE Case

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Track 19: VENTURES AND ENTREPRENEURSHIP

Abstract

Rapid growth rates of new businesses in the telecommunication industry can only be achieved if existing large sales organizations can be adapted to integrate innovative products and services. These stem from small firms or development units. The challenge is to systematically update the large organization's operational routines. We analyze a case of a telecommunication manufacturer that changed its organizational structure, in order to cope with the interface problems between the product & solution management department and the large sales/operations department. This interface was seen to be unsatisfactory; i.e. long lead times, inefficiencies, dissatisfaction of employees.

Grounded on the case data, we will investigate how business units of large organizations can cope with managerial issues that arise at the interfaces between new entrepreneurial ventures and the existing organization.

As a local theory for this case, we have identified two dynamic capabilities: incubating and grafting. These support two phases of this entrepreneurial venturing process. We refer to entrepreneurial venturing as an interface process between technological innovations generated by small entrepreneurial ventures and the subsequent ramp up of the sales organization.

1. Introduction

The telecommunication industry is faced with disruptive technology changes. New businesses are arising at such a pace that traditional organizations can hardly deal with them and risk taking is becoming more necessary to excel in this industry. This requires a change from administrative management, stemming from the pre-deregulated business era, to entrepreneurial management techniques.

In this context, we are studying the dynamic capabilities of management and how these have evolved in our case study. The dynamic capability research has emerged from theoretical streams such as the resource-based-view of the firm. However to date little empirical research has been contributed so far and the observation of dynamic capabilities remains difficult.

The objective of this paper is to report a case study, on which we have grounded the conceptual establishment of the two dynamic capabilities: incubating and grafting new ventures. Evidence suggests that the process of entrepreneurial venturing shows two distinct phases. Firstly, the re-combination of technological and marketing knowledge in entrepreneurial initiatives, and secondly the continuous organizational innovation. These processes are supported by the distinctive capabilities, which we refer to as incubating and grafting. In the following sections these capabilities will be discussed in the light of the evidence provided by the case.

We are using a grounded approach (Eisenhardt, 1991), and are reporting a longitudinal case study, of the Enterprise Networks division (ICE) of Siemens Switzerland. The case follows an ongoing change project initiated at Siemens in order to address the problems outlined above. The department focuses on both data and voice solutions for enterprises.

To academia this research intends to contribute conceptual clarity (Dyer, 1991) on entrepreneurial dynamic capabilities. Although the concept has been developed by a longitudinal case study at one company, which implies that the degree of generalization has yet to be discovered, it provides the first concrete candidate of a dynamic capability concept of entrepreneurial venturing. The scope of this empirical research therefore contributes to the

overall research agenda of dynamic capabilities in general, and specifically opens the discussion towards more concrete and applicable concepts of how dynamic capabilities work within specific environments.

The contribution to management practice is a concept that allows for a more systematic approach to enhance successful entrepreneurial venturing in highly competitive environments. The successfulness of the concept derived from our case is indicated by a number of changes supported by its members that resulted in a lean organization. These changes enabled the existing sales/marketing organizations and the innovation process to interface. The concept explains a process based on two venture phases and determines the absorption degree in the exiting sales organization. The dynamic capabilities for entrepreneurial venturing allow for careful management of the new business development process. This concept helps managers and decision-makers to plan and organize their processes so as to optimally benefit from new innovations.

The remainder of the paper is structured as follows: in chapter two we will present a theoretical foundation of dynamic capabilities on entrepreneurial venturing, briefly discuss the research methodology. In chapter three we will present the case study data. In chapter four we will extract two dynamic capabilities from our case observations. We close the paper with directions for further research.

2. Theoretical Foundation and Research Methodology

Entrepreneurial Venturing

For our purpose it is useful to distinguish between traditional administrative management practices in the telecom industry and entrepreneurial venturing. The latter is based on risk taking, development of new opportunities and an orientation towards growth. We define entrepreneurial venturing as the process of incorporating entrepreneurship and new business models into an existing organization. A key challenge in this process is to overcome the interface barrier between new product/solution development processes and the sales/marketing and logistics processes.

The entrepreneurial venturing process can be seen at a start-up level (small independent business units). However, the management competencies to integrate this process in a larger setting (large-scale commercialization) can be found in large organizations. We have focused on ventures that reside in larger organizations. Dynamic capabilities (Teece, 1995) are required for larger organizations to systematically support the process of entrepreneurial venturing,

Dynamic Capabilities

Technology-based industries have alternating periods of incremental innovation and subsequent dominant designs, and periods of radical change. Telecom firms encounter new technologies that can be disruptive in one or more aspects to their knowledge base. They often face these changes with limited ability to react due to financial or managerial commitments. In these situations firms should have capabilities to innovate (Nelson and Winter, 1982, Nelson 1991, Zollo and Winter 1999, Teece, Pisano and Shuen 1997). Simply having processes to produce a certain product or service, will not be enough in the long run. These capabilities require appropriate organizational and managerial routines, that enables them to innovate and take economic advantage. These dynamic capabilities, from a Schumpeterian perspective, must enable the firm to innovate, and to make that innovation profitable over and over again (Nelson, 1991).

The emerging literature on dynamic capabilities draws on the resource-based view of the firm (e.g., Hayes et al., 1988; Itami, 1987; Iansiti, 1994; Teece, 1994; Kogut and Zander, 1992; Nelson and Winter, 1982; Teece et al., 1997) that states that the firm's resources are an essential structure for innovation.

