Reconfiguring Resource Allocation Routines:

Process Innovation at a European Network Service Provider

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Abstract. We investigate the innovation process in the European Wireline Telecommunications sector, building upon recent theoretical development within the dynamic capabilies view. Based on 23 expert and executive interviews, we explore dynamics and linkages within the creation of routines and the reconfiguration of capabilities to develop and influence the innovation process at one major European incumbent . Using an embedded research methodology, we observe techniques pertaining to the allocation of resources in order to intentionally strengthen the initial phase within the innovation process. This initial phase is characterised by the development of simple tabular routines as well as configured capabilities, which find their research anchor in the dynamic capabilities literature. We conclude by highlighting the implications for managerial practice, which should be on the development of dynamic capabilties especially within the initial phase of the innovation process.

RUNNING TITLE

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KEY WORDS

Innovation Process, Dynamic Capabilities, Management Practice, Telecommunications, Resource Integration, Reconfiguration, Incremental Innovation, Case Study Research

Introduction

Different theoretical paradigms - including path dependency, trajectories and organisational learning – have been useful in understanding the nature of incremental innovation. Academics have more recently started to recognise the fundamental role of resource and capability reconfigurations with respect to innovation behaviour (e.g. Eisenhardt and Martin 2000, Salvato 2003). Few studies, however, have attempted empirical research with regards to the shift in recombination patterns that eventually affect the innovation processes and routines of companies (Salvato 2003); Huizenga (2004) specifically invites research into possible combinations of resource routines that might control or influence the innovation process. Lawson and Samson (2001) argue that especially those industries are suited for investigation of this phenomenon that have undergone a transformation in their dynamics. In this respect, significant potential for the applicability and theoretical enhancement of the dynamic capabilities perspective has been hypothesised (Teece *et al.*1997, Winter 2003).

The telecommunications sector in Europe has been facing such rapid changes in the past decade, shifting its nature from that of a basic infrastructure provider to one constantly confronted with rapid technological, structural and organisational changes (Abeysinghe and Paul 2005). Driven by an increasingly liberal policy environment as well as radical supplier innovation advancements, incumbents have been confronted with multidimensional challenges. Customer needs and demands have increased dramatically, while initially radical but subsequently incremental technological innovations have been

absorbed into modern communication technology, contributing to the landline business coming to resemble a pure commodity. However, technological developments such as broadband, Voice over IP or WIMAX have forced incumbents towards greater flexibility, while at the same time margin pressures in both operational and capital expenditure have increased (Volberda *et al.* 2001). This has prompted wireline incumbents to develop methods and routines to strategically renew themselves, as in seeking quicker times-to-market of new products and services with a parallel demand for a rapid reconfiguration of their innovation capabilities (Lange *et al.* 2003). The literature, however, is lacking in empirical evidence as to how this reconfiguration is happening and how it interlinks with the process of innovation.

The major objective of this paper is hence to reassess incremental innovation processes in the turbulant and dynamic wireline market, building upon recent theory development within the dynamic capabilies view. By drawing upon the key findings and issues from a six-months research project, we seek to realign the debate within the sector towards a more micro-based perspective, emphasising routines that interlink with the development of incremental innovation (Johnson and Huff 1997, Johnson, Melin and Whittington 2003). Our research aim is two-fold: First, we aim at exploring dynamics and linkages within the creation of routines that affect the innovation process; second, we seek to disentangle how the reconfiguration of capabilities shapes the innovation process in the sector.

The paper begins with a brief literature review on innovation processes and dynamic capabilities, with particular emphasis on interlinkages with telecommunications and more specifically, the wireline industry. This is followed by an outline and critical

discussion of the methodology adapted throughout this paper. The findings of our case study are presented and assessed with regards to potential managerial implications, with limitations of the study acknowledged. Finally, a number of suggestions as to the future methodological direction and further research are proposed.

Literature review

We have received great insights as regards the liberalisation and regulation paradigms in the telecommunications literature and their impact on innovation. However, there is only a small body of work covering the area of innovation processes within the wireline sector (e.g. Majumdar 2000). Reason for this could be the difficulty of gaining in-depth qualitative data about the innovation process. Further, capabilties and their impact on innovation have only recently come into researcher's attention (Johnson et al. 2003, Eisenhardt and Martin 2000). To remedy this felt imbalance we will start by drawing upon research of second and third-generation innovation process models (e.g. Cooper 1994), with an attempt of integrating theoretical developments within the dynamic capabilities perspective to provide the overarching theoretical foundation for our investigation (e.g. Teece *et al.* 1997).

Innovation Process Models and Dynamic Capabilities

Research studies of the process of innovation have developed rapidly since the early works of Schumpeter (1942), who formulated his theories of economic development around the concept of innovation. Carter, Williams and Reynolds (1997), Allen and Cohen

(1969), Henderson and Clark (1990) and Takeuchi and Nonaka (1986) have significantly contributed to identifying determinants and process steps of innovation, pointing the way in modelling innovation or an organisation's competitiveness (Bernstein and Singh 2006). A variety of researchers have attempted to categorise and consolidate the literature on innovation processes, with agreement on three major phases of innovation process models (Bernstein and Singh 2006, Cooper 1994, Rothwell 1994, Sarren 1984).

Early research on innovation processes proposed a simple linear and sequential process of innovation, focussing on research and development activities within enterprises. While these improved the general understanding of innovation, first generation models were criticised for their inadequacy in dealing with complexities and uncertainties and regidity in the process steps. Moreover, a review of first generation innovation process models reveals a focus on the individual as the main driver of innovation. A major criticism that eventually evoked the development of an alternative –more integrated approach - of innovation process models was that no explanation of the embedding of innovation within the organisation could rest on studies that failed to explain linkages within the innovation phases for corrective actions, as well as interface management (Cooper 1994, Rothwell 1994).

