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Innovation Management

- How does it work in practice in different organisational structures?

Bachelor Thesis

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Abstract

Many authors subscribe to the importance of innovation for modern companies. Yet, the meaning of this term seems rather evasive. It is even more challenging to capture the meaning of innovation management. In this study, we try to answer to W*hat innovation management is and how it works in two different organisational structures.* To this aim, we studied how innovation process is managed in Vattenfall AB and Bioprocess Control AB.

The task was approached with a qualitative method using interviews, completed with company publications. The results gathered from this were analysed against a theoretical framework about innovation processes, its management and the importance of (organisational) structure.

The study concludes that there are discrepancies between theory and practice partly due to the unarticulated approach to innovation in the companies selected. Without labelling activities as part of an innovation process, both companies work with innovation management on a daily basis. A set of management tasks crucial for the innovative capacity of the two companies were identified. Although present in both companies, these tasks were carried out differently due to different organisational structures. The organisational structure in turn reflected on to what extent innovation management was formalised in Vattenfall and Bioprocess Control.

Keywords: Innovation, innovation management, organisation, structure, process

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1. Introduction

1.1 Introduction

“Innovation has become the new industrial religion” according to Valéry in The Economist. This was stated already back in 1999 (Valéry, 1999, February 18). Since then, the importance of innovation does not seem to have faded. To the contrary, it appears to be a must for any modern company to subscribe to according to many management theorists, among these Michael E. Porter (2000) and Gary Hamel (2006, 2007).

“Innovation and its management have had central roles in many industries since the industrial revolution” (Westland, 2008, p. 3). Thus, the interest and the usefulness of innovating organisations is nothing new but perhaps more noted as a success factor nowadays. Dooley and O’Sullivan (2001) consider innovation to be one of the core competencies of any organisation in today’s competitive market place. Westland (2008, p. 3) takes it one step further by claiming that being innovative is not optional anymore; it is a must for firms that wish to sustain competitive advantage as well as staying ahead of competitors. The importance and relevance of innovation for organisations in today’s society contributed to our interest for innovation in practice. As with all popular expressions, the actual content of the concept risk to become vague as everyone starts using it to fit with their purpose. One could therefore take on a critical view as to how much of what is labelled innovation by organisations that is truly innovative.

However, we believe there is one global challenge that has forced many organisations to become more innovative, and even caused a new sector of organisations to emerge based on innovations aiming to tackle the challenge. What we are referring to here is the climate change challenge. The effects of the policies aiming to tackle the challenge are cross-cutting many industrial sectors, not least energy production. The consequences on a company level include efforts to reduce carbon dioxide emissions in production processes, in delivery systems and transport. Not only is it a matter of finding new materials or inventing new products, but also of finding ways to become more energy efficient. Due to this, an overall demand of making the company more innovative has emerged.

Since the statement was made by Valéry, it is not only innovation which has gained importance in company management but also sustainability. This made us interested in looking into innovation and in particular innovation management in companies that are innovating following the new demands put on their operations due to climate challenge. We were also interested in innovation management in companies originating from ideas of how to produce clean energy. In this

study, we will describe our findings from looking closely at innovation management in one big energy producer as well as one small clean tech company.

1.2 Problem definition and limitation

When looking into the company cases selected, it was not the technology behind their innovations that was of interest to us. Our focus lies instead on *how* they innovate, and in particular on the management of innovation.

Much has been written about innovation on the macro-level, looking into the structures and activities within innovation systems for regions, countries and/or industrial branches. Focus has for instance been on how to create incentives for innovation, mapping the range of various ways for innovation to take place and so forth (OECD, EU Commission, VINNOVA etc) We wish to clarify that this is not the aim in this study. Instead, our point of departure is how innovation is managed in practice on a company level.

Leaving the macro-level aside, like how to form policies to stimulate innovation, we dedicate this study fully to the micro-level management of innovation. The micro-level approach is something we believe is missing in the area of innovation. According to several authors, (Berchicci, 2009, preface; Van de Ven, Polley, Garud & Venkataraman, 1999, preface) there exists a need for a new perspective in innovation literature, preferably based on practical cases on companies. This statement adds to our motivation to look closer at the actual content of the innovation process in terms of actions in individual companies.

If the actions of the innovation process are about content, then the structural components providing a setting for the innovation process could be seen as its form. The relationship between structure (the form) and actions undertaken in practice (content) of the innovation process is one that we will pay particular attention to. We believe that in order to understand what innovation management is all about, both form and content of the innovation process needs to be explored.

As study objects we have chosen two companies that differ in terms of organisational structure for innovation (the basis for this selection will be explained more thoroughly in the methodology chapter). The nature of the study will be descriptive and exploring and the question we aim to answer has been formulated as follows:

Innovation management – what is it and how does it work in two different organisational structures?

1.3 Definitions

First of all, what is innovation? What does it mean to innovate?

When going through the innovation literature, it becomes clear that there is an arborescence of definitions of what constitutes innovation. Quite frequently, it is treated as a noun, referring to a new product or service. An example of such a definition is the one of Frykfors, concluding that "innovations are knowledge which is applied in new contexts" (cited in Benner, 2005, p.5-6). Another is of Skogen and Sørlie who define an innovation as a "planned change with the intention to improve practice" (1995, p. 13-4). The deliberate vision, the planning, is thus the essential of an innovation.

According to Westland (2008, p. 6-8), an innovation includes features of a product or service that is new in the market or is commercialised in a new way which result in new ways of usage and new consumer groups. Westland additionally brings up the professor and management expert Michael E. Porter's definition of innovation: Innovation = Invention + Commercialisation. Bigliardi and Ivo Dormio (2009) distinguish three reasons why innovating is essential to the competitive firm. They express that the innovation activity is both related to the increase of efficiency and to adapt to regulations. Finally they mean the innovative feature will increase the possibility to get finances for project. Porter (1990) states innovation and change as closely related and that executing innovative activities constitutes steps towards gaining competitive advantage.

Sometimes it refers to the process to renew in itself, like in Carl-Otto Frykfors's definition of innovation processes as processes which create increased values and increased learning, which in turn lead to competitiveness and growth (cited in Benner 2005, p. 6).

Freeman (1982, p. 7, 44-5, 110) argued that one must separate between something new and the application, which is invention from innovation. The invention does not become an innovation until it has been processed through organisational and marketing tasks and reached the market.

Johannesen, Olsen and Lumpkin (2001), concluded that any definition of innovation could be analysed according to the three dimensions of "what is new", "how new" and "new to whom". What is important in our study is however that the actors taking part consider themselves to innovate. Westland (2008, p. 10) states that due to the fact that the term innovation is so broadly and differently defined, knowing how to be innovative also becomes difficult.

In our study we find it useful to separate between innovation as noun, adjective and verb since what interests us most is the action, which is "to innovate". For this reason, the approach to view innovation as a process is one that we will elaborate on further in chapter 2. In addition to the actions of the innovation process, we will look into how it is structured. By structure, we mean not

only organisational structure in terms of what the organigramme looks like, where formal responsibilities lie within the organisations and so forth. We also include how different parts of the innovation process are structured, for instance how communication and collaborations are being formalised, what routines and scripts the actors in the process are due to follow.

Another term to be defined is innovation management. As a consequence of the concept of innovation being subject to many different interpretations, we conclude that so is innovation management.

However, since the very aim of this study is to explore what innovation management means in practice in the cases we selected - how it works and how it relates to both form and content of the innovation process - it would be premature to define it here already. In fact, it remains to be seen to what extent it is accurate to talk about innovation management as a distinct type of management in our specific cases. We will come back to the meaning of "innovation management" in the analysis and conclusion sections.

2. Methodology

This study aims to give a descriptive and analytical contribution of what constitutes innovation management and what it could look like in practice in certain organisational structures and formal settings for the innovation process. We therefore decided it is better to focus on just a couple of such distinct structures/settings rather than a broad-based attempt to cover a range of different types of innovating organisations. The aim was to attain in-depth information of the innovation process, its form and content as well as the management of innovation in our study objects. Therefore, the methodology chosen for the study was that of qualitative interviews.

In order to find appropriate study objects, a scan of companies in the energy sector was pursued. The companies to be selected had to fulfil the following criteria:

- Innovation is of importance for the companies' core activities.
- The organisational structure and the settings for the innovation process should differ between the chosen companies: one of the companies should have a more structured approach in their innovation process having distinct departments for development activities and the other one a more informal, ad-hoc based approach.

As our first study object, we ended up selecting a big energy company, Vattenfall, which has its origins in a public organisation established almost 100 years ago. In addition to fulfilling the criteria we set up for selection of study companies, Vattenfall seemed like an interesting case to us for a variety of reasons. First and foremost due to their ambition to be one of the companies to drive the development towards a sustainable energy production. In order to succeed with this goal, the company would need to be truly innovative and manage the innovation process efficiently. Furthermore, it had a formal organisational structure for working with innovation which we wanted to look closer at, in particular the department called "strategical innovations".

As study object two, we looked for a small university-spin off created to bring a research discovery to the market; thereby the whole company would be imbued by innovation. Bioprocess Control, which previously was linked to Lund University fitted well with the requirements we had set-up for this second study object.

Our goal was to examine how the innovation activities were organised in the two companies of our choice. We decided to interview people with different functions and formal responsibilities in the company's innovation process in order to get a broader understanding of the process as well as to receive different aspects on the same activities.