Dynamic capabilities are the antecedent organizational and strategic routines by which managers alter their resource base (acquire and shed resources, integrate them, and recombine them) to generate new value-creating strategies (Grant, 1996; Pisano, 1994). In line with Teece, Pisano and Shuen, (1997) we define dynamic capabilities as:

Dynamic capabilities are what enable a firm to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997). Dynamic capabilities are the firm's

*processes that use resources to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die (Teece et al., 1997).*¹

Teece and Pisano (1994) identified three classes of factors that determine how a firm's dynamic capabilities evolve:

- processes: managerial, technological and organizational routines
- positions: current endowments of technology, customer bases, and suppliers
- paths: available strategic alternatives.

Competitive advantages and competitive disadvantages (Moss Kanter, 1994) of firms are seen as to be resting on distinctive managerial and organizational processes (ways of coordinating and combining), shaped by the firm's specific asset positions (internal and market) and molded by the evolutionary and co-evolutionary path(s) it has adopted or inherited. Managerial and organizational routines are referred to as a firm's routines or patterns of current practice and learning. Positions are being defined as current specific endowments of technology, intellectual property, complementary assets, customer base, and the external relations with suppliers and complementors. Paths are the strategic alternatives available to the firm, and the presence or absence of increasing returns and attendant path dependencies. The firm's processes and positions collectively encompass its competencies and capabilities. The competitive advantage of the firm is seen to be sustainable at the firm level through repeatedly creating short-term business.

Drawing on this theoretical foundation the following section briefly describes the methodology for the longitudinal case study at Siemens ICE.

Methodology

We have used a grounded approach for the case study research (Eisenhardt, 1991; Glaser, 1967). Given the early stages of theory development on dynamic capabilities, we followed the logic of grounded theory by building our research on an exploratory case study. This method has already been successfully used in the emergent field of continuous innovation (e.g. Burgelman, 1991; Leonard-Barton, 1995; Brown, 1997), and it is consistent with the problems of theory development in the field of organizational capabilities (Verona, 1999). It can be hard to develop normative prescriptions on capabilities from cross-sectional studies (Henderson, 1990). Organizational capabilities are the result of complex processes comprising of the accumulation of small decisions and actions undertaken over many years in a situation of great uncertainty that can hardly be identified by quantitative research. In this sense, qualitative research is better suited to explore their nature.

Our study encompasses in-depth semi-structured interviews with CEO, middle managers as well as all employees participating in the innovational diffusion process. Amongst these were the Director of the research center, the Vice President responsible for Business Development and several managers directly involved in the projects leading to the development of VoIP and Security Systems. Also archival data based on financial statements, internal documents, industry publications and other written material were included. The interviews began with a brief description of the respondents' background and their organizational role. We then concentrated on the process of new business development, to detect the different dynamic capabilities used to stimulate and manage new business development. Interviewees were asked to describe the process and their role in it. Subsequently they were asked to explain possibilities for the improvement in new business development. We tried to leave the questions as open as possible, thus letting the results emerge from our respondents. We also never directly asked about «dynamic capabilities» or analogous concepts.

¹ The term “dynamic” in this context is not used in the sense of multi-period analyses but refers to situations where there is rapid change in technology and market forces, and “feedback” effects on firms (Teece, et al. 1997).

The analysis began with the identification of relevant capabilities as explicitly mentioned or indirectly implied by our informants. After having identified relevant capabilities, we tracked actions, decision and structural features that were considered to be at their basis. Five interviewers, including the three authors, conducted the analysis independently and integrated the findings with the results of the archival collection. Our aim was to build on and move beyond our informants' interpretations, in an attempt to interpret facts and narratives within an emerging theoretical framework.

3. The Case of ICE at Siemens Switzerland

3.1 Background

Siemens in General

Siemens is an international electrical engineering and electronics multinational company employing over 440,000 employees in over 190 countries. Their product offering includes 50,000 product families and approximately 1 million products. Siemens is a highly innovative company, roughly 80 percent of the products have been developed over the past five years. It has over 49,000 employees engaged in research and development worldwide, and the annual R&D budget exceeds EUR 5 billion.

The revenues stem from 6 business segments: energy, industry, healthcare, transportation, lightning and information & communications.

Siemens Enterprise Networks Division in Switzerland

In our case study we will focus on the business segment of information & communications (I&C) in the Enterprise Network Division (ICE) in Switzerland. Traditionally the national subsidiaries of Siemens are sales outlets of Siemens Group. However, the I&C division in Switzerland is different in that it also strongly engages in R&D activities (R&D budget of 51 million Euro, of which 18 million Euro is allocated to the ICE division), especially in the voice over IP section.

Siemens Switzerland head office is located in Zürich and employs 3900 people. The annual turnover of Siemens Switzerland is 1.1 billion Euro, with the Enterprise Networks department accounting for an annual turnover in 1999 of 160 million Euro. The turnover has risen 69% in the accounting period from 9.1998 to 9.1999. The Enterprise Networks department employs approx. 500 people.

Market

The market in which ICE operates is the Telecommunication Enterprise Network market. The customers are enterprises for which tailor made information and communication solutions are provided in 5 major areas: Voice networks, Data Networks, Application (Hardware and Software) Services, and recently Converged Networks (Voice over Data Networks). Figure 1 shows a short overview of this market and some product examples.