Research on the organisation of enterprises shifted the focus within innovation research towards structurs of organisations as well as organisational functionality within the business environment (Rothwell and Zegveld 1985). What was later categorised as second generation models, introduced the concepts of technology push and market pull as well as the 'stage gate process' (Cooper 1996). More emphasis was placed on the identification of the initiators of innovation as well as the role of functional departments.

The innovation process itself was found to be much richer including several feedback rounds and allowing knowledge interactions (Kline 1985). An emergent literature has criticised this perspective for not accommodating more integrated approaches, arguing that the innovation process was lacking a more strategic perspective (Coriat and Weinstein 2002).

Third generation models have tried to incorporate this criticism focussing on minimizing time-to-market cycles, by using cross functional teams as well as functional tasks, for the understanding of innovation processes (Huizenga 2004). Three areas of innovation processes were analysed: organisational capabilities, market place, and science and technology development (Bernstein and Singh 2006). Further strategic goals as well as different strategic perspectives were added to the organisational charateristics influencing the innovation process; Karlsson and Ahlstrom (1996) in particular showed that shorter innovation cycles and shorter time-to-market become a competitive advantage, based on the earlier work of Cooper (1994). This more strategic orientation was supplemented by Griffin and Hauser (1996) and Song and Parry (1999), highlighting the importance of internal information flows as well as research by Thomke and von Hippel (2003) on the relevance of internal and external resources, constructing the link toward newer theories based on resource-based views. We will use these newer theories, in particular the dynamic capabilties view to assist in understanding some of the idiosyncrasies of innovation processes in the telecommunications industry.

Dynamic Capabilities within the Telecommunications Sector

Over the past two decades, the resource based view (RBV) has been applied to more dynamic markets, resulting in the theoretical extension of RBV to the dynamic capabilities perspective (Teece and Pisano 1994, Teece et al. 1997, Eisenhardt and Martin 2000). Given that forces such as deregulation and internationalisation have dramatically changed the wireline industry landscape, the basis for applying the dynamic capabilities framework to the analysis of the telecommunications sector is well established. Dynamic capabilities, by which firm managers "integrate, build, and reconfigure internal and external competencies" (Teece et al. 1997: 516) are the drivers behind the recombination of resources into new sources of competitive advantage (Henderson and Cockburn 1994, Teece et al. 1997, Eisenhardt and Martin 2000). Dynamic capabilities are evidenced by the ability to develop 'antecedent strategic routines' by which the management exploits its resource base—acquires and sheds resources, integrates them, and recombines them—to generate new value-creating strategies (Grant 1991, Winter 2003).

Given the lack of a specific telecommunications literature on capabilities, we draw upon five areas in the context of dynamic capabilities, based on earlier classifications of Eisenhardt and Martin (2000) and Teece et al. (1997) (see Table 1). These categories include the integration of resources (e.g. strategic decision making), the reconfiguration and exploitation of resources within firms (e.g. resource allocation routines), the gain (e.g. knowledge creation and acquisition) and the release of resources (Eisenhardt and Martin 2000), together with 'other' resource based activities, as for example capability upgrading (e.g. Szulanski 1996, Winter 2003).

	Teece et al., 1994	Teece et al, 1997	Newbert, 2005	Eisenhardt and Martin, 2000	Huizenga, 2004	Wirtz, 2001	Lawson and Samson, 2001	Winter, 2003
Integration of Resources	✓	✓	✓	✓		✓	✓	✓
-Product Development Routines				✓				
-Strategic Decision Making				✓		✓		✓
Reconfiguration of Resources	✓	✓	✓	✓		✓		✓
-Transfer Processes including routines for replication and brokering				✓		✓		
-Capability Transfer across Borders				✓				
-Resource Allocation Routines				✓		✓		
-Synergistic Resource Combinations				✓				
-Patching				✓				
Gain Resources	✓	✓	✓	✓	✓			
-Knowledge Creation Routines			✓	✓	✓			
-Knowledge Acquisition, Distribution and Interpretation			✓	✓	✓		✓	
-Routines that bring external sources into the firm				✓				
Release Resources	✓	✓		✓				
-Exit Routines				✓				
Other	✓	✓		✓				✓
-Changes in Architecture					✓			
-Changes in Knowledge Components						✓		
-Capability Deployment						✓		
-Capability Upgrading						✓		
-Structures and Systems		✓					✓	
-Culture and Climate							✓	

Table 1: Literature Matrix on Dynamic Capabilities and Telecommunications

However, when reviewing the literature on telecommunications, Wirtz (2001) attempts to highlight the causes of industry convergence in the sector. While he does do not directly refer to the dynamic capabilties view, his work on strategic strategic decision making and resource allocation routines ex-post does fit the view. Quinn and Hilmer (1994) also include the reconfiguration of value chains into their framework of innovation, though they explore this research topic under a make-or-buy paradigm. In the survey of European ICT firms, Huizenga (2004) attempts to determine success in the telecommunications industry, referring to innovation strategy, in particular to innovation strategy style and resource capacity commitments, as well as organisational development, focussing on organisational culture and knowledge development.

Barczak (1995) examines 128 telecommunication companies with regard to new product development (NPD) strategies, identifying three different models: a first-to-market, a fast-follower and a delayed-entrant, none of which, however, have shown themselves to be significantly more successful. Groundbreaking technological developments, e.g. Broadband, VoIP and WLAN, have helped enlarge the scope for discussion on radical innovation in the Information and Communication Technology (ICT) industry. Newbert (2005) applies the dynamic capabilities framework to new firm formation and innovation, with a specific focus on the integration and reconfiguration processes. He argues that learning has a positive impact on new firm formation, especially for high velocity markets. Lawson and Samson (2001:396) develop a conceptual model of the innovative firm, highlighting structures and systems within dynamic capabilities. They especially call for detailed case studies that "can provide richer, more textual background into innovation variables". This link has been used as one of the initiators for this work.