The interviews were partly conducted through telephone calls and partly through visits. We aimed for semi-structured interviews, in the sense that core themes were sent to the interviewees in

advance in order to give the persons involved a chance to prepare themselves. During the interviews, an open discussion took place around the themes but often expanding into new areas for discussion. The persons, subjects for our interviews were the following:

Karl Bergman, Head of R&D, Vattenfall AB (Telephone, March 15, 2012)
Katariina Güven, Responsible for Communications, Project Governance, Vattenfall AB (Telephone, May 2, 2012)
Per Kallner, Manager Technology Development Biomass, Vattenfall AB (Telephone, May 4, 2012)
Patrik Andersson, CEO/Managing Director, Bioprocess Control Sweden AB (Personal meeting, March 21, 2012)
Jing Liu, Head of Research & Development, Bioprocess Control Sweden AB (Personal meeting, March 21, 2012)
Jan Roesen, Head of Sales, Bioprocess Control Sweden AB (Telephone, April 5, 2012)

In the case of the interview with Patrik Andersson and Jing Liu, this was conducted with both of them present at the same time. In the remaining interviews, only one person was present. During the interviews, notes were taken. After finalising our results, we asked the respondents to review the citations and referencing to ensure validity of these.

The results of the interviews with Vattenfall and Bioprocess Control respectively were intended to form one pillar of the basis for our analysis. A second pillar consists of documentation describing both the form and content of the innovation process. That is, both the organisational structure/structured elements of the process and its actual activities. Such documentation includes for instance business plans, owner directives, annual reports, work scripts, project plans, websites and information targeting clients as well as owners. In parallel with conducting interviews, we searched for and reviewed published information about the innovation processes in the chosen companies. Unfortunately much of the documents were either not updated or not publicly available. However, we were able to examine annual reports, sustainability reports, information coming from websites and in the case of Vattenfall also some internal documents about the company's R&D projects as well as the management strategies. Regarding the smaller company of our choice, Bioprocess Control, we found less published information since the company does not have the resources to create formal publications explaining what they do. Because of this, we relied mostly on information coming from their website and on news relating to their products and processes.

The results of the interviews as well as the review of published information about the companies were then related to theory of innovation processes, innovation management,

organisational structure and overall innovation activities in organisations. The theoretical framework included research articles and books as well as literature that is more of the "management handbook type" or student's text books for courses in innovation management. The idea was to put these handbooks in relation to the reality in the concrete company cases we are looking into and use them to analyse and understand our findings. A choice was made to present the empirical results and how they connect with the theoretical framework in one and the same section of the report. This structure aims to visualise both the differences between theory and practice and how our findings are sometimes supported by literature. Following this chapter, our own analysis of what innovation management is in the two different organisational settings is presented.

3. Theoretical framework

As mentioned in "definitions", by content we refer to the actions of innovating which taken together can be seen as a process whereas by "form" we refer to the organisational structure and formal settings for such innovation activities. The division we make between these two aspects of innovation is not an easy one to make since formal components like routines and structure are present within processes of innovation. In this section, we will go through some contributions to the theory of innovation that deals with the form and content of innovation.

First, we will look closer at how the perception of innovation as a process emerged in the first place and how the innovation process concept has developed over the years. Different models of how to look at the innovation as a process will be presented.

In the second part of this section, we will then turn the form of innovation. Extensive work has been made to investigate the importance of structure for innovation. This work has predominantly focused on the actual *organisational* structure, such as the size of the organisation (Berchicci, 2009, p. 41-2). However, structure could also be understood as the formal settings for the innovation process in terms of routines, division of responsibility into formal roles, scripts and business plans to be followed etc. This aspect will be dealt with as well.

Our motive to systematically explore the theory around what we call the form and content of innovation is to get closer to an understanding of innovation management – what it is and how it works in different types of organisational structures. Incorporated into the theoretical framework of both parts of this section, we will present what literature has to say about innovation management. We will look into how it relates to models that view innovation as a process and how it relates to structural elements of innovation.

3.1 Innovation as a process

3.1.1 Innovation process in a historical context

Roy Rothwell (1994) has contributed to the theory of innovations by looking at innovation processes in a historical context. He distinguishes four different eras of how companies previously arranged innovation and also tries to define the current or future innovation process, which he calls the fifth generation innovation process. These phases have all been influenced by the surrounding environment and current events, starting with the linear *technology push* model during the 1950-60s, which was affected by the ideas from the supply-side. After that era, the innovation process in

the 1970s developed towards the *market pull* generation where the idea-generator instead was the market or the demand-side. The, by Rothwell defined, third generation innovation process called the *coupling model* was present during the late 1970s. This model was also linear but feedback allowed communication to flow back and forth between several actors. Throughout the 1980s and 1990s, networking and the inclusion of external actors were keys to speed up the development and to improve inventiveness. That was the reason for Rothwell's labelling of the forth generation as the "*integrated innovation process".*

Rothwell (1994) explains a fifth innovation process that he, in 1994, considered we then were moving towards, *process of systems integration and networking.* This name refers to the main attributes of a greater integration, both concerning the organisation and systems. During this time, the firm will move towards being a flat and flexible organisation with the aim of getting even more efficient. Networking will take a greater role in the day to day-process. Rothwell identifies 24 elements which are present in an organisation's work of improving speed and efficiency. Commitment from management, taking in external knowledge, the use of electronic tools and involving various actors are among these elements (Rothwell, 1994).

3.1.2 Contemporary innovation process models

There are a number of different models for describing the innovation process, all of them with their own special approach. A few of these will be addressed in this theoretical framework. Contrary to the models of the innovation process covered by Rothwell, Trott (2012, p. 28) argues that we must view innovation as a management process. This process consists of a series of activities that are linked in some way to each other, but not in a linear way. A number of models have tried to capture the non-linear nature of innovation processes. One of them is the cyclic model of Berkhout, Hartmann and Trott (2010) that takes as its point of departure that innovation management is really about change management (fig 2.1 below). Change in turn is caused by decisions that people make. Behavioral sciences therefore play a part in this model along with natural sciences, engineering, services etc. New ideas could emerge in any one of these so called cycles, interconnected in nodes, and then propagate clock-wise or anti-clockwise through-out the cycle. The model thereby aims to illustrate the iterative character of the network processes of innovation (Berkhout et al., 2010).

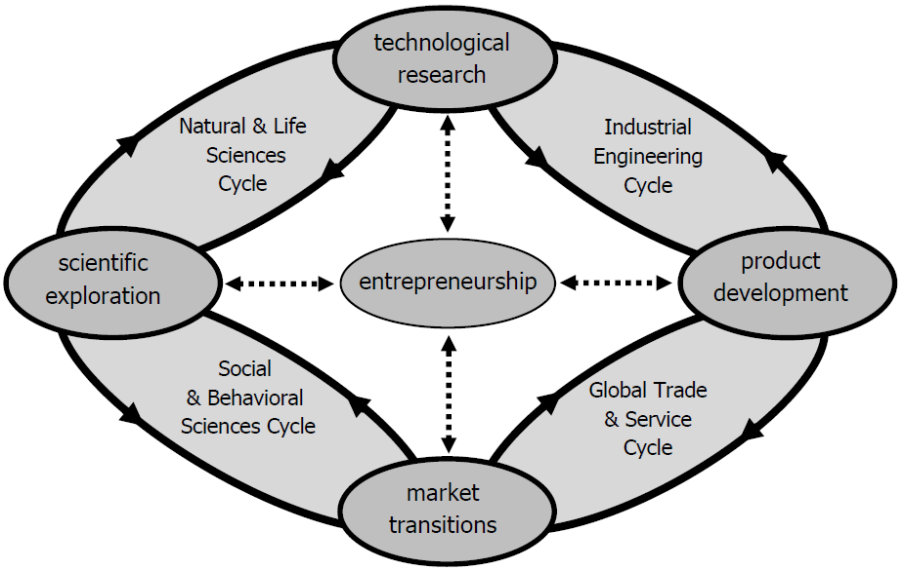

Figure 2.1: Berkhout, Hartmann & Trott's innovation circle (Berkhout et al., 2010, p. 485)

Some contemporary research presents the innovation process in steps and phases while still not considering it to be completely linear. This is because elements of learning and feedback are incorporated into the models. One such model has been developed by Berchicci (2009, p. 3-4) who describes the process to innovate as a learning process through uncertainty reduction. By that, he means it is difficult to forecast how innovations will develop and what obstacles will show throughout the process. Van de Ven et al (1999, p. 4, 66) contribute to the subject by stating that innovation is a route towards the unknown, assuming that the innovation journey is dynamic and characterised by complex and uncertain situations. Forecasting outcomes and costs is an activity characterised with a high level of uncertainty, and this may lead to the wrong decisions in the process (Tidd et al, 2005, p. 217-8). The main goal for a firm that wishes to become successful in innovating is thus to reduce uncertainty. The uncertainty level is often positively correlated with the level of newness and the scope of the innovation (Berchicci, 2009, p. 3).

Berchicci (2009, p. 16-9) explains Schon's contribution from 1967 to the view of innovation as a process. In Schon's view, the innovation process should be seen as one cohesive process rather than as phases in sequence. The process is much more complex than just cyclical phases, where activities, goals and involved people constantly change.

Fuglsang and Sundbo (2005), on the other hand, choose to see innovation as a systemic process instead of a structure constructed by individuals. They present a view of innovation as a social system where people have to be engaged and where the organisation then has to care for the inventiveness the people possess. One way of doing this is to arrange a supporting organisational structure. In other words, they conclude that innovation is a social system which characterises the involved people.