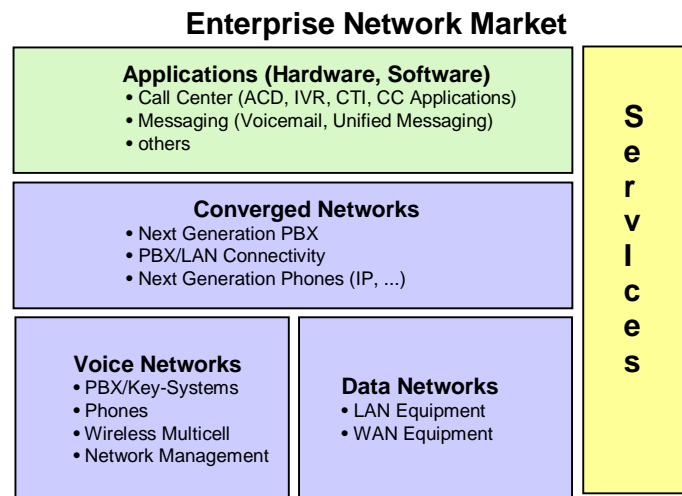


Figure 1: Enterprise Network Market

The telecommunications services market is increasingly outperforming the telecommunications equipment market in volume. This development is driven by the trend in demand for comprehensive, customized solutions and new hardware / software functionality. The mixture of traditional and IP-based networks and the stronger penetration of applications increase complexity, which is visible in converged products where Voice is digitally routed over Data networks such as Internet Protocol (VoIP) and ATM.

Furthermore this complexity requires a more solution-oriented approach by the vendors (Siemens: Marketing, 2000). The share of enhanced services revenues generated by integrating converged systems and applications is strongly outperforming the share of revenues made with traditional voice-based systems. The lack of human skills associated with the topics convergence (of voice, data and media), IP networking and application development leads to increasing service costs and new business opportunities for hardware suppliers in the services business.

3.2 The initial situation at Siemens ICE Switzerland (July 99 – Jan 00)

At the ICE division of Siemens Switzerland, competencies in the information business and in the communication business proved very competitive for the development of innovative VoIP systems. At the same time however, organizational assets caused inefficiencies. These inefficiencies emerged on the interface between the new product/solution development department and the sales and marketing organization. The division's management board perceived the interfaces between the small entrepreneurial ventures (new businesses) and the large sales organization as unsatisfactory (i.e. long lead times, inefficiencies, dissatisfaction of employees), which instigated the change efforts described in this case.

Changes in the product life cycle

Using the product life cycle (Abernathy and Utterback, 1978) Siemens found a profound change in the pattern of innovation. An interpretation of these changes can be found using the traditional Roger Curve (Rogers, 1962) at ICE. Based on the 1995 figures, this curve shows a product life cycle of 3 years, with investments of approx. 10 million Euro per product. Figure 2 depicts the traditional curve and confirms the BCG Matrix for products, in that the product shows a positive cash-flow during the maturation phase of the life cycle. This implies the existence of so-called cash-cow products.

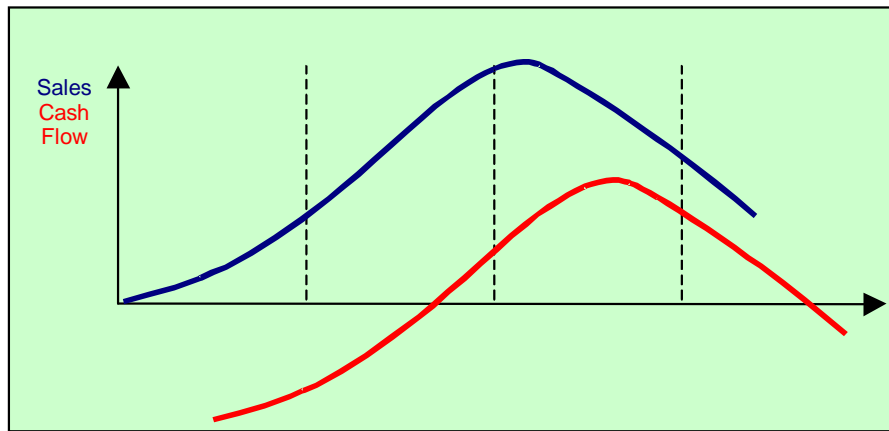


Figure 2: The traditional life cycle (Rogers, 1962)

This representation of the business was valid until 1995. In the telecommunication industry, a range of factors has been reported to cause drastic changes in the life cycle of the products.

Compared with the traditional curve, the market-life cycle has shortened to 9 months, and the required pre-investments have more than doubled. An example of the new life cycle is depicted in figure 2 and shows a study of a Wireless device made by Siemens. .

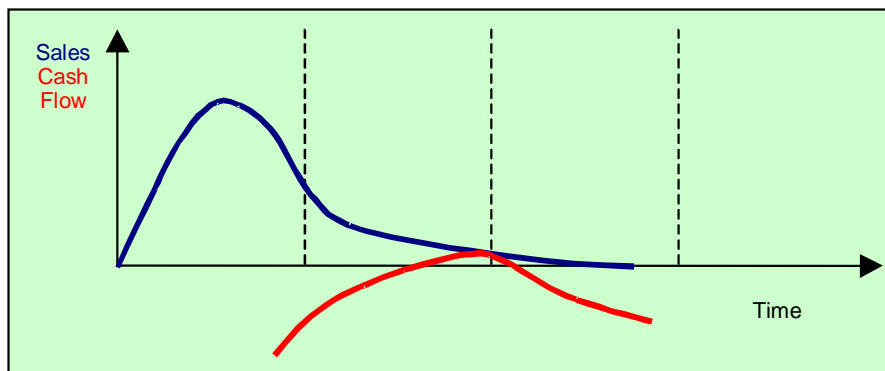


Figure 3: The present life cycle on the telecommunications market (Example of the new Wireless generation)²

Two initial conclusions can be drawn out from this study. Firstly, the cash cows in the product portfolio disappear. Secondly, architectural innovation (Henderson and Clark, 1990) becomes a requirement, because the pre-investments and technologies have to be rapidly integrated.

Voice over Internet Protocol Innovations at ICE

This is particularly true for VoIP where voice technology and LAN technology come together for one product. IP Telephony and Voice over IP (VoIP) are key themes in the telecommunication industry. IP is an acronym for "Internet Protocol" - a network level data transfer protocol which is often used for networking PCs and accessing the Internet.