Research Gap and Statement of Purpose

A clear research gap exists as regards the question of how wireline incumbents can develop routines of resource and capability utilisation related to their innovation activities. This includes the question as to how wireline incumbents can act more entrepreneurially to develop their capabilities as a means of achieving faster times-to-market and thus a sustainable competitive advantage (Rule and Irwin 1988, Carrier 1996). The techniques and practices by which incumbents identify and codify relevant capability combinations and actively pursue them in order to enhance the generation and deployment of ideas have also been cited as constituting a research gap by a variety of authors (Lawson and Samson 2001, Newbert 2005).

The purpose of this paper is therefore to investigate these fundamental questions from a managerial perspective by shifting the understanding of process innovation development within the wireline sector towards a dynamic capabilities perspective. Particular emphasis is placed on illustrating those routines and developments related to capability reconfiguration, thereby enhancing the theory on innovation processes from a dynamic capabilities view.

Several reasons underline the importance of case study research in the wireline industry. First, the telecommunications and high technology industries have been characterised in recent years by substantial technology changes and by the growth in new services and in the market itself, thus providing an appealing context in which to study managerial phenomena. Secondly, research in this field is still in its infancy, as for

example when measured by the number of journal articles. Huizenga (2004), in reviewing the existing research in this field, notes the need for greater understanding of the combinations of routines and processes that control and influence the innovation process. Resource and capability based arguments might help in this respect. Here, we seek to respond to the call for further empirical research in this area by a variety of authors who argue that case research can "provide richer, more textual background into innovation variables" (Lawson and Samson 2001:396).

Methodology

We pursued an inductive research approach, based on Eisenhardt (1989), Miles and Huberman (1994) and de Rond (2003). Centered around innovation processes, we follow Balogun, Huff and Johnson (2003:198) in their argument of a "need for research designs that give a priority of breadth". In order to be able to concentrate on detail as well as being broad in the aims and scope of the study, we engaged in embedded research, acting as informants researching detailed practices during a six-month consulting project, as proposed by Johnson, Melin and Whittington (2003) as well as Balogun, Huff and Johnson (2003). Facitilation, one of the prerequisites of such a research design, was conducted by a 'gate-keeper' responsible for academic reflection as well as rigour in data collection and interpretation. The process included group meetings as well as reflection cycles that challenged current values within the company, encouraged dialogue and reflected upon assumptions and procedures (Torress and Preskill 2002). Moreover, we made use of research criteria established explicitly for case study design (Eisenhardt 1989, King,

Keohane and Verba 1994, Yin 2002). Thus, 23 semi-structured, open ended interviews with in-company experts and external specialists were conducted during the project, lasting from 30 minutes to two hours. For some of the interviews permission was given to protocol or transcribe, whilst others were summarised in an attempt to achieve external transparency and reliability of results. In-house presentations, consulting material, external data sources such as Ovum, Forrester and Citigroup, as well as reflective discussion were further used for triangulation of the interview data. Whilst this methodology does not allow for statistical generalisation, it does provide a sufficient frame for theoretical reflection (Yin 2002). Since current strategic innovation decisions have been observed and directly influenced during the course of the project, there was a high degree of sensitivity and confidentiality attached to the data, which evoked the necessity for name changes and limited description and analysis of the environment of the company.

The case

The company under review is one of Europe's leading providers of information and communications technology (ICT).[1] We concentrate our investigation on the division responsible for serving business customers, which include 60 multinational enterprises and a number of large public authorities as well as 160,000 medium sized enterprises. Its main operations include two major areas: Network infrastructure and Billing solutions. Network infrastructure spans 'classic' ICT activities ranging from network planning and construction as well as business related network service solutions and the outsourcing of

[1] Due to confidentiality reasons, a more detailed description of the exact market environment as well as company details have been avoided in this paper.

complete network services for its business clients. The latter consists of an initial consulting phase, the implementation of communication solutions, long term network management and service support networks. Billing solutions include activities such as invoicing, cash collection, credit check and fraud management as well as the underlying billing service and network infrastructure.

In 2004 the company achieved a multi-billion USD turnover, however it faced revenue declines in its two major business areas. Voice convergence, mobility solutions, Wireless Area Network (WAN), and security systems for billing applications have changed the old business model. However, these developments have been driven mainly by the first-tier suppliers of the company, which have thereby achieved a higher margin on their respective areas of network infrastructure and billing solutions. These suppliers, as for example Ericsson, Alcatel or Cisco Systems, are recognised as acting more entrepreneurially and being more innovative, though facing similar constraints as regards innovation, namely size, organisational structure or information assymmetry (Huizenga 2004).

Our case company has therefore developed the vision of 'achieving a leading position in innovation application'. In doing so, the innovation process of the company has come under close scrutiny. Devising an effective innovation strategy and devising mechanisms for structuring the ways in which innovation projects are organised, are seen as two of the key critical success factors, in line with the findings of earlier studies (e.g. Cooper and Kleinschmidt 1995, 1996). The existing innovation process has been questioned, including its organisational structure that includes three stage gates (Cooper 1996) and six different management panels for reasons of problem confrontation

(escalation). In this respect the company has started to intensify its University-Industry relationships, experimenting with the integration of 'gate keeper' concepts and think tanks. Moreover, the question has arisen as to the appropriate strategies for yielding a better resource utilisation regarding the innovation process, including resource integration mechanism and reconfiguration of resources. This embraces the issue of how mechanisms are developed regarding capability priorisation and capability realignment, given the need for the concentration of innovation resources.

To address such a breadth of issues as well as concentrate on individual depth, the company realised the need for external knowledge and evaluation. Thus, it agreed on an embedded research project that lasted six months. This allowed us to research existing practices and mechanism within the innovation process of the company, feeding back our results as a basis for adaptation of the innovation process. We focussed our research on areas which inter-relate with dynamic capabilities, the findings of which are presented below.