3.1.3 Innovation Management from a process-oriented standpoint

Many of the researchers who have contributed to develop the innovation process discourse have also presented ideas on what constitutes innovation management. As mentioned earlier, Berchicci (2009), Tidd et al. (2005) and Van de Ven et al. (1999) consider innovation management to be about transforming uncertainties into knowledge. The idea of Tidd, Bessant and Pavitt originates in their study which explains innovation as a knowledge-based process based on different combinations of knowledge. The process in which different knowledge is weaved together is a complex one and takes place under uncertainty. Managing innovation, i.e. uncertainty, successfully demands knowledge of the components in innovations as well as how these are combined preferably (Tidd et al., 2005, p. 15). In order to handle the uncertainties, it is important to examine and reassess the projects at several stages. With a supporting management, it is more likely that the innovation will develop and eventually be commercialised and meet the market (Dooley & O' Sullivan, 2001).

Some researchers have taken these ideas further and presented concrete linear models for how to manage innovation. According to Tidd et al., the primary thing companies ought to do in an innovation process is to *search* and scan the environment for possible opportunities (figure 2.2 below). The search includes finding market gaps where an innovation can contribute to efficiency and to find out where a change may be welcome (Tidd et al., 2005 p. 349). Having routines for the search is something the authors find important since it will lead to more accurate and useful knowledge of the surroundings. Developing routines to sense the market will broaden the market's perspective and increase the idea generation as the number of relationships increases. However, having someone at the customers' site is not enough. The information has to be communicated throughout the whole organisation which means routines of communication have to be present in the firm (Tidd et al., 2005, p. 347-61).

A reasonable step after the search is to *select*, thus to decide which opportunities to take on and then commit resources to. The key is to avoid too risky projects and to select ideas which are in line with the business. (Tidd et al., 2005, p. 89-91) Since much energy and resources will be applied to the innovation, some strategy is required to enhance the possibility of selecting the "right" ideas, for example by a strategic framework which sets the rules for the closing down or the continuation of the ideas (Tidd et al., 2005, p. 363-72). One of such is having stage gates, which will be addressed in chapter 2.2.2

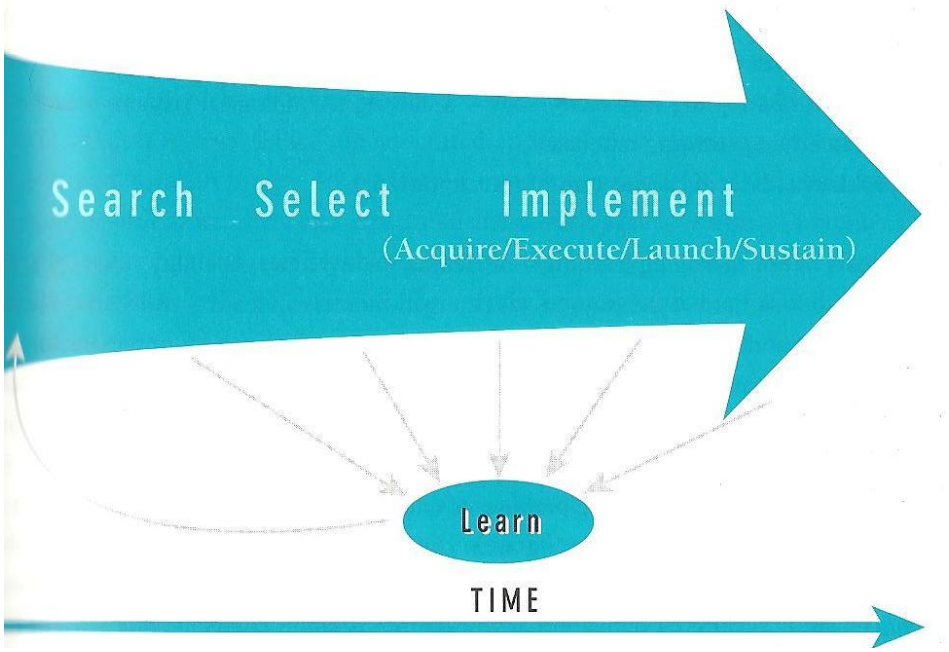

Figure 2. 2: Innovation Process Model by Tidd, Bessant and Pavitt (Tidd et al., 2005, p. 68)

The final phase is the *implementation* of the innovation, turning theory and ideas into practice. In this phase different activities are carried out, which are related to acquiring knowledge for innovating and the execution or launch of the innovation (Tidd et al., 2005, p. 91-8).

. In addition to follow these three stages in the innovation process, Tidd et al suggest some feedback or reflection about the executed process where new ideas or improvement should be discussed in order to make the innovating even better in the future. The company will hopefully take the chance to learn from experience if the managers are aware of the previous mistakes and achievements

Dooley and O' Sullivan (2001) discuss the difficulties related to the management of innovation linked to poor participation. They advocate for how active and involved employees will contribute to the success in innovations as well as to the reduction of resistance towards changes. If employees are poorly involved in idea generation and in problem solving, the potential for coming up with innovations will be limited (Pascale and Athos, 1981, p. 47-51, 64-7); Furey, Garlitz & Kelleher, cited by Dooley & O'Sullivan (2001). It follows from this limitation that neither the problems, nor the solutions will be the right ones in all cases. Davenport and Kotter (cited by Dooley & O'Sullivan, 2001) points to the necessity to motivate employees about the importance of a certain change. Coulson-Thomas and Coe report that the employee level of motivation will affect their level of participation in the innovation process (according to Dooley & O'Sullivan, 2001).

3.2 Structure of innovation

3.2.1 Organisational structure and innovation

When going through more contemporary research, many researchers seem to share our view that it is not so interesting to find out which organisation is the better innovator - large or small - but to be able to say something about what significance organisational structure have for on how companies innovate. Both Benner (2005, p. 123-40) and Tidd et al. (2005, p. 110, 196-7) conclude that small and large firms most probably have different innovation strategies. The size may have an impact on the internal organisational structure because of different conditions in resources, both human and financial, and in strategic goals. Different structures in turn affect how the firm innovates.

Benner (2005, p. 123-40) further argues that smaller companies seem to be better equipped for radical, breakthrough innovations than the bigger ones, but often lack the resources needed to refine the ideas and produce and market them in a large scale. For these small companies, specialised employees are the critical factor.

Small firms can have many advantages in innovating. The structure of a small firm enhances flexibility, which gives them a better ability to exploit various industry segments than a large one. Due to less formal structure and shorter distances between employees and departments, the small firm can react faster to changes in the environment. Studies show that they also innovate more efficiently, maybe because of the flexibility and promptness (Bercicchi, 2009, p. 56-9; Forsman & Rantanen, 2011; Tidd et al., 2005, p. 231).

The role that the individual play in the innovation process differ between small and large firms, according to several sources. According to Tidd et al. (2005, p.231-3), the importance of the individual for the integration, control and assembly of new knowledge and to other strategic tasks is greater in small firms than in large firms. The individual managers and the employees with their experience, education and overall skills are highly influential on the performance of innovation strategy. Berchicci (2009, p. 46-50) however focuses on the individual as entrepreneur and states that, unlike experienced and older firms, new firms are often built around the entrepreneur. The entrepreneur is someone who search, find and make use of opportunities. The author continues his discussion by stating that, compared to larger organisations, the small company's survival is more dependent on its ability to stay innovative and creative.

Trott (2012, p. 31) advocates that individuals are key components in the innovation process both in terms of being the ones to identify problems, have ideas and perform creative associations etc, but also in the role of managers. Key individuals of the innovation process include inventors, entrepreneurs and business sponsors. At the same time, Trott makes the observation that recent

innovations and scientific developments are associated with organisations rather than individuals. It takes the resources of an organisation, including knowledge, money and market experience, to innovate. White, Braczyk, Ghobadian and J. Niebuhr (1988, p. 21) conclude that individualism is favourable in companies which employ fewer than 20 people whereas large firms (more than 50 employees) take advantage of resources and their structure.

The organisational structure of a larger company is often that of a "tall hierarchy" with several hierarchical levels. The taller the hierarchy, the more the leader's control will be reduced Williamson reasons (Williamson, 1975, p. 126-8). Larger companies are also associated with greater bureaucracy than smaller firms, which could constitute yet another barrier to innovation. (Bigliardi & Ivo Dormio, 2009; Williamson, 1975, p. 127).

At the same time, the big companies have an advantage when it comes to developing new technique because of their economies of scales and the great resources they own. More often than small companies, the bigger companies invest in improving existing solutions rather than in new ideas (Benner, 2005, p. 123-40). One may also say that established firms have a natural access to knowledge resources both internally and externally through having strong relationships with customers and suppliers (Tidd et al., 2005, p. 134-50).

In this section, we have chosen not to address what characterises innovation in medium-size firms. That does not mean they are exempt from the ongoing discussion about structure and innovation of researchers in management theory. For instance, Forsman and Rantanen (2011) discuss conclusions about how the intermediate sized firm is supposed to be less innovative than both small and large firms.

3.2.2 Structuring the innovation process

The actions that together constitute the innovation process do not take place in a vacuum. According to the theories described in 2.2.1, the organisational form in which it takes place (small company versus big company, formal structure versus less informal structure) seem to shape the content of innovation, so to speak. Now we turn to other types of formal elements that aim to structure, or *form*, the innovation process.

According to Tidd et al. (2005, p. 389), building an adequate structure of a new project is crucial to successful implementation. The structure will give different prerequisites for how problems and challenges can be dealt with. In other words, the structure of the project creates the premises for its management.