² Source : Department of Marketing and Finance of Siemens Switzerland, Swisscom

The benefits offered by IP telephony are to cut the cost and investments of communication between various business sites. The innovation came in the form of IP telephony gateways which no longer link individual terminals such as PCs via the Internet, but rather connect entire communication systems located at different sites. This ensures that the infrastructure familiar to the user (telephone, features, and dialing behavior) would remain intact. At the same time, new possibilities can be offered, e.g. the call can be routed (transparently for the user) by the telecommunication system via an IP telephony gateway and the Internet by means of the Least Cost Routing functionality.

VoIP innovations are typical architectural innovations, where the components do not change however the architecture between these components does. Voice components such as the PBX (communication servers) and Data networks are integrated.

At the ICE division level it was evident that the incubation of such solution oriented competence centers were well supported. In the VoIP competence center, the manager of the department was also an entrepreneur (previously owner of a company) and therefore created a small venture within the company. This venture brought together the backgrounds of both data and voice engineers, and focussed on solutions, with own projects.

The processes of the independent centers were not adapted to the existing two sales organization; Voice Networks (telephone) and Data Networks (computers, Local Area Networks).

It was found that the malfunctioning of the integration of the data and the voice side of the company was a result of two existing cultures. Siemens is a traditional telecom producer and has telephony competencies. In 1996 the need for data communication led to the decision to buy a data company (employing approx. 90 people). A separate data division, Siemens Nixdorf, initially bought the company. In 1998 this division (approx. 120 people) integrated with the ICE division. However, the different technology orientations implied a degree of culture conflict. The voice side, which used to work with over 95% of Siemens-made products, now had to collaborate with a data organization, which used to work with more than 95% of products and components from external suppliers. In general, we have observed that the culture from the data side is flexible in nature due to co-operation with relatively young and flexible organizations like Cisco and 3icom, which are generally considered as having a more flexible and autonomous stance towards the innovation process.

Impact on operational and innovation processes

The ICE division still runs two separate order management systems, and the ordering process of putting in an offer and delivering the goods and services requires over 23 transaction systems. The incompatibility of the two IT worlds (legacy systems) led to the need for increasing coordination efforts to be put in place when customers ordered data, voice and converged equipment and solutions.

The incompatibility stems from the division's history, in that it (the voice side) used to deal with fairly stable customers, like the national phone operator. However due to the liberalization, deregulation and privatization trends the market has become more competitive. More customers came on the scene, and thus competitors. Previously the organization received clear-cut orders (from the voice side of the business) from well-known customers with relative well-known products. However the environment changed to the provision of more complex innovations to a diversified market.

On a divisional level we found increasingly complex innovation problems due to a decentralized organization. The technological knowledge of the new (converged) products could not be diffused in the regionally organized department. Switzerland has 3 dominant regions with their own language and culture (French, German and Italian). Whilst appropriate from a customer relation point of view (one regional face to the customer), the technological knowledge of these complex businesses is not available in all parts of the country. In an interview, a presales consultant confirmed this

“... sometimes I have to spend up to 2 days to find the best supplier for a particular cable, even though I am almost certain that the same problem has already been solved somewhere else in the organization”.

Customers also perceived this lack of knowledge transfer in the sales process. A customer who ordered Swiss-wide PBX's and telephone-sets, came to the conclusion that the installation differed in Lugano (Italian region) from the one in Basel (German region). Due to the enhanced and more complex features of the products, his employees, who traveled frequently between the two sites, had to learn how to operate the same equipment twice, because the installation was not standardized.

The lack of knowledge transfer was not limited to the different regions within the same function (presales, technician), but equally occurred cross-functionally. Interviewees demonstrated that diverging sales strategies withhold Siemens from optimizing the sales of new products. For instance customers told of several occasions where they were aware of new Siemens products before the sales-force were.

Internal reasons for the lack of knowledge transfer were further limited by the organizational competencies and the motives of the sales-force to concentrate on old and familiar products instead of innovative solutions. A quote from a salesman:

“Why would I spend a day on trying to sell one VoIP system, whilst I can sell 3 PBX systems in the same time”.

Traditionally the sales-force was specialized in selling products “sales of boxes” as a result of the traditional supplies to the national phone operator. But as a customer put it:

“I do not care what kind of PBX is in my cellar, I just want to make a phone-call”

The above mentioned process implications were further rooted in the compensation mechanisms. The compensation scheme was sales oriented (regionalized) and depending on the individual sales volumes. Established products generate better sales than new products. Although new businesses have been explored using pilot projects and specialists and the use of so-called competence centers, there were no clear rewards for sales to invest in building the sales competence on new products. The product and solutions managers, who were responsible for the introduction of these new products, were organized as a support function (overhead). As a result the information flow of new product information was seen as unsatisfactory by the sales organization.

Such interface problems between the product department and the sales department culminated, when nationwide big projects were to be realized. These projects require the cooperation of numerous employees from different departments and regions. This resulted in insufficient accessibility by phone, lingual barriers and lack of readiness to cooperate.

Rapid Product Switching in the Development and Sales Departments

In the course of this analysis it became clear that the ICE division needed new organizational competencies. During an interview session the following drawing (figure 4) was produced to show the competence had to quickly move from one Rogers curve to the next. It shows that the organization has to be able to quickly switch from innovation to innovation, rather than to rely on the cash cows. A separate business strategy was required for the division, in addition to the corporate strategy, in order to deal with the flow of new business opportunities and sustain competitiveness.