Findings

We arranged our findings around major topics regarding innovation processes and dynamic capabilities, identified earlier in the literature. We start by depicting the current innovation process of our case study, including mechanism for integrating resources. This is followed by the presentation of routines for capability alignment and reconfiguration. In the subsequent sections different levels of change in innovation organisation are discussed with implications for the new innovation process highlighted at the end of this section.

The Old Innovation Process: Resource Integration Dilemmas

The integration of resources is hypothesised to be one of the crucial dynamic capabilities related to product development and thus to innovation management (Eisenhardt and Martin 2000, Winter 2003). Within the ICT sector, the innovation process starting from idea generation to implementation has received increasing attention within the past ten years, as most industry experts agree: *"Innovation management has become an essential part of [the company's] strategy". [Industry Expert D 2005.]* One of the key questions has been on the difficulties of resource integration within the innovation process.

Within our case study, interviewees described the old and formally displayed innovation process as linear, starting from idea generation and selection to implementation, including three decision gates. With its four sequential parts as well as the incorporation of three gates, the process exemplifies the 'stage gate process' (Cooper 1996) as depicted in second generation innovation process models (Figure 1).

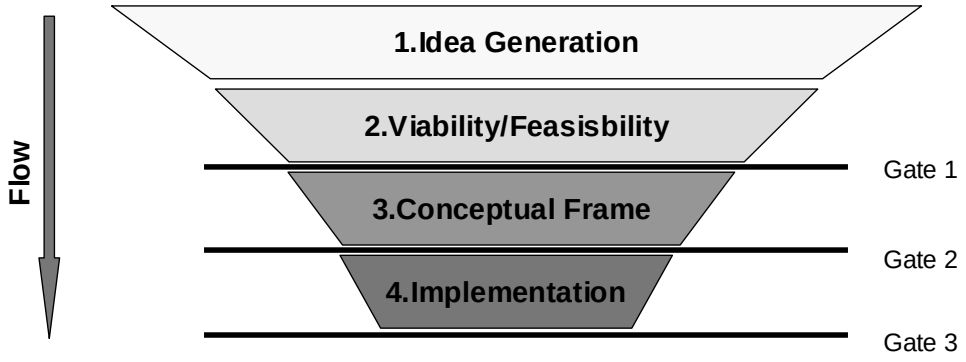

Figure 1: Stage gate innovation process of the company

Our case highlighted the fact that internal research and smaller development groups of up to five people have driven the idea generation stage within the company. The major focus is on incremental process innovation of existing products as well as on new areas of applications or new combinations of products. The innovation managers currently evaluate and classify the ideas into three main categories: 1.) very good; 2.) average; 3.) poor. Priority is given to ideas receiving a '1', though the grade is achieved very rarely. Ideas achieving any lower mark need reconsidering and rewriting. However, they are in practice passed through the process with minor rephrasing. One of the underlying reasons is that the innovation management is evaluating the feasibility and appropriateness of ideas, following no particular guidelines or procedures. The evaluation is done "*on a demand base or on […] past experience" [Industry Expert Z 2005].* Company managers agree that a set of simple and 'easy to apply' guidelines need to be developed that provide a degree of transparency and flexibility.

The first gate is situated after the feasibility study, and involves a variety of criteria for proceeding, among them resource intensity, projected return-on-investment and impact on competitive advantage. Resource intensity is perceived by the management as a 'vague description' for human resource estimation and financial projections and external knowledge requirements. The integration of these resources is critical throughout the innovation process and it is perceived that the old innovation process does not capture the messiness in the feasibility stage that is *"not as straightforward a process step as one […] would expect. If the right guy drives the innovation it will make its way through […] no matter what happens." [Division Head B 2005.]* In this context, we also explored the possibility that many ideas were artificially kept outside the innovation process in order not

to have to go through the gates and thus remain beyond corporate control and interference. The apparent resource integration dilemma arising in this stage is on how these ideas can be better integrated within the entire innovation process without losing the flexibility and innovation capture capability that is perceived as essential in this phase. We argue that the very loose structure in the interface moments only benefits a minority of individuals within the company, producing major resentment and frustration among the more integrative teams. Moreover, a similar finding can be observed for other resource boundaries, as for example resource integration from the parent company as well as suppliers.

Within the stage of 'concept development' the commercial value of the idea should be determined. However, this routine is non-linear in nature and may follow a number of possible approaches. As one manager explains: "*It is very much rule of thumb times the number of years you have been with the company*" [Innovation Manager R 2005]. Another approach to concept development is number-driven, involving detailed assessment of production and development costs as well as quarterly sales predictions. Even though 'messy' in nature, both approaches seem to be successful. They are, however, not depicted in the current innovation process. Moreover, the average time of 19 weeks until the first presentation of the innovation pillars is perceived as far too long with a considerable amount of resource binding attached. There is no real justification for the apparent time delays. Returning to the literature on second generation processes, Cooper (1994) argues that stage gate establishment involves early 'go' or 'no-go' decisions at the phases within the innovation process, with resource concentration on a small number of projects. Our case highlights that too many projects pass the first two phases, albeit with adjustments,

and thus evoke a resource intensity that does not pertain to later stages of the innovation process.

The second gate determines whether a concept could be developed with significant implementation potential. As a manager criticises: *"[at critical moments the handing over from one stage to another failed. Thus interfaces […] can become the cause for delays." [Innovation Manager R 2005]*. Delays were transferred from one phase to another for two reasons: inappropriate transfer of documentation to the later stages as well as insufficient information management, especially with other departments. This second gate, however, is essential for the narrowing down of projects in order to succeed in the implementation phase. 'Managing of the interfaces' as described by Womack, Jones and Ross (1990) as well as Clark and Fujimoto (1991) is the critical part in any (re)design of innovation processes.