Linked to the view of innovation as a process, as described in the previous chapter, is the importance attributed to routines. According to Tidd et al., (2005, p. 347-8) organisational culture is

reflected in patterns which after frequent use turn into "routines". These authors point to the need for companies to stay flexible about their routines in times with higher uncertainty and changes in the environment. In reality, routines are often conducted ad hoc, which also explains why the innovation process should not necessarily be seen as linear. As mentioned earlier, having stage gates is one idea of a systematic process which will help the decision making (Tidd et al., 2005, p. 384). According to Berkhout et al. (2010), the central role in the cyclic model is often held by a manager, taking on what they call a stage-gate approach of what projects should pass or not.. Much like Berkhout et al., Cooper (2008) addresses a stage gate approach model to make out successful innovators. This model by Cooper suggests implementing "gates" at key stages of the innovation process where the project's actual success is measured to predefined criteria. The project will be continuously worked on if it passes the gate (meaning meeting the criteria), otherwise shut down or revised.

Kotter and Davenport argue, according to Dooley and O'Sullivan (2001), that formal responsibilities regarding the management of the innovation process are vital. However, they are sceptical towards the strategy of locating such responsibility to a consultant or a certain delegation. This means that the management could remove them from leadership in relation to the change process. According to Kotter and Davenport, this could be a factor behind why innovation processes and change management fail.

Having predefined or clear roles could support the structure in an organisation. One of these roles which seem to be of certain importance is the gatekeeper, who is thought to improve the communication paths. The role of the gatekeeper is to communicate between departments, companies and/or industries and the actual location of the gatekeeper should be such that communication in different directions is facilitated. Nevertheless, informal communication should not be underestimated (Tidd et al., 2005, p.362; Westland, 2008, p. 113).

3.2.3 Innovation Management from a structural standpoint

The structural elements of innovation processes such as routines, project structure, formal communication paths and formal roles as described in 2.2.2 are closely related to innovation management. In fact, according to Tidd et al. (2005, p. 347-8), the management of innovation is seen as the task to implement and *routinise* the innovation process. More specifically, one part of the innovation management is about creating routines in the organisation, another part is to recognise when to update or change them. Through routines, activities in the process are more easily managed and organised. Torrisi (1998 p. 15) views them as a tool to direct performances and activities in order to reduce uncertainty. The routines in turn are supported and developed by

structures and procedures (Tidd et al., 2005, p. 78-84). Routines are apparently seen as a tool for, and maybe even the content of, the management of innovation processes.

Such approaches to innovation management that focuses on the formal elements of innovation processes (what we define as structure) could also be found in the course literature for MBA students of innovation management. An example thereof is "Innovation Management - strategy and implementation using the pentathlon framework". In this framework, Goffin and Mitchell (2010, p. 11) argue that turning an idea into reality is something that must be treated as a project. In their words, it is a "finite activity with its own objectives and resources and above all its own leadership" (2010, p. 227). The role of the management is to drive the underlying processes that stimulate innovation within a company. However, although Goffin and Mitchell consider that there are innovation management processes that can be formally defined and documented, there are other parts of such management processes which cannot. Some processes are not tangible enough to be documented, for instance idea generation or the management of company culture (Goffin & Mitchell, 2010, p. 11).

Another aspect of the link between structure and innovation management is how the management task changes with the formal settings (organisational structure) in which it is being carried out. According to Tidd et al. (2005, p. 41), their model for managing innovation in phases (search-select-implement) will differ depending on the situation and on the company. A smaller company will probably have an informal way of managing innovation whereas a large firm is more likely to have a more formal and structured process. More often, a company with less than 50 employees incorporates research and development into the daily overall business and in general does not have formal routines for the conduction of innovations (Forsman & Rantanen, 2011).

Tidd et al. (2005, p. 231) conclude that the size of the firm influences what innovation management and the innovation strategy looks like. In big firms, innovation strategies focus on the structural elements such as routines and organisational design and not so much the qualifications of individuals. As Tidd et al. (2005, p. 71, 126) argue, small companies (here defined as companies with less than 500 employees) do not really need formal structures for communication in general, but as has been discussed, are more dependent on individuals. In addition to having the right set up for external communication, the patterns for internal communication that exists within a company are an important part of knowledge management (Tidd et al., 2005, p. 361-2).

The management issue of most concern in small firms is the limited resources, both concerning competence and finances (Forsman & Rantanen, 2011; Tidd et al., 2005, p. 127). Thereby the starting point of innovation differs from the one of larger firms. Limited resources can restrict the capacity to conduct a screening phase that gives an appropriate image of the company's

possibilities (Forsman & Rantanen, 2011).

A way of overcoming these various limitations is by having an informal structure that support rapid decision making. Small companies could also make use of being part of networks in order to get access to more resources. (Tidd et al., 2005, p. 71, 127). Incorporating external knowledge into the innovation process is something that organisations seem to be investing more and more in (Torrisi, 1998, p. 23). External sources not only increase available resources for the firm, but also increase the idea generation and contribute to problem solving (Torrisi, 1998, p. 133-4). For an established organisation, such patterns consisting of routines and other structural aspects have been refined over the years along with external relationships being created. This makes it easier to bring the products to the market (Berchicchi, 2009, p. 42-3). Building up an internal source of knowledge will improve the ability to take advantage of knowledge which exists outside the organisation (Forsman & Rantanen, 2011). For established organisations, assigning resources to basic research is necessary to create new, internal knowledge that later on can develop into advanced technologies (Berchicchi, 2009, p. 42-3). If the management concern of small firms was its limited resources, the big company that does have important resources is facing a challenge to coordinate these. Constant communication across divisions is crucial to be able to adapt to the changing environment. This is because innovations are encouraged by interaction of different competences in the company, and additional focus on teamwork and internal networks may help to improve the interaction (Tidd et al., 2005, p. 124).

4. Results

In this chapter, we will present our results from interviews and review of published information about the companies and look at how this relate to the theoretical framework presented in chapter three.

4.1 Vattenfall

As a company active on the energy market, Vattenfall is part of a sector that is becoming increasingly important for the Swedish economy (Svensk Energi, 2012-05-25). Vattenfall is one of Europe's largest energy producers, mainly providing electricity, heating and gas. The number of employees in 2010 in Europe augments to 38,000 out of which 9,000 are based in Sweden. Vattenfall as a limited company has only existed since 1992. Up until then, it constituted a governmental agency. The parent company, Vattenfall AB, is owned by the Swedish state which holds 100% of the shares. Following the deregulation of the Swedish electricity market in 1996, an expansion of the company took place to European markets, including the German, Dutch, and Baltic energy markets. In recent years, company activities have been located also to Denmark, Great Britain, Belgium and Finland (Vattenfall AB, 2010, p. 2)

As described in the methodology section, we wanted to look closer at Vattenfall due to its organisational structure, including a specific department called "strategic innovations". Only after we contacted the head of R&D, we learnt that a decision was taken in 2010 to undertake a major reorganisation of the company. The company is still in the process of implementing its different steps (Vattenfall AB, 2010, p. 6)

As the reorganisation is cross-cutting the entire company, the innovation process, including the management of innovation, has been highly affected by this. However, this only made us more interested in studying the organisation and management of innovation in Vattenfall. When applying our research question to Vattenfall we saw a potential to explore the reasons for changing the previous organisational structure and how this affects the innovation process and the management thereof in practice.

4.1.1 Results from looking at innovation at Vattenfall – structure

Based on the size of Vattenfall, we had expected a rather formal structure for the innovation process. Like Tidd et al. (2005) reason, we imagined that the larger a company is, the more

demanding becomes the challenge of internal communication and finding an organisational structure fit for this. Indeed, when looking at the new organigramme of Vattenfall, it shows a classical hierarchical bureaucracy with the development activities located to a specific unit in the business segment and governance of the projects located to another unit in this segment.

From the interview with the Vattenfall head of R&D, Karl Bergman, we learnt however that the actual structure for the innovation process at Vattenfall is a much more complex one than what can be interpreted from the organigramme. This is partly due to the fact that Vattenfall relies more on networks that we envisaged. This also has to do with the meaning of innovation being much broader than a mere technical development and the implementation of its results. In fact, innovation as a term is rarely used internally. Instead, innovation is something that Vattenfall rather expresses in terminology such as business development and process development, in addition to technical development (K. Bergman, March 15, 2012).

Restructuring of Vattenfall – implications on its innovation process

The formal changes are easy to detect from the company documentation we went through. For instance, no distinct department exists any longer for dealing with innovation issues of strategically importance. The new organigramme shows that the structure for the actual technological development has changed as well, with R&D projects being included in a business division called "asset development". In this division, a new business unit called "Project Governance and Improvement" emerged. From the interview with Katariina Güven at this unit, we learnt about its horizontal function as a support structure for basically all other units involved in projects. Part of its role is to develop a template that all projects undertaken at the company should now follow. Through this standardised approach, the motives for undertaking a certain development project will be clearer from the start (K. Güven, May 2, 2012). This will be described more in detail under the innovation management heading. Part of the role of this unit is also to provide competence development to project leaders of other units about the new methodology. This competence development thus functions as support when implementing the new, structured approach for how to undertake development projects. The current organigramme of Vattenfall is shown in figure 3.1 below

.

Figure 3.1: Organigramme of Vattenfall. (Vattenfall AB, 2012a. Vattenfall Business Unit R&D projects [PowerPoint Slides, p. 5]).

Looking closer at the new business unit called R&D projects, it covers five different focus areas (figure 3.2 below). Two of these focus areas are devoted to the different energy production types of Vattenfall: Low Emitting Technologies (including ocean energy, wind energy, hydro energy and nuclear energy) and Thermal Power and Biomass. Another focus area deals with R&D linked to Carbon capture and Storage. Incorporated into the same business unit is also the focus area of Sales and Distribution. Finally, the R&D unit also holds responsibility for Strategic Innovation. The internal structure of the R&D business unit is shown in figure 3. 2.