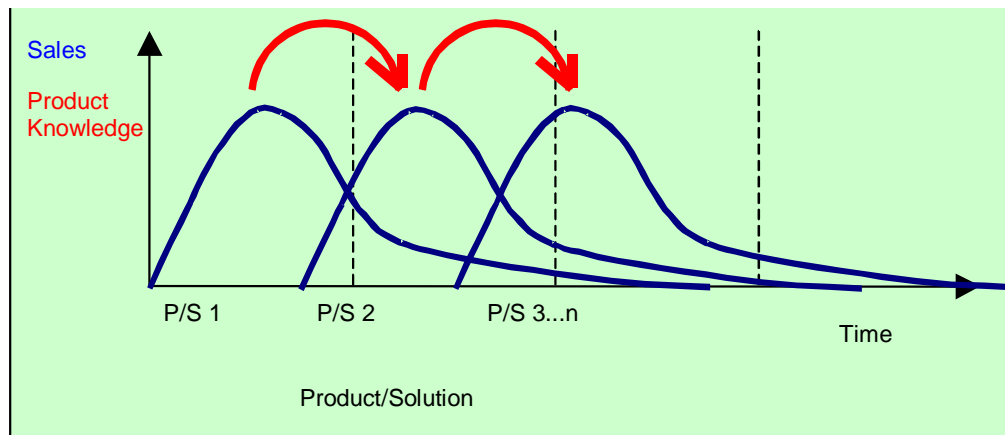


Figure 4: Switching Business Opportunities

This first phase and analysis was mainly based on document analysis from Siemens sources and approx. 20 interviews with managers of the ICE steering group.

3.3 The ICE 2000 project (Jan. 00 – June 00)

The division's board decided to engage in an ongoing process change management initiative. ICE previously undertook three Business Process Re-engineering projects, which were all unsatisfactory. The last project (so-called GPO project) resulted in a description of the processes within the ICE division, however the organization was not able to implement recommendations for improvement of the processes. This led them to start a new project (so-called ICE2000) in January 2000. This project aimed to check the current processes against the results of the GPO (which ended in June 1999) and furthermore improve the processes.

New Process Concept

The ICE 2000 project resulted in a new process concept. Figure 6 is the graphical representation of the new process concept.

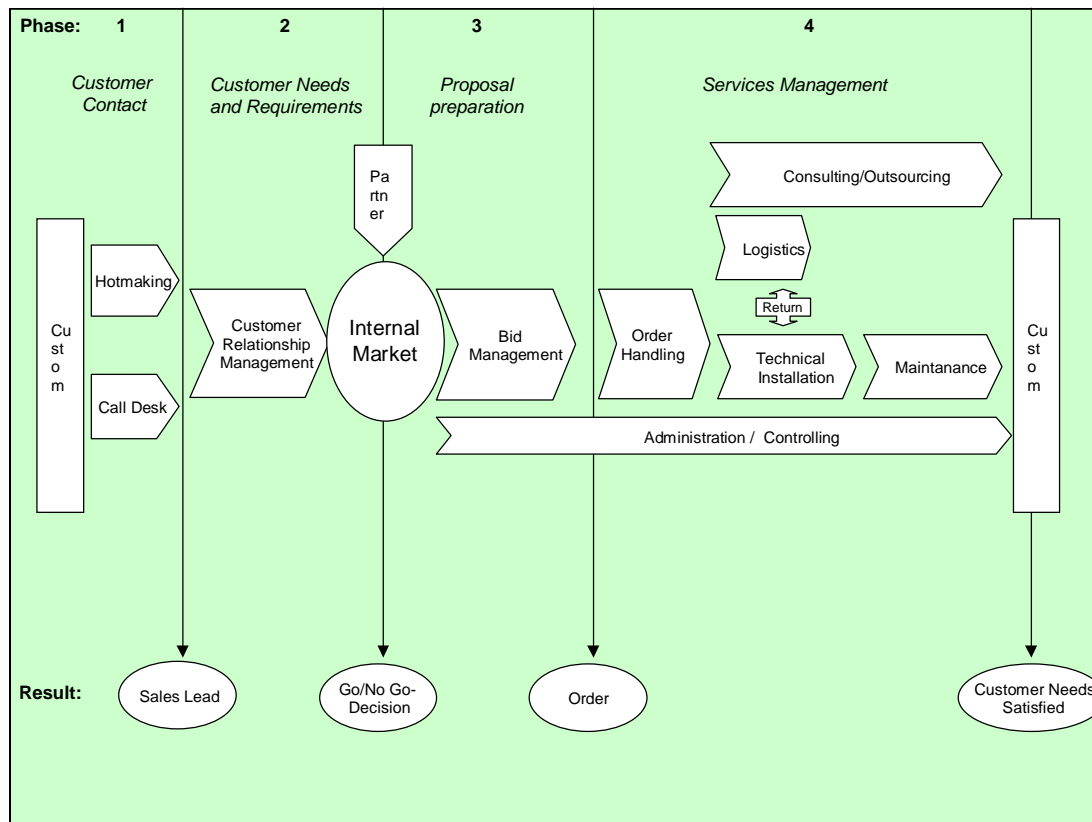


Figure 5: New Process Concept ICE

Phase one represents the customer contact. The input for this phase focuses on informing and establishing potential customers. As a result of the increasing competitive markets, the former sales activities have been redefined. The former sales representatives mainly focused on maintaining the existing customer base. As the national operator, the biggest customer of the department faced more competitors, which affected the need for more active sales actions to be taken by the division. This led to the creation of a new process coined “Hotmaking” (making potential customers interested). The output is defined as a sales lead, which is the input for the phase two, Customer Relations Management.