The 'implementation phase' and Gate 3 face similar problems to those already identified at the preceding phase in terms of knowledge transfer and resource management. As one interviewee mentions: *"The implementation really was a muddled process, but at the beginning it worked quite well, so we decided not to touch it".* The more recent failures of projects within this phase are traced back to either biased information within the handing-over process or to lack of directions within earlier phases. Further, there is agreement that during the innovation process there is a clear lack of accountability and along with this responsibility for decisions. Hence, the company feels the need to re-customise many projects that were entering this phase, with delays of up to three months due to resource shortages, in particular human and financial resources, and the failure of integrating these at earlier stages. On this basis, we argue that innovation is a more

heterogeneous process than previously thought in the wireline industry and that bringing a dynamic capability perspective into the field of idea generation enhances the literature that had previously focused on strategy, organisational intelligence as well as creativity.

Reconfiguration of Resources

Within our case study the (re)configuration of resources was seen to be one of the most critical routines in the innovation process. We follow Volberda et al. (2001) in the proposition that one of the key linkages of reconfiguration formed in this respect is the management of capabilities. To do so, it was necessary to examine how incumbents identify relevant capability configurations and actively pursue them to enhance the generation and deployment of ideas. This includes the configuration of new capability clusters that incorporated capabilities and resources from other parts of the company and thus strengthened the innovation process. As one of the key strategists of the firm mentions:

"We needed to ask ourselves […] which parts of the value chain create most value… More importantly our aim was to build capability clusters, so to speak a number of […] 'killer capabilities' to increase the integration and the variety of our communication solutions" [Company Executive B 2005]

The company was categorising its capabilities according to value contribution and level of innovation in order to classify capabilities directed towards innovation process management. This was essential since the company has experienced a shift from pure connectivity packages towards managed services and technology solutions that are more innovation intensive. Hence the strengthening of the innovation capabilities within the sector is apparent and necessary. Innovation process formulation can therefore be

appreciated within the perspective of creating tailored routines of learning to develop and strengthen capabilities. Within the company the creation of capability clusters has been extended in order to achieve a competitive advantage in its core areas of expertise: billing and network planning:

"The company's core capability really is learning, how to align their processes, like billing and network development … how they can align their capabilities to achieve a […] clear competitive advantage." [Industry Expert A 2005]

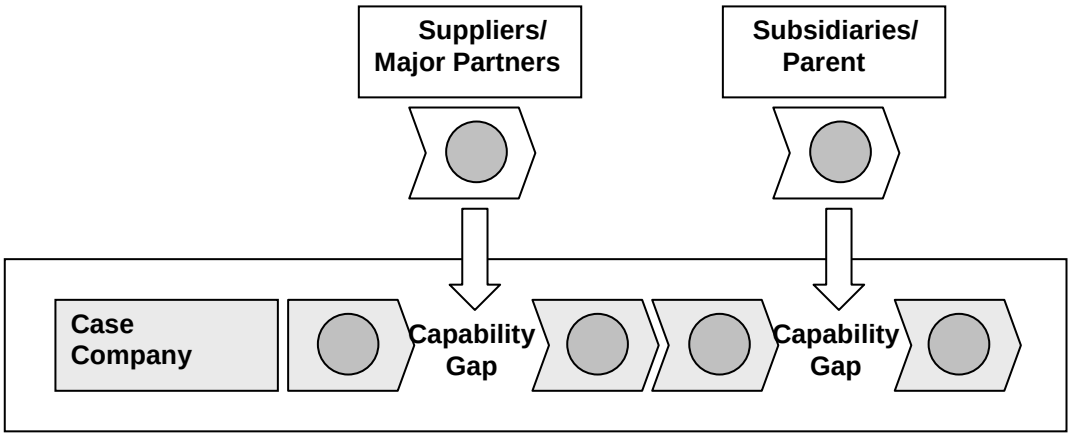

Figure 2: Learning to realign capabilities, Source: Case Company

As illustrated in Figure 2, learning to integrate these capabilities from both the parent company on the one hand and third parties on the other, helps in reframing new innovation sequences and clusters. According to Eisenhardt and Martin (2000:1112) the value of dynamic capabilities "lies in the resource configurations they create". In our case study these were initially knowledge transfer processes used by management to recombine resources in the areas of billing and network management. Subsequently, capability clusters and new capability configurations were formed in order to incorporate major industry changes. *"The company tried to identify industry best practices and realign its*

innovation resources accordingly […]" [Industry Expert 2005]. This process of 'best practice analysis' conforms to earlier findings of Eisenhardt and Martin (2000) which suggest that the evolution and development of dynamic capabilities can be effective in numerous ways, including the imitation of industry best practices and cross industry relationships.

Learning Processes of Sequencing and Codification

By combining simpler capabilities and routines, sometimes also referred to as 'sequenced steps' (Brown and Eisenhardt 1997), the company has tried to develop capabilities for value clustering. A necessity for clustering had occurred due to the need for locating innovation areas that could provide a unique selling point. In extrapolating from Quinn and Hilmer (1994), this clustering activity needed to be enhanced as a [dynamic] capability in order to strengthen the company's value proposition. To develop a sophisticated methodology for capability clustering, simple tabular routines were integrated and applied to a more complex scenario (Figure 3).