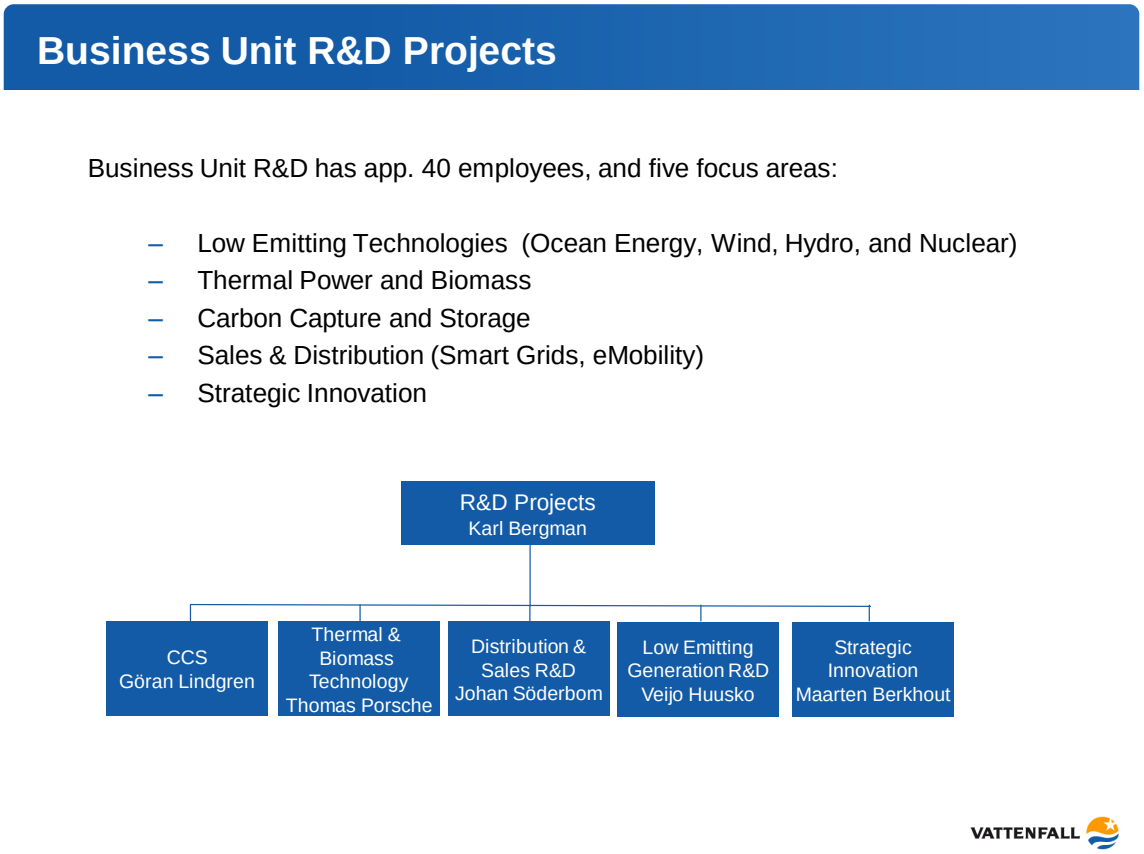

Figure 3. 2: Internal Structure of Vattenfall. (Vattenfall AB, 2012a. Vattenfall Business Unit R&D projects [PowerPoint Slides, p. 7]).

The rational behind grouping these focus areas together in a specific business unit is to be able to better match the organisational structure of Vattenfall with its new strategy. According to the strategy documents, this vision reads 'Vattenfall will create a strong and diversified European energy portfolio with sustainable and increased profits, significant growth options and will be the leaders in developing environmentally sustainable energy production' (Vattenfall AB., 2012b). Through setting up this vision, the company aspires to at the same time better satisfy its owner's demands on rate of return and be in the forefront of shifting towards sustainable energy production

(Vattenfall AB, 2011, p. 2-4). The new vision and the restructuring following on from it have in concrete terms meant turning every part of the companies' activities into business units, including the development activities (K. Bergman, March 15, 2012).

We interviewed Per Kallner, responsible for the focus area Biomass within the R&D unit about the reasons for and consequences of the restructuring. He describes the new structure as a way to bring together long term development projects with the more hands-on, short term projects that originate from an immediate demand (May 4, 2012).

In addition to the organisational restructuring, all projects including development ones will also be subject to the new, structured approach for deciding on if and how they are to be undertaken, which was described by Güven (May 2, 2012). Regardless of what type of development project that is to be undertaken, it should now follow the logics and the methodology of the structured approach that is to ensure all projects will bring business value to Vattenfall (K. Güven, May 2, 2012; P. Kallner, May 4, 2012).

4.1.2 Results from looking at innovation at Vattenfall – process

A structured but non-linear innovation process

One of the core activities of Vattenfall is to invest in energy production. Those investments function as the starting point for innovation in the company. As the company does not develop new technologies or products, innovation becomes a matter of using existing ones in a smart way; minimising risks, costs and problems when using a certain technology for instance.

The technical challenges and aspects related to this require the competence of the R&D department, but with a continuous interaction with other departments. The innovation process can be described as an iterative process in which a number of departments are involved.

Clearly, the linear models of innovation, like Rothwell's (1994) coupling model, do not fit with the case of Vattenfall, which does not appear to have a linear process following certain steps. Instead, it seems to be well in line with the perception of an innovation process as a learning process, as described by Berchicci (2009) and Tidd et al. (2005), among others.

"Innovation is about problem-solving"

As a concrete example, Bergman describes the current problem with ice forming on the wings of the wind turbines. The wind power department thus identifies a need to solve this problem and turns to the R&D department. The R&D department in turn involves other actors, including external ones, to see what can be done about the problem, whether it is feasible from a technical point of view, the

costs involved and so forth. The information gathered is being fed back to the wind power department. If the project receives a green light, a number of aspects are to be included in the innovation process which requires the competence of various parts of the company (K. Bergman, March 15, 2012). This type of problem-solving through the inclusion of internal and external actors is what Bergligi and Ivo Dormio (2009) refer to as a wider knowledge base, which according to Forsman and Rantanen (2011) leads to an environment that supports innovativeness.

Structure versus relevance of innovation process outcome

According to Bergman, there is a need for a separate R&D unit at Vattenfall in order to ensure that the right problems are identified and a strategy to tackle them is developed. The innovation process of a larger company will automatically be fit into formal structures due to the need to manage the company's resources through an organised budget process. Allocating resources to innovation activities requires a clear target in the sense of a distinct part of the company responsible for the activity (K. Bergman, March 15, 2012).

This is something that Bercicchi (2009) discovered as well. Established organisations require resources for innovating activities to be assigned in an explicit way. At the same time, several writers (Lindholm Dahlstrand, cited by Benner, 2005, Bigliardi and Ivo Dormio, 2009) have found that more formal structures and bureaucracy often becomes a barrier for innovation in larger companies due to the loss of flexibility.

In the interview with Bergman, it was pointed out how the formal "departmentalisation" of development activity risks leading to results which are not relevant for the other parts of the company (March 15, 2012).

4.1.3 Innovation management

"Introducing change demands leadership"

Provided the budgetary process requires a certain organisational structure where the responsibility for various activities is attributed to fixed departments, a management challenge then occurs when the result of those activities are to be integrated in various parts of the organisation. The innovation process is no exception. Not only must the results of technical development be turned into practical implementation at various parts of the company, all business segments must feed into the technical development.

As has been described, this is an iterative process at Vattenfall. Managing such a process is about leadership, according to Bergman, as innovation is partly about introducing change. This

requires acceptance from those who are the targets of the new ideas. The main management challenge is involving everyone who is affected by (or ought to be involved in) the innovation process (K. Bergman, March 15, 2012).

Involving people broadly in the innovation process

The issue of involving people broadly into the innovation process that Bergman describes seems to be important from to two different dimensions. One is the challenge to succeed in identifying the problems and to find solutions to them. The other one is about gaining acceptance for the results of the problem solving. As described in chapter 2, these two elements have been highlighted in management literature as key components in how to create a successful innovation process (Pascale & Athos, 1981, p. 47-8., & Dooley & O' Sullivan, 2001). Bergman's way of describing this is to say that change in terms of implementing development results will demand the involvement of "both heart and brain". Finding logical solutions to relevant problems is obviously an unavoidable part in gaining acceptance for change. But this in itself is not enough. There is an emotional part to it, acceptance require a will to change (March 15, 2012). Bergman's thoughts are supported by e.g. Dooley and O'Sullivan (2001) who believe having a high involvement among employees is central for a good innovation management, precisely due to the fact that this will increase acceptance towards change.

This latter challenge about gaining acceptance corresponds to what Bergman describes as soft management, whereas the management challenge to make sure people are involved so that the right problems are addressed is more a matter of rationality and "hard management". The importance of the so-called soft management relates to the role of the individual in the innovation process. As Bergman describes it; innovation is driven by people. It requires "driving spirits" (March 15, 2012). This is in line with Trott's view (2012) that individuals are key components in the innovation process both in terms of being the ones to identify problems, have ideas and perform creative associations as well as in the role of managers

The theories of Kotter and Davenport that Dooley and O'Sullivan (2001) address about the importance of clear responsibilities regarding the management of the innovation process are interesting in light of the trade off detected in Vattenfall. The trade off between on the one hand appointing responsibility for core elements of innovation to certain structural departments of the company and on the other hand the challenge this brings in terms of making sure the contribution made by such departments will be seen as relevant to the rest of the company. It could be that larger organisations by necessity must locate the responsibility for innovation to a definite structure. However, the responsibility to manage the innovation process must be taken on by someone who is

inside the process.