Customer Relations Management is the second result from the redefinition of the old sales-force. Customer Relations Management receives the sales lead from Hotmakers, the call desk, or requests for proposals from existing customers. The task is to turn these sales-leads into clear business opportunities. This phase is characterized by a high customer focus, in which the customer requirements and needs will be defined. The output is a clear business opportunity that will be presented to the internal market.

Phases 3 and 4 are the actual bid management and the service management processes (including the distribution, installation, maintenance, and consulting). These processes are predominantly technology oriented. The internal market represents the negotiation between the sales pull and technology push activities.

The previously described process implications and incompatibilities led to the common understanding of having an internal market structure within the order mechanism.

Internal market is a metaphor for switching. The rules of the game were seen as a means to generate the dynamic capability of getting new products into the sales organization.

Organizational Changes

In order to increase exploitation of the opportunities arising from new innovations, the organization has been restructured to support an entrepreneurial spirit. With respect to the interface inefficiencies identified during the

project between the product/solution development departments and the operational side of the business (e.g. marketing, sales, presales and installation and services) the division aimed to create better co-ordination between these two functions by allowing internal business ventures. The focus for this analysis is based upon the process for large innovative projects.

Firstly the division created the so-called Business House, in which new ventures are incubated. The Business House is a combination of the previous product management and solution management departments. Engineering specialists together with business experts develop new product/solution combinations in dedicated business venture groups. The venture leaders are responsible to produce a business plan in order to shift the focus from mere product development to business development. In addition to development activities the venture groups have the objective to start pilot projects with selected customers to test the commercialization of the innovations. The Business House supports these venture groups. They serve as an incubator, providing the necessary funding and facilities to start-up business ventures.

Secondly the sales side of the operations is structured in customer areas instead of regional areas. The sales/customer relations management departments now cover specific customer groups such as Banking and Insurance companies, Hospitals, etc. Where previously it was this department role to produce a concrete sale, now the main output is a concrete customer requirement.

In addition, the presales team will function on specific areas of expertise rather than on a region and will be led by a pool of project managers. When the customer relation managers have identified concrete requirements for a customer they hand it over to the project management pool. The project management pool evaluates these opportunities and accordingly composes a virtual team of presales people (specialist) in order to compile a bid. When this results in a sale the project manager will co-ordinate the installation and the maintenance accordingly.

New capabilities

The division has introduced a new coordination mechanism in order to allow for more rational go/no-go decisions. This mechanism is based on network co-ordination where the project manager is able to compose virtual teams by negotiating with the several specialist areas. The virtual team becomes a project oriented team build up out of pools (ventures) of specialist. Co-ordination is based on the internal market in which negotiations can take place within certain rules, which are being defined.

The interface between the Business House and the Operations department can be explained with a revolver metaphor. The Business House builds the bullets – the venture groups, which are successively inserted into the revolver – the operations department. The mechanism of a revolver exists of one barrel for several chambers of bullets. This is true for the operations department, which should portray a single source of competence in marketing and selling towards the customer. The coordination mechanism allocated each sales opportunity to the correct group of specialist (ventures).

When a start-up is successfully nurtured in the business house it will be integrated into the operational department. The team of specialists will then take the function of specialist in their field (e.g. VoIP) of expertise within the operational department. The sales/customer relations department is then able to feed this internal venture with business opportunities, by exposing the tested solution to the extensive sales network. The mechanism of systematically placing new ventures into the operational department can therefore be identified as a new dynamic routine.

In summary, two distinct phases for the ventures can be identified when looking at the Siemens Division. Firstly, the incubation phase, where the new venture is nurtured to make a business out of an innovation. Secondly the venture is grafted into the existing operational processes, by systemically reconfiguring the organization continuously. These two capabilities will be addressed in the subsequent chapter.

4 Case Discussion: Three Necessary Dynamic Capabilities for Entrepreneurial Venturing

4.1 Dynamic Capabilities for the Entrepreneurial Venturing Process

In the case study, we have observed the entrepreneurial venturing process on a business venture level (so-called venture groups). New entrepreneurial ventures, in our case within an organization, go through several phases. We have focused on the interface where the new venture is developed but has to be adapted into the sales/operations organization.

The division is organized in two main groups: the business house and the sales/operations department. The business house is responsible for the product/solution development. The sales/operations department is responsible for the sales and customer relation management as well as the co-ordination of the technical installation.

In the business house new ventures are created which act like entrepreneurial “start-ups”. This means that each venture is supported, next to the solution development and product management activities, in writing a business plan. This phase of the venture is referred to as the incubation phase, where the business provides the necessary competencies, budget and support for these “start-ups”.

When innovations are ready to be exposed to the sales network of the division, the ventures can be integrated into the sales/operations department. This change is an organizational one, for the venture is no longer strictly dependent and supported by the business house, but interfaces with a different department. This is the second phase in the entrepreneurial venturing process, which we have termed grafting. Grafting means the successful installation of a venture into the sales/operations department. These two phases of the entrepreneurial venturing process, and the interface between these phases, require dynamic capabilities. Parallel to the two venture phases, we have observed two dynamic capabilities that are developed in the organization to support the entrepreneurial venturing process.