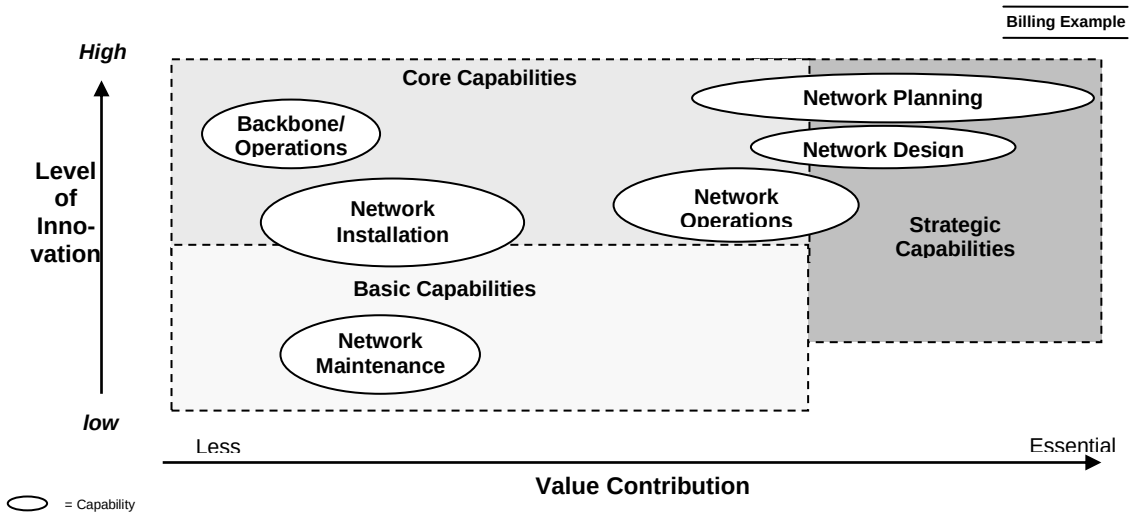

Figure 3: Tabular exhibit for capability reconfigurations, Source: Case Company

This process of configurative learning is broadly linear and has predictable outcomes. Moreover, it shows that large telecommunications enterprises also develop specific learning routines proactively, even though they are faced with asymmetric information due to their multi-division structure and resource shortages. Key dynamic capability is the ability to develop rather short routines that address questions of capability analysis as a function of the innovation process. Adapting and transferring this logic of simple tabular routines to the innovation process, particularly during concept development and implementation phases, is one of the key learning mechanisms at the company, elaborated in a variety of meetings throughout our research.

Dynamic Capabilities and Changes in Innovation Architecture

After investigations as to innovation process steps and reconfiguration of capabilities, we will turn our attention to the innovation architecture of the company, following Lawson and Samson (2001). This architecture had a project oriented organisational focus. Two major innovation panels exist, of which the management panel has the responsibility for Gate decisions and also acted as the highest level of problem escalation, as for example where different innovation projects were simultaneously demanding the same resources or had contradicting implications as to the future direction of the company. A ‘co-ordination’ panel had been installed to monitor the different stages in the innovation phases, with responsibilities of cross-functional communication and problem escalation at the project level. In addition to this, steering committees had been established that held responsibility for the individual sub-projects. Further, company-wide

circles were involved once supplier/manufacturing co-ordination was essential and an innovation strategy board defined the longer-term innovation prospects.

Our interviews revealed that two areas were frequently criticised under this panel structure. First, the panels were experiencing interference points and lacked clear responsibility. "*If a decision on the longer-term strategy of a development was needed we have to go to three different rounds of panel meetings" [Innovation Manager B 2005].* The boards were over-staffed, since innovation decisions affected a variety of middle-managers, thus hampering the desired immediate response that characterises effective innovation processes. *"There were simply too many meetings where attendance was required" [Industry Expert D 2005]*. The innovation process was further slowed down by the direct involvement of the co-ordination panel with major areas of the innovation phases and the unrepresentative staffing of the management panel, consisting of major unit heads of a single division: *"A more independent board could better judge and decide at the decision gates." [Industry Expert D 2005.]*.

Following Gobeli and Brown (1988) the installation of multidisciplinary project teams and cross-functional interfaces (Galbraith 1994) is a major success factor in intra-company innovation processes. Even though these were formally codified, neither of the two vehicles were incorporated into the innovation process. However, following Polanyi (1966), explicit and tacit knowledge sharing is seen as the key for achieving effective communication in order to drive innovation. From an organisational perspective, the individual innovation projects lacked strong project management, as indicated by our observation of poor assignment of responsibilities at the decision gates and the absence of strong project leaders. Stacey (1996) and Clark and Wheelwright (1993) argue that success

in innovation is characterised by an end-to-end responsibility of one or two key individuals. Alongside the resource constraints imposed by a relatively weak filtering at the Innovation Gates 1 and 2, this essential function of control was lacking.

A further problem within the organisation for the innovation process was the 'informal reality' of projects that were assigned VIP-status without having to pass through the innovation stages. These projects did not suffer from hand-over shortcomings, but did have a smaller success rate, arguably because an 'argumentative base' was lacking. This reality is best described by an innovation project manager (2005):

"*I have taken part in two VIP-projects … and even though they were better resourced, we were not more successful than the … normal projects. I think it rather had the effect of suspicion among the other projects, since we did not have to go through the 'normal' procedure*".

Dynamic Capabilities in the Organisational Structure

Our investigations have proved useful in proposing organisational tools better suited to achieving the required cluster of dynamic capabilities, especially as regards innovation management. During the period of our research project, an 'innovation pyramid' was constructed, depicting the interconnections between innovation process, strategy and organisational layers. As a reaction to the criticism of a lack of strategic focus as regards the innovation behaviour of the company, an innovation strategy was designed to propose overall direction for the individual innovation projects, with an assignment of possible internal and external resources. Cooper and Kleinschmidt (1995) explicitly highlight the importance of embedding the innovation process in the overall strategy of the

company. Within this board, areas of innovation are outlined that function as a basis for innovation strategy formulation. This outline includes sketching of guidelines, identifying research gaps and customer needs on the existing products and picturing possible extensions that are then targeted. The urgency of this re-organisation step has been driven by the negative experience with individual projects that developed a short-term promise but had to be abandoned due to a misfit with the overall strategy. Thus, a misallocation of resources had occurred and also a misdirection of capability development.