This reasoning about soft management, and in particular about involvement of all employees concerned in the innovation process, is in line with the thoughts of Dooley and O'Sullivan's (2001) and Pascal and Athos (1981). These authors believe that poor employee participation impact on the functioning of the innovation process. Engaging active employees is also a way of deleting resistance towards changes of various types.

Organisational changes and innovation management

As has been argued in chapter 2, the organisational structure for how innovation takes place in the company could in itself *form* the actions of the innovation process as well as its management. According to Tidd et al. (2005), having a supporting structure for innovations is fundamental. The underlying structure has a great impact on the innovation strategy. This seems to be the case in Vattenfall, as demonstrated by the effects of the organisational restructuring of Vattenfall.

For instance, clearer responsibilities in the management of Vattenfall's development activities were an outcome of the reorganisation that took place in 2010-2011 according to Bergman. In concrete terms, the organisational change consisted of a centralisation of management responsibility. Previously, the structure for development work included a central R&D unit and a number of decentralised R&D units at the various sites. Every unit was independent. In the new structure, development activities are still taking place at the various sites, close to the core operations of Vattenfall. However, the management responsibility is all gathered to one centralised R&D unit. That means long term projects as well as the more immediate development needs are all managed in one and the same process (K. Bergman, March 15, 2012). This concentration and clarification of management responsibility could be defended against the backdrop of the theories of Dooley and O'Sullivan (2001) described in chapter 2, pointing to the importance of having a clear overview of the innovation process. However, when the responsibility is concentrated to one organisational component, the pressure to make the right choices etc increases on this specific segment.

According to Bergman, the organisational restructuring has led to improvements, for instance by making it easier to identify and spread practices. Still, the restructuring brings both pros and cons. The challenge to overcome distance between where decisions are taken and the actual core operations has increased with the new structure, not least since its only the managing responsibility for development that has been centralised. The responsibility as regards management of human resources is still decentralised. This demands a good collaboration between the managers further down in the line and Bergman, head of R&D. Such collaboration must not be completely ad

hoc, Bergman emphasises. It still needs to be structured (March 15, 2012).

New structured, approach to project governance

We have now argued first that the underlying organisational structure impacts on what innovation management is all about and secondly that the innovation management at Vattenfall was impacted by the restructuring of the organisation.

In addition to the organisational restructuring, the new project governance methodology that is being implemented also means a novelty in terms of structure. All R&D project portfolios are now set to follow a management framework with clear steps, as described in figure 3. 3 below.

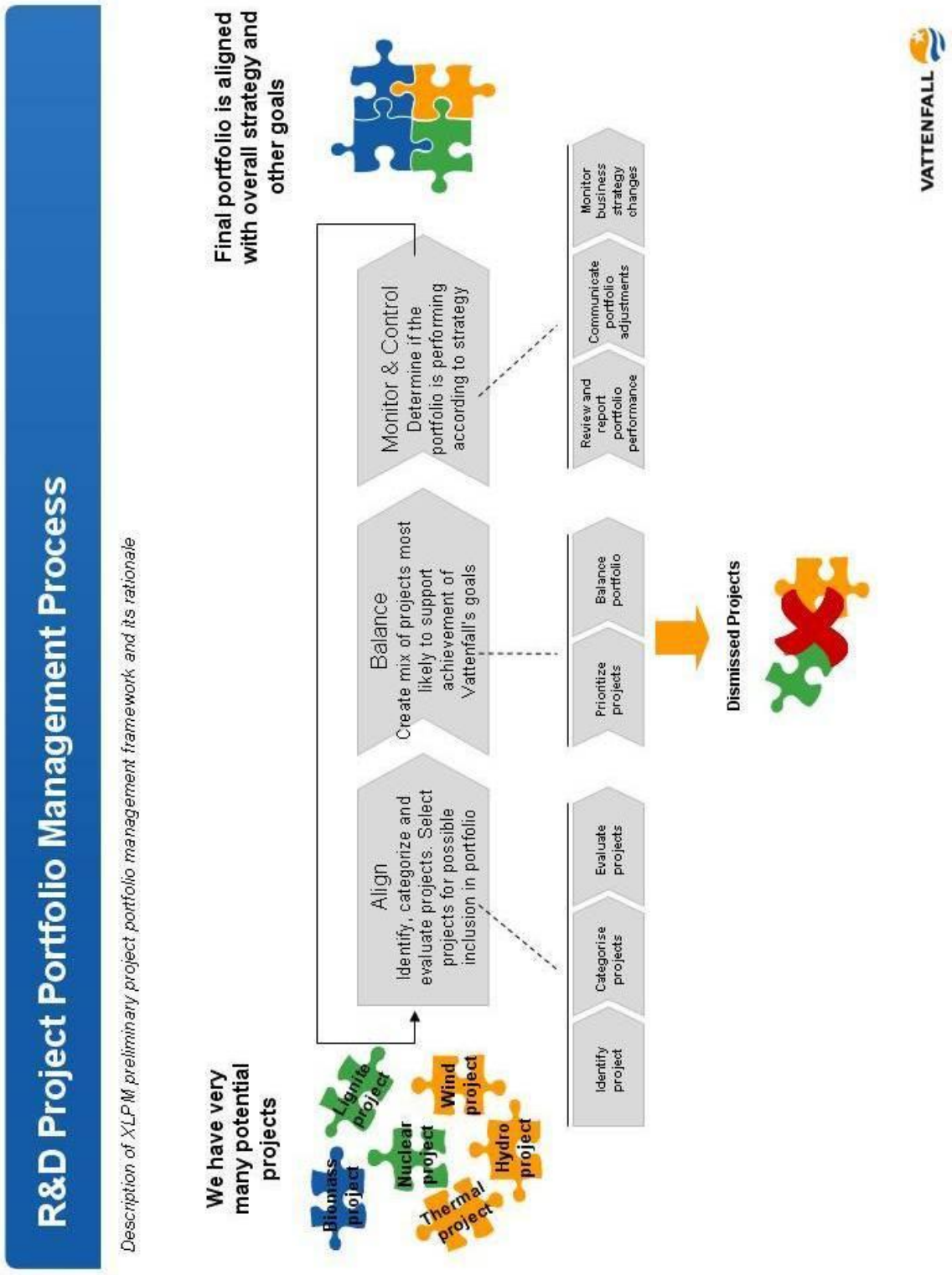

Figure 3. 3: R&D Management Process of Vattenfall. (Vattenfall AB, 2012a. Vattenfall Business Unit R&D projects [PowerPoint Slides, p. 9]).

In this framework, a first step to bring some order among the many potential R&D projects is the alignment step. Projects are identified, categorised and then evaluated to see if they should be included in the project portfolio - fit into the puzzle so to speak. In the second step, the aim is to create balance between projects, making sure the portfolio consists of a mix of projects that are likely to together support the achievement of Vattenfall's goals. The third step of the management framework is about Monitoring and Control. It involves determining whether the portfolio is performing according to the strategy. This in turn means reviewing and reporting on portfolio performance, communicating portfolio adjustments and lastly to monitor business strategy changes. The framework should thereby ensure that the final portfolio is aligned with overall strategy and other goals. Then, the process restarts, with new potential projects being tested against the new puzzle. The projects which do not fit are dismissed.

Structure needed for the resources of a big company to fully work as a competitive advantage

According to Güven, the standardisation in work method is a way to make better use of the resources of Vattenfall. Being big and managing huge resources could be a competitive advantage, but it demands a type of management that actively search for synergies and ways to make use of the large resources efficiently (May 2, 2012).

From the interview with Güven, we learnt that the ambition with the new project governance model is to make it clearer where responsibility lies. It should also make it easier to make decisions, by functioning as a framework to lean against in the decision-making on how to handle projects, from start to end (K. Güven, May 2, 2012).

According to Kallner, the new structured approach for how to decide on the start and continuation of development projects is supposed to function as a management tool to avoid innovating in the wrong area. That is, investing in a type of R&D project, that even if it is interesting and promising in technical terms, might not be of actual relevance to the core operational areas of Vattenfall. At the end of the day, they must help achieve the goals of Vattenfall. This is what Kallner would describe as a key component of what innovation management is all about in Vattenfall (May 4, 2012).

Structuring the innovation process to reduce risk of making the wrong investments

He admits in real terms, the new organisational structure along with the more structured project governance means less risk-taking. The less risky projects filling an immediate demand tend to be favoured on the expense of "blue sky" or exploratory type of development for which it is more difficult to point to their actual relevance for achieving Vattenfall's goals. Nevertheless, Kallner

underlines that there are various types of R&D projects taking place, including the long-term exploratory ones, often in collaboration with universities (May 4, 2012). Vattenfall is involved in innovation projects on the EU level within the framework of the so called Knowledge and Innovation Communitities (KICs) linked to the European Institute of Technology. InnoEnergy - the KIC that Vattenfall is part of – aims to be a leading engine for innovation and entrepreneurship in the field of sustainable energy (KIC InnoEnergy, 2012).

In the interview with Bergman, the management framework described above is referred to as the gateway approach and highlighted as one example showing how innovation management is about structuring the innovation process (March 15, 2012). This has been addressed by Cooper through Tidd et al. (2005) and by Berkhout et al. (2010). The implementation of certain gates will facilitate decision making about the continuation of an innovation project.

Although the specific framework used by Vattenfall does not follow the stages search – select – implement, which is what Tidd et al. (2005) propose, there are some similarities, particularly in the identifiation/search step. However, in the case of Vattenfall, it is not a matter of developing radically new innovations. Instead the focus lies on the demands for further development of processes etc in the core operations at the various sites (K. Bergman, March 15, 2012). As described in the anthology by Benner (2005); the focus of larger organisation often lies on already existing products (in this case delivering energy) rather than exploring the unknown to find new ones.