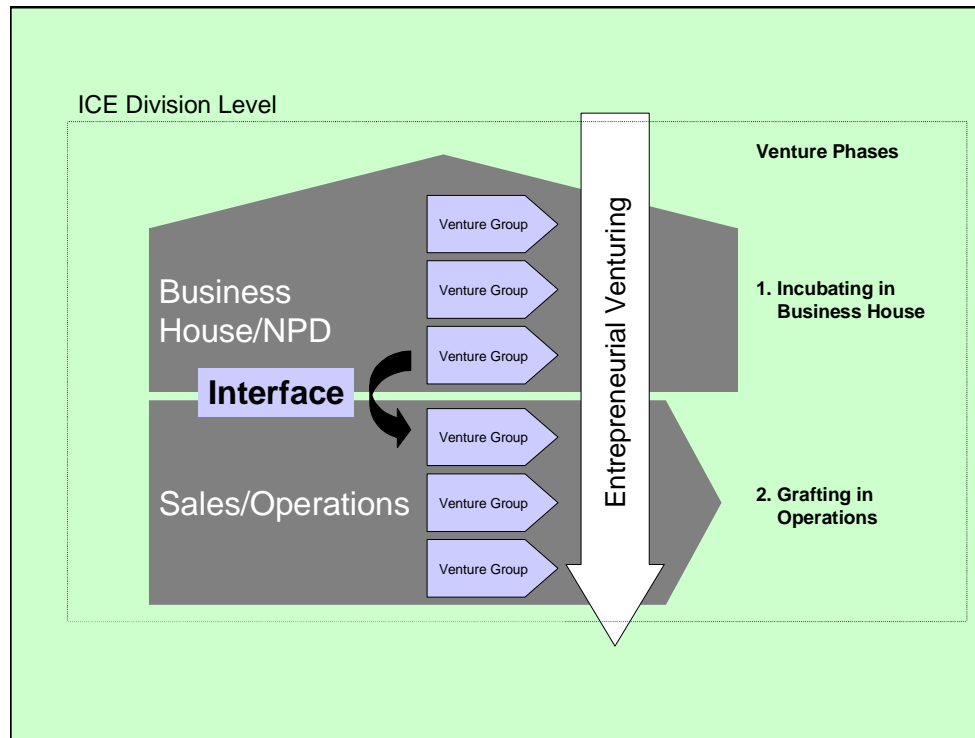


Figure 5: Incubating and Grafting Capabilities

4.2 Building of Dynamic Capabilities at ICE

We draw on the dynamic capability framework (Teece et al., 1997) to trace the development of these two dynamic capabilities in the Siemens division. The framework suggests that path dependencies shape the specific asset position of the firm, which in turn shape the processes. Subsequently these processes build the dynamic capabilities.

The Siemens ICE case confirms this theory for dynamic capabilities for entrepreneurial venturing, and by identifying the paths, positions and processes at Siemens ICE, we are able to extract how the above-mentioned capabilities are being built.

Paths

We have identified 2 major path dependencies relating to the capabilities build.

- Firstly we have identified the technological trend where the telecommunications industry integrated the data networks (local area networks). This trend extends to the current trend of the convergence of voice and data solutions.
- Secondly, the inapplicability of the Roger curve derived from the changes in the telecommunication market, the increasing R&D pre-investments required, and the decreasing product life cycle can be identified as a major path dependency. The new curve shows the need for a constant capability to switch and diffuse new architectural knowledge on the products and solutions throughout not only the new product development but also the new business development process, with increased pace.

Positions

In accordance with Teece, Pisano and Shuen (1997) our case shows how these changes contributed to the current specific asset position at ICE. Firstly the technological position, as determined by the previous path dependency of the architectural innovation, is interpreted as a lack of architectural knowledge diffusion of innovations between the

voice and data sides of the division. Although the technical inventions appeared to be successful, the diffusion of this knowledge did not reach the sales organization.

Instead of benefiting from the complementary assets brought by the extensive sales network and the business house (eg. award winning inventions), the two did not meet. They were opposing each other and the lack of coordination had a negative influence on the processes.

Processes

The lack of diffusion of the architectural knowledge of the VoIP innovations throughout the organization resulted in inefficient process coordination. In our study we have found a range of examples that illustrated these inefficiencies. This was particularly visible at the interface between the „old“ sales organizations (both voice and data side with independent order mechanisms), and the new product/solution developments and successful technology oriented competence centers.

The process change management project “ICE 2000“ involved 25% of all employees working at the division. This allowed both sides to acknowledge these inefficiencies. The learning effect created a shared mental model throughout the division, resulting in a new process concept including a new coordination mechanism between the operational side and the R&D side of the division. In addition the organization became aware of the necessity not only to re-engineer the processes to their current asset position, but also to systematically update its routines and the organization as they move forward.

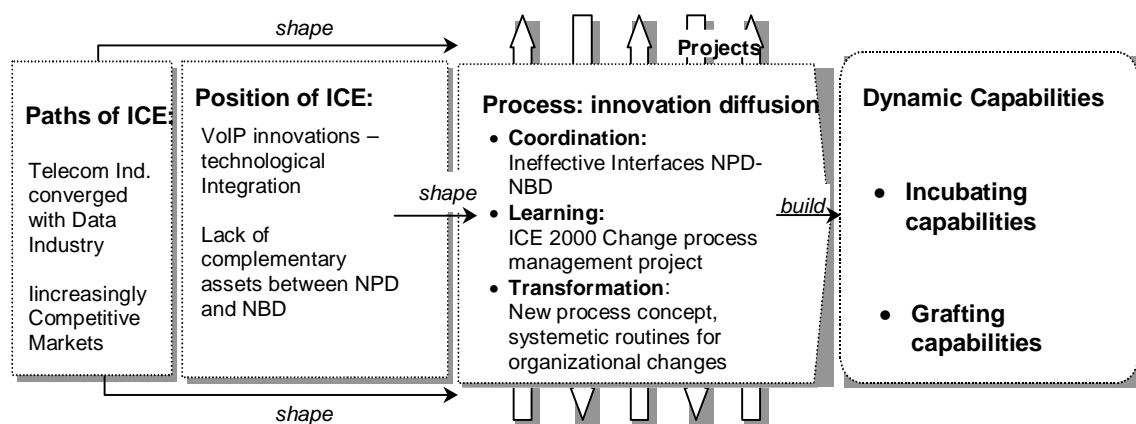


Figure 6: Building of Dynamic Capabilities at ICE

Incubation as a dynamic capability

The subsequent results of this (ongoing) learning process within the division led to the transformation of the organizational routines at the interface in question. The re-organization introduced a business perspective in the former product and solution houses (now termed Business House). This is where the inventions are put to the market to pilot test the business potential.