To remedy this deficiency, an innovation board was included into the existing innovation structure of the company. This board (Figure 4) was regarded as essential by the interviewees to co-ordinate existing activities of the think-tanks and innovation centres and to act as a supreme board for project management. Following Eisenhardt and Martin (2000), codification of such an innovation board within the company could be regarded as a dynamic capability.

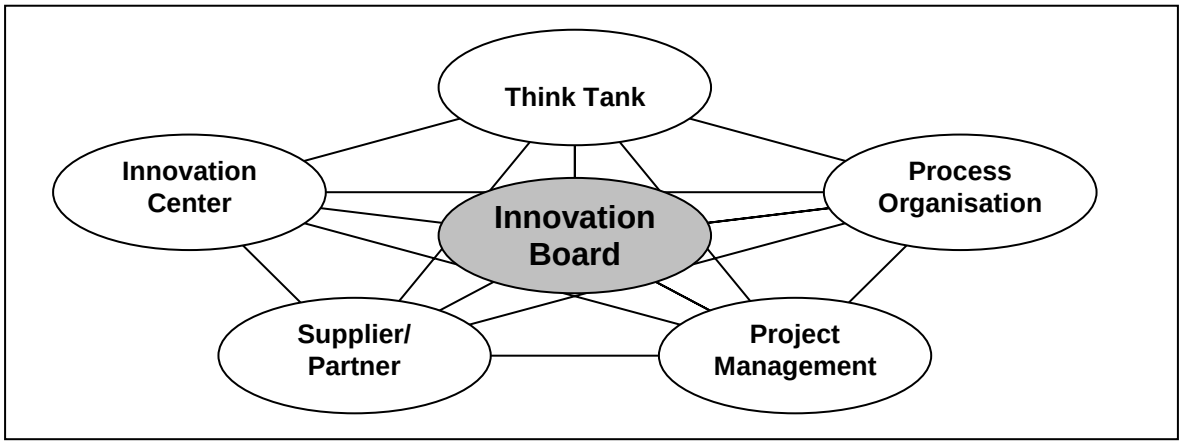

Figure 4: Organisational structure for process innovations, Source: Case Company

Within this structure, think-tanks have the function of 'trend developers', having as an aim the idea generation and co-ordination of internal and external resources. This more modern structure integrates external resources, given the external and well-protected environment of the think-tanks (Moorcroft 2005). Members from different functions and backgrounds are involved in the think-tanks, allowing for a greater plurality in approaches as well as a broader knowledge-base from which to draw.

The innovation board was staffed by a diverse set of 'delegates' involved with the innovation process, among them higher management, strategy experts and a variety of managers from functional levels. Our interviews revealed that the middle-management, charged with responsibility for implementation of the different process steps, had often been neglected, evoking conflicts in the communication of the innovation strategy. This change in structure also represented a rich source of first-hand feedback as to the integration of resources and their configuration. A number of carefully selected members of functional areas were thus integrated into the innovation board on a rotating level. *"[This…] made sure that the innovation strategy and other decisions were quickly and smoothly communicated down to the operative/ implementation level." [Industry Expert D, 2005]*. The innovation board was installed as decision maker at all gates having overall innovation responsibility and simultaneously being held responsible for the individual projects, including areas of resource and capability integration as well as internal and external communications.

The number of innovation panel members was limited to five people, to enhance the ability of these panels to function effectively and reduce the decision-making time. Cross functional members ensured the inclusion of external knowledge, with strategy

members being responsible for capability transfer from one project to another and developing new line-ups of resources to form long-term advantages. This included the better integration of telecommunication suppliers into the innovation process to actively drive concept development and implementation. This integration played a multiple role; external resource integration and capability transfer as regards innovation structures of the innovative first-tier suppliers.

Implications for an Adapted Innovation Process

During the course of our research the innovation process was changed to take account of practices that had proved themselves useful over the past, as well as including more diverse routes into the single sequential innovation process. In order to allow for a degree of 'messiness', strong project leaders were given end-to-end responsibility, taking account of their individual experiences and routines. They acted as the first level of problem escalation, which has led to greater decentralisation of the innovation process. We follow Clark and Wheelwright (1993) in their analysis of project leaders needing to be given a higher measure of resource control over the different project stages than in the conventional processes of a company. Further, no VIP-projects were allowed, but the innovation process itself was changed to include a degree of greater flexibility. Thus the stages were strengthened, with easy-to-follow measures incorporated into decision making. Interestingly the flexibility was not narrowed by the formalisation of the stage gates, since the criteria of the gates were simply structured, based on two sets of criteria:

"In conjunction with a well defined scoring model at each gate, most of the guiding principles had been replaced and […] now form the basis for reasoned decision making and clear guidelines." [Industry Expert 2004]

These criteria were based on the external expertise of a specialist to the pharmaceutical industry, guidance from whom has helped to establish a more efficient management of new ideas. This finding is especially important, since evaluation techniques and knowledge of criteria development is only rarely observed between industries (Eisenhardt and Tabrizi 1995). This mechanism, however, ensured an easy-to-understand structure with scores allocated for benefits and implementation costs that are later ranked.

"The scoring model was first imitated and later adapted from a cross industry sample…We took the pharmaceutical industry as an example" [Industry Expert 2005].

The criteria that were established at the first gate included a benefit analysis that estimated financial, strategic and technological developments as well as possible cost and risks (project risks, resources, complexity, and timeline). To reasonably estimate these factors, the first decision gate was delayed to allow for a sounder basis for project evaluation. The second effect of this development was a faster decision time at the gate:

"It should allow the decision makers to judge quickly on a fair basis and thus avoid delays during the transition to […] the next stage." [Industry expert 2004].