In the interview with Güven, she underlined the importance of giving sufficient time for changes in work methods to be implemented, especially in large organisations. At the same time, it could be a frustrating process of reaching that stage if it drags out. Just like Bergman, she points to the need for feedback from the people concerned by the changes early on, and throughout the implementation process, to gain acceptance. In addition to this "soft" management argument, she also sees the benefit of being able to adapt the changes along the way. Nothing should be set in stone (K. Güven, May 2, 2012).

4.2 Bioprocess Control

The other company we selected for our study of innovation processes and the management thereof was Bioprocess Control. Founded in 2006 and employing only nine people, the company is part of the clean tech industry, an industry which among other things aims for higher efficiency and a more environmentally friendly production (Clean Tech Group, 2012). The small company develops and commercialises technologies to optimise the production of biogas. In addition to providing a

portfolio of products that supports design and operation of biogas plants and processes, their core activity consist of delivering a specific approach to biogas production. This approach, called Biogas Optimizer, was selected the top Swedish Clean Tech Innovation of the year in 2007. In short, it means that once a plant has been built, the Biogas Optimizer approach can be used to ensure that the plant always operates as close as possible to its designed capacity from a process control standpoint, avoiding bottlenecks (Bioprocess Control Sweden AB, n. d., a).

The Biogas Optimizer (TM) approach consists of consultancy services, hardware modifications, and propriety software (Bioprocess Control Sweden AB, n. d., b). According to the annual report of 2010, the company started to sell their first product in that year which was a test system aiming to contribute to an easier analysis of the methane potential for customer. In the same year, a worldwide distribution system was established (Bioprocess Control Sweden AB, 2011).

When it comes to the importance of innovation for the small company Bioprocess Control, they express a need for this to keep up with the market. This is also why they on their web page say research and development is the centre of attention (Bioprocess Control Sweden AB, n. d., c). Our interest for the company stems from its explicit ambition to take a leadership role as a driver of innovation. Further to exploring the management of their own pipeline of innovative products and services, we wanted to look closer at their role in external innovation management and draw on their experiences from this (Bioprocess Control Sweden AB, n. d., c). The role of Bioprocess Control in the biogas industry is, according to Jing Liu (March 21, 2012), to research and then to apply this into other companies. This is a question of commercialisation of their own research which has to fit in with, and contribute to, existing innovation processes in other companies (J. Liu, March 21, 2012)

4.2.1 Results from looking at innovation at Bioprocess Control – structure

The evasive structure of a start-up company

Since Bioprocess Control is a small and relatively young company, employing only nine people in total, a very different organisational structure than the one of Vattenfall was expected. At Bioprocess Control, we interviewed the CEO/Managing Director Patrik Andersson, the Head of Research and Development Jing Liu and the Head of Sales and Communication Jan Roesen.

Indeed, the organisational structure is almost invisible, or at the very least, evasive. Depicting it in an organigramme with units and levels would not make any sense. Instead, we get the impression of the company as consisting of different circles, with Jing Liu as the centre point and innovator, and the management team of three (including himself) around him as the inner circle.

But then again, the idea-generating team of Liu and his students, with input from external actors through various networks, interferes also with this attempt to fit Bioprocess Control into a certain organisational structure.

Having a formal structure with defined communication paths, directions of interaction and a division of roles would not help the company, says Andersson. Due to Bioprocess Control being such a small company, the lines of communication are short. Most of the people in the company work closely together on a daily basis which means they communicate automatically about new ideas or upcoming issues. In fact, Andersson claimed that the company tries to avoid bureaucracy as far as possible since one of their main advantages is to be flexible and it is crucial that it stays that way (March 21, 2012).

Andersson's view is shared by Roesen, the person responsible for marketing and the contact with the clients. He says the company has a structure "under construction" but they are not yet at the point where the structure is needed. However, Roesen adds a few concerns to the picture. To him, not having predetermined ways for monitoring of the company's activities or for the communication could sometimes be a drawback. He suggests some sort of deviation templates to enable a better surveillance. These would function as formal reconnections, to keep track of where and what things went wrong. Thereby he expresses a certain downside with the flexibility gained by not having a structured innovation process (J. Roesen, April 5, 2012). His thoughts are interesting due to the fact that there are very limited theories developed on this in the literature we have reviewed.

Being small - a competitive advantage?

To the contrary, the opposite of structure and formalised processes are often advocated in the management literature. For instance, the informal way of communicating is promoted by Tidd et al. (2005), who believe this is a forgotten success factor to improve the innovative spirit. The same authors state that a small company is often characterised by spontaneous conversations.

Liu and Andersson emphasise the need to stay flexible and adapt their offer to the specific needs of new customers (March 21, 2012). Their reasoning finds support in the management literature, showing that being able to stay flexible in the innovation process is crucial (Tidd et al., 2005, Berchicci, 2009, et al.). In this, small firms are assumed to have an advantage over larger firms, Berchicci (2009) argues. According to Tidd et al. (2005) and Lindholm Dahlstrand (Benner, 2005), smaller companies are characterised by flexibility and a need for skilled individuals, which impact on the innovation process in the way that these companies are able to detect gaps in the market and thereafter can respond to changes quickly. Andersson and Liu both conclude that the small size, and thus the flexibility of the company, is indeed a competitive advantage. Their

personalised, tailor-made services are advertised on the company website as well. At the same time, the fact that one and the same approach is not applicable in every case is a challenge to them resource-wise which limits the exploitation of innovative ideas (March 21, 2012).

"A more formal structure is like a suit that still does not really fit the company"

Although Liu and Andersson express that the company does not need - nor have the resources for - a formal structure with separate functions at this point, some small steps has been taken towards more formal structures in the company. One of the novelties is having meetings on a regular basis, but in practice the communication and problem solving are still mostly done ad hoc. Some structuring has also taken place through the development of a role culture, with formal responsibilities and titles. This change was introduced to increase clarity on who does what and avoid confusion within the company. Andersson describes the steps taken towards a more formal structure to currently be, as stated above, too much for the company. But he also concludes, looking ahead, that the company will grow into it. It will be needed further on. The importance of the role culture will become clearer in the future and then become fully implemented (P. Andersson & J. Liu, March 21, 2012).

4.2.2 Results from looking at innovation at Bioprocess Control – process

According to the website of Bioprocess Control, they view themselves as drivers of innovation processes (Bioprocess Control Sweden AB, n. d., c). In the interview, Jing Liu and Patrik Andersson explain this statement by pointing to the role of Bioprocess Control visa-vi their customers. Additionally, they clarify that Liu today was the clear driver but that over time, the organisation will become the driver of innovation. The role of Bioprocess Control is to apply and adapt their approach to optimising bioprocessing for each and every customer. The business idea of the company require them to constantly keep up to speed on where the market is heading and then adapt the bio-optimiser approach to be just ahead of the demand and interest from potential customers (P. Andersson & J. Liu, March 21, 2012). Based on the annual report of 2011, it is clear that the company still focuses on research and development, but sales and costs will acquire more attention in 2011. A high per cent, 40 % of the total assets, is allocated development efforts, revealing that the company really seems to put a lot of effort into further development (Bioprocess Control Sweden AB, in press, 2012).

"Innovation is in our genes"

Although Bioprocess Control categorises the organisation as a driver of innovation processes, they

have not defined any innovation strategy of their own. Overall, they do not talk about innovation strategies internally; they just execute the innovative activities such as process design and increasing knowledge (P. Andersson & J. Liu, March 21, 2012). Small companies seldom locate research and development activities to specific divisions (Forsman & Rantanen, 2011), which seem to be the case of Bioprocess Control. In Bioprocess Control, almost every activity is directly or indirectly related to innovation, which is supported by the quote above by Liu himself. The rational for innovation in Bioprocess Control coincides with the rational for the whole company. That is, the innovation needed to develop the product Biogas Optimizer to improve efficiency and stability in the biogas industry is at the same time the core activity cross-cutting the entire company.

One of the main characteristics we noted with the innovation process of Bioprocess Control is how dependent it is of feedback, in accordance with the non-linear models of Tidd et al. (2005) and Dooley and O'Sullivan (2001). It could also be depicted as a learning process, much like the one described by Berchicci (2009). Andersson and Liu both believe it is necessary to look back at experiences made from dealing with previous customers and identify the specific factors that were contributing to the success in separate cases (March 21, 2012).

Although each bio plant is in a different level of maturity and face different problems, Bioprocess Control's concept consists of certain standardised and common elements, which also is suggested by Tidd et al. (2005). The first element is to improve the input to the bio production process and to ensure high quality. The second is the operation on the biological level as well as the plant level. A collaboration with The Faculty of Engineering at Lund University on simulations contribute to giving an overview of the process. The third element is the ongoing activity of process design and technological knowledge which is needed for further development (P. Andersson & J. Liu, March 21, 2012).

The second main characteristic of the innovation process of Bioprocess Control is how the company works with a broad range of actors in various networks. These include regular contact with PhD students, customers and suppliers (P. Andersson & J. Liu, March 21, 2012). Rothwell (1994) defines the fifth innovation process in organisations as one characterised by networks, further integration and more use of external knowledge. Having regular contact and cooperating with actors outside of the organisation is somewhat true in the case of Bioprocess Control. Tidd et al. (2005) suggest networks as a way of increase the available resources for the company.