Grafting as a dynamic capability

Although previously incubations on an ad-hoc basis had been proved successful, the systematic installment of these business ventures into the sales organizations had not been dealt with. The traditional processes of the sales organization were difficult to influence and impossible to rationalize in terms of terminating or accepting a particular order throughout critical phases of a (large) project. The transformation of this particular process by implementing a so-called “internal market“, allowed the sales pull and the technology push sides to negotiate. Subsequently the business ventures, arriving in this process after incubation, are able to function as bullets in a

revolver, switching from venture to venture and consequently being exploited by the sales “gun“. We have coined this integration process grafting, the “young tree” - incubated in the business house, can now be planted in the sales organization.

5. Conclusion and Further Research Directions

Contributions

Looking at Siemens from a dynamic capability perspective, the significance of the entrepreneurial venturing process stands out. The entrepreneurial venturing process at Siemens created an interface between new product development and sales/operations and was divided into two phases, incubating and grafting. For both phases we identified two corresponding dynamic capabilities. Incubating and grafting play a fundamental role as a dynamic capability which allow rapid changing innovations to be exploited by the existing sales network, which is closely related to the competitive advantage of Siemens ICE in the telecommunication industry.

Implications

The case study of Siemens is one telecommunications equipment manufacturer among many that faces transformation of its voice and data businesses. There are obvious limitations to what can be inferred from the analysis of a single case. Through in-depth case research the study tried to detect some dynamic capabilities in entrepreneurial venturing. Although methodologically consistent with the status of the theory and the prescriptions to select a sample, this paper represents a local theory of one case, which delivers two candidates of dynamic capabilities. These however do not claim to be generalized results.

Future Research

The evidence provided by this exploratory case study can be a useful starting point for future research. Similar future studies should test the degree of generalization and the concept developed in our case. Secondly, the interface studied in our case has a limited scope of analysis. Additional dynamic capabilities for the process of entrepreneurial venturing can be explored such as the phase out of old products and services.

Following this direction, future research will strengthen the findings on entrepreneurial venturing, providing a framework for firms competing in turbulent environments.

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References

- Abernathy, W. J., Utterback, J. M. (1978), *Patterns of Industrial Restructuring*, Technology Review, 80 (7), 1-9.
- Brown, S., L.; Eisenhardt, Kathleen, M. (1997), *The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations*, ASQ, 42 (1), 1-34.
- Burgelman, R. A. (1991), *Intraorganizational ecology of strategy making and organizational adaptation: Theory and field research*, Organization Science, 2, 239-262.
- Dyer, W. G., Jr.; Wilkins, Alan L.; Eisenhardt, Kathleen M.; (1991), *Better Stories, Not Better Constructs, to Generate Better Theory: A Rejoinder to Eisenhardt*, Academy of Management Review, 16 (3), 613-619.
- Eisenhardt, K. (1991), *Better Stories and Better Constructs: The Case for Rigor and Comparative Logic*, AMR, 16 (3), 620-627.

- Glaser, B. G., Strauss, Anselm L. (1967), *The Discovery of Grounded Theory: Strategies for Qualitative Research*, London, Weidenfeld and Nicholson.
- Hayes, R. H., Wheelwright, S. C., Clark, K. B. (1988), *Dynamic Manufacturing - Creating the Learning Organization*, New York, The Free Press.
- Henderson, R., Clark, K. B. (1990), *Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms*, ASQ, 35, 9-31.
- Henderson, R. M. C., Kim B. (1990), *Architectural Innovation: The Reconfiguration Of Existing*, ASQ, 35 (1), 9.
- Iansiti, M. C., Kim B. (1994), *Integration and Dynamic Capability: Evidence from Product Development in Automobiles and Mainframe Computers*, Industrial and Corporate Change, 3 (3), 557-605.
- Itami, H., Roehl, Thomas W. (1987), *Mobilizing Invisible Assets*, Cambridge, Harvard University Press.
- Kogut, B., Zander, U. (1992), *Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology*, Organization Studies, 3, 383-397.
- Leonard-Barton, D. (1995), *Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation*, Boston (MA), Harvard Press.
- Moss Kanter, R. (1994), *Collaborative Advantage: The Art of Alliances*, HBR, 72 (3), 33-43.
- Nelson, R.R. (1991), *Why do firms differ, and how does it matter?*, Strategic Management Journal (12), 61-74.
- Nelson, R. R., Winter, S. G. (1982), *An Evolutionary Theory of Economic Change*, Cambridge (MA), The Belknap Press of Harvard University Press.
- Pisano, G. (1994), *Knowledge, integration, and the locus of learning: An empirical analysis of process development*, SMJ, Winter Special Issue (15), 85-100.
- Rogers, E. M. (1962), *The Diffusion of Innovation*, New York, The Free Press.
- Teece, D. J., Pisano, Gary (1994), *The dynamic capabilities of firms: An introduction*, Industrial and Corporate Change, 3 (3), 537-556.
- Teece, D. J., Pisano, G. P., Shuen, A. (1997), *Dynamic Capabilities and Strategic Management*, SMJ, 18 (7), 509-533.
- Verona, G. (1999), *A resource-based view of product development*, Academy of Management Review, 24 (1), 132-142.
- Zollo, M., Winter, S.G. (1999), *From organizational routines to dynamic capabilities*, INSEAD Working paper series, 99/48/SM.

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