From a dynamic capabilities perspective, we observe an early allocation of resources that are realistically determined in order to intentionally construct capabilities. This allowed a harmonisation of the resources of the entire innovation process and made the construction of resource deployment plans possible. These function as a roadmap for the individual project, identifying and categorising resource needs as well as possibilities of resource acquisition. IT capacities in particular were flexibly managed with external experts acting as trend-setters. The adaptations and allowances for 'messiness' in the

innovation process have helped in reducing the overall time-to-market. Even though the initial phases of the innovation process were prolonged due to the requirement of greater pre-development work and an estimation of realistic resource assignment based on prior projects or similar projects in other industries, the later phases in the innovation process were significantly shortened. This has led to overall time and resource savings and a better structure for dynamic capability development.

This, in turn, has helped in strategically optimising the innovation portfolio and improving the segment of idea generation. Less complexity at the stage gates and clearer responsibilities led to more rapid decisions at the gates and greater commitment among the innovation team members. The new stages within the innovation process were codified in a simple format and revision meetings have helped in adapting the innovation process according to developments of capability need or resource deployment. Simple controlling mechanisms and a codification of routines are key dynamic capabilities, which, in combination with better inclusion of supplier innovation techniques, have helped in identifying and deploying new ideas that provide a sustainable competitive advantage for the company.

Conclusions

This paper has sought to contribute to the field of telecommunications by shifting the current debate on innovation processes within the sector towards a dynamic capabilities perspective. It has done so by emphasising the interconnections between the codification of capability cluster formation and innovation stage processing on the one hand, and the

emerging field of dynamic capabilities on the other. We argue that the dynamic capabilities perspective provides useful insights into understanding some of the 'black boxes' hitherto encountered within the innovation process, based on the evidence from the wireline sector.

Analysing the innovation process from a dynamic capabilities perspective highlights resource integration dilemmas, which the company needs to consciously and explicitly address to enhance its innovation capability. Among these are the need for simple and ‘easy to apply’ guidelines that have to be developed to provide a degree of transparency and flexibility. These are essential for an early allocation of resources that are sensibly determined in order to intentionally and consequently construct capabilities. This allows for the harmonisation and categorisation of resource needs along the entire innovation process, which functions as a roadmap for the individual projects. Alongside, it helps identifying and categorising resource needs as well as possibilities for resource integration.

We highlight techniques, how companies identify relevant capability configurations to increase the generation and deployment of ideas. This includes techniques for the configuration of new capability clusters that strengthen the innovation process by incorporated external capabilities and resources. We argue that these techniques are persistent routines for resource configuration and hence can be categorised as a key dynamic capability.

As regards innovation architecture, we argue that innovation is a more ‘messy’ process than previously thought in our case company. However, by giving strong project leaders end-to-end responsibility, following their individual experiences and problem-solving routines this messiness drives rather than hinders the innovation process. Also the

adaptation of the innovation process to include a degree of greater flexibility, with easy-to-follow measures in decision making, provide a key dynamic capability for strengthening the innovation process within our case example which has been theorised in the literature (e.g. Eisenhardt and Sull 2001). Following Zollo and Winter (2002) we conclude that in the wireline sector, dynamic capabilities are persistent with strategy dynamics influenced through routine and resource combination developments which help explain the innovation orientation of the firm from a dynamic 'inside-out' perspective (see also Henderson and Cockburn 1994, Teece *et al*. 1997, Eisenhardt and Martin 2000). Our empirical example highlights the importance of routines and codification in combining resources in the dynamic process of innovation management and gives practical suggestions as to the interconnection of developing dynamic capabilities within the innovation process of a firm.

Managerial Implications

Our findings have considerable managerial implications, especially for the wireline sector. If recombination patterns are structured and guided, whether in the case of capability construction or innovation process adaptation, the successful recombination and inclusion of internal and external resources can more readily be achieved. This conforms to the earlier findings of Salvato (2003), who suggests a micro-strategic approach in identifying patterns that have already proved to be successful. Our example showed that such a structured managerial approach to the evaluation of internal and external capabilities can form new value combinations.

The innovation behaviour of a company benefits from resource allocation mechanisms that on the one hand provide simple guidelines, but allow for a degree of variability in approaches. Establishing innovation stage gates and developing scoring models for evaluation of the different projects provides the mechanism in developing routines for the integration reconfiguration of resources that themselves are major dynamic capabilities that provide higher likelihood of achieving innovation success and thus sustainable competitive advantage.

Limitations and Future Research

Though robust in terms of methodological foundation, we faced a number of limitations related to the difficulties of 'embedded' research. We were subjected to similar methodological problems akin to those of 'embedded journalism'. We sometimes experienced overenthusiastic responses of interviewees. Also, a potential bias of the interviewer could be observed, being too closely connected to the overall project in making choices on the boundaries within which research should be conducted, and data collected and interpreted. Further, since the foci of the project were sequentially practitioner and research oriented, little attention has been paid to comparing and contrasting issues and outcomes with those facing other incumbent players. However we follow Balogun *et al.* 2003:220 in their argument to improve insight within research, "researchers need to be project managers, skilled negotiators, trainers, co-workers and collaborators as well as writers and methodologists", reconceiving our identity as researchers.

Since this case study has been based on one major European telecommunications incumbent, the validity of the findings of this paper could be strengthened by the inclusion of other industry players. The aim of the study was to analyse the behaviour of one incumbent under a recent, changing theoretical paradigm, hence there can only be limited comprehensiveness in this research. We call for future research into the dynamic behaviour of incumbents, through in-depth, cross-industry and possibly cross-country empirical examples. Innovation might also be thought of as a more complex social phenomenon that evolves under contradictory influences. This calls for an underlying theory that would arguably strengthen the literature on the evolution of such innovation capabilities.

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