The successful implementation of new ideas is not just about technical aspects. According to Liu, an even more important aspect is the issue of gaining acceptance for the ideas. In Liu's experience, it is the cultural barriers, consisting of people, more often than the technical barriers that prevent successful implementation. Only individuals are able to tear down these cultural barriers

(March 21, 2012). This stands in contrast to the view of Tidd et al. (2005), who claims that technical knowledge is a key to success for small firms.

In the case of Bioprocess Control, the issue of gaining acceptance for new ideas is about acceptance from the customer. Communication with and understanding for the customer thus becomes very important. When Bioprocess Control is in the midst of implementing a more innovative and efficient approach to bioprocessing at customers, they need to simplify the communication about the approach to facilitate the interface. Being flexible, lowering barriers of communication and understanding the different customers is all part of a learning process, according to Andersson and Liu (March 21, 2012).

4.2.3 Innovation Management

The pros and cons of individualism...

Bioprocess Control could be described as a company being built around just one person, the innovator and founder Jing Liu. As the origin of the company's innovation processes, a lot of pressure lies on him to remain creative. Close to Liu is a small team of PhD students where a lot of knowledge transfer takes place. Having talented students around him may lead to new ways of thinking, but the main advantage for Liu is that he gets a chance to test his idea (J. Liu, March 21, 2012). According to White et al. (1988), this type of strong individualism could be advantageous in smaller companies. Clearly, there are benefits with having the responsibility for various parts of the innovation process by and large centred to Liu. In larger companies, the management face the challenge to coordinate internal and external competencies, according to Berchicci (2009). However, both Berchicci (2009) and Trott (2012) argue that the strong individualism in small companies implies a certain vulnerability for the company, as it depends to a large extent on the creativity and management skills of one individual.

Currently Liu's role is at the same time to be CTO, board member, product developer and so forth, apart from being the driver of innovation. Shifting between the many hats create a management challenge in itself of being able to bring in various perspectives (J. Liu, March 21, 2012). This could be troublesome according to Dooley and O'Sullivan (2001), who highlight the need for a clear overview of the innovation process. It also constitutes a management challenge when it comes to the issue of killing your darlings. That is, selecting what projects to pursue and which ones that should be abandoned. For Liu, this is not an easy thing to do since he truly believes in the new development (March 21, 2012). His decision-making does not have the support of any type of formal or structured method, such as Cooper's stage-gate approach.

More structured than they think?

Much of the comments made by the respondents point towards that the management of innovation at Bioprocess Control is informal and carried out ad hoc. Still, when going through the documentation available on the web, a management team with a formal division of responsibilities is presented. This management team of three consists of the Managing Director/the CEO, Patrik Andersson, Jing Liu who is the Head of Research & Development and the Head of Sales, Jan Roesen (Bioprocess Control Sweden AB, n. d., d). Based on this it appears that Liu has the support of a certain decision-making structure. In the interviews with each of the three members of this management team, they all emphasise the benefits of informal structures and open discussions where everyone has their say over a formal division of roles. When it comes to selecting what projects to go for, Liu, Andersson and Roesen discuss the projects jointly, and then the three of them usually try to decide on whether they should be shut down or to continued (P. Andersson & J. Liu, March 21, 2012; J. Roesen, April 5, 2012). This seems like the textbook example of informal innovation management, as described by Tidd et al (2005). The management trio point to its benefits in terms of quick decision-making and flexibility. However, some authors see risks in having too much flexibility in the division of roles and responsibilities. Dooley and O'Sullivan (2001) argue that the absence of strictly separated responsibilities could jeopardise the success of a company's innovation endeavours.

Driving the innovation process together with the early adopters

As a driver of innovation, Bioprocess Control aims to become a market leader in the area of bioprocessing. This means at the same time taking a risk and having the opportunity to take market shares. From the interviews with Liu, Andersson and Roesen, it is clear that this is actually one of the most important management tasks for the trio, to carefully choose which clients and projects to invest in (P. Andersson & J. Liu, March 21, 2012; J. Roesen, April 5, 2012).

The trick, according to Andersson and Liu, is to find the early adopters on the energy production market and approach these companies with the offer of Bioprocess Control. By identifying the early adopters and have them on board as their clients, the commercialisation of new products or services becomes easier overall. These early adopters are companies that are open-minded and interested in investing in new ideas. As the Andersson puts it; "getting the first customer is difficult, but the following ones come easier*"* (March 21, 2012).

Managing creativity

Another management challenge that came up in the interviews is that of keeping a creative

environment in the company. Turning to the literature assessed, maintaining such environments of innovativeness is said to be what determines the future of the small organisation (Berchicci, 2009).

To this aim, Bioprocess Control strives for having open-minded individuals who can take on both technical and market challenges. They rely mostly on internal competence but as the need for broader competence grows, external competence and a more developed network will be needed. Looking ahead, Liu and Andersson believe that maintaining a creative environment will be even harder in a larger company, thus voicing the dilemma of making the company grow while still staying innovative. In order to do so, Liu and Andersson emphasise the importance of giving room for the entrepreneurial spirit and to keep up the culture of short communication paths. As Andersson puts it, they are actively trying to avoid becoming a paper tiger (March 21, 2012).

The management headache above all: how to prioritise your resources!

Yet another management challenge that comes with being a small company with limited resources is the financial considerations; how to prioritise between what projects and activities to go for. Both Liu and Andersson agree on that the company's success depends upon continued research, which demands a lot of capital (March 21, 2012).

One could argue that financial considerations are an important management task in any company. However, Tidd et al. (2005) claim that the challenge of managing the company's resources is of greater concern for a small company, whereas a bigger company struggles with keeping an innovative spirit. According to Tidd et al. (2005), small companies find it particularly troublesome to find the means to make long-term investments, which is precisely what R&D investments are. As we recall, this barrier for innovation in small companies was also brought up by Bercicchi (2009) who thought it would limit small companies' access to modern technology. In the case of Bioprocess Control, this observation does not really seem accurate considering they are in the very forefront of developing new approaches based on modern technologies. But the limitations in resources could explain the short-term perspective in Bioprocess Control's strategy, which according to Roesen could be seen as a benefit in the sense that it enables flexibility (April 5, 2012). However, a long perspective in the market place could be advantageous. According to Roesen, the scarce resources also limit the possibilities to develop a more efficient organisation with more specialised roles of the staff. In a perfect world with unlimited resources, the first thing Roesen would do is to employ a market coordinator and another active seller. Having a market coordinator would be useful as the company grows and the marketing work becomes more long term, believes Roesen. The task of the market coordinator would be to help develop the image of Bioprocess Control as a leading company in its business segment (April 5, 2012).

"Without feedback you do not control anything"

Having a market coordinator is also about ensuring proper feedback from the market to the development operations of the company. Knowing what the needs are on the market early on is crucial (J. Roesen, April 5, 2012). As Liu puts it, "without feedback you do not control anything" (March 21, 2012). Innovation management, as Roesen sees it, is also about having antennas to pick up changes in the environment in which the company is active. Roesen himself currently holds this role, but as mentioned, he sees a need to strengthen the internal resources for this task. (J. Roesen, April 5, 2012).

Roesen describes his role as someone who needs to be a great listener when meeting with customers. The input he receives will then be transferred back to Andersson and Liu. In addition to providing ideas for how to improve Bioprocess Control's offer, Roesen thinks the feedback is important to develop the branding of the company (April 5, 2012).

The importance attributed to feedback from customers in the innovation process is emphasised also by Rothwell (1994). He argues that networking and external knowledge, especially knowledge originating from customers, are crucial factors in this process as it helps the company understand the environment that it operates in. The "Search" and "Selection" phases of Tidd, Bessant and Pavitt's (2005) model as presented in figure 2. 2 require a regular contact with the market. Roesen's role in Bioprocess Control could thus be viewed as what Tidd et al. (2005) describe as trend-spotting; a routine which contributes to a more efficient search-phase.

5. Discussion

5.1 Final thoughts about Vattenfall

It should be pointed out that the wording "innovation process" that we have used to describe the process of identifying and solving problems in Vattenfall is our own. From the company's perspective, it does not serve much purpose to label the activities accordingly with some sort of theoretical framework about innovation. The aim is not to innovate, the aim is business development. The overall objectives are set by owner directive and the overarching business plan.

Still, when reasoning with Bergman, Kallner and Güven, the picture emerges that there exists a rather conceptualised but complex innovation process which functions as a tool to solve problems emerging when complying with the business plan. If ideas are not turned into value creating practical use, then they are not truly part of an innovation process, Bergman reasons (March 15, 2012). Thereby he expresses a view on innovation which is in accordance with the one of Freeman (1982), namely that an invention does not become an innovation until it has been processed through organisational and marketing tasks and reached the market. However, the meaning of "reaching the market" may be too limited in Freeman's definition. In the case of Vattenfall, "value creating practical use" could for instance be an improvement of internal processes through different types of problem solving which is of benefit to the energy consumers. This view of innovation as a process of problem solving to be able to deliver on the business plan constitutes one key finding from the interviews with Vattenfall.

For a large company with a need to innovate, there seem to be a trade off between on the one hand the need for an organisational structure of the innovation process in order to earmark resources (both capital and human resources) to development activities and on the other hand not limiting the responsibility for innovation to a distinct part of the organisation. Although structuring the innovation process is a necessity, it constitutes at the same time barriers. Based on our study of Vattenfall, we conclude that innovation management in this case is about overcoming such structural barriers. Part of this challenge seems to be to involve people broadly in the process to gain acceptance for its outcome.

Based on the limited insight we have on the restructuring of Vattenfall from this small case study, it is not in our competence to comment on what has been successful elements or not. Moreover, even with a much broader study, it would be too early to draw such conclusions. However, we do have some thoughts about where conflicting interests could occur in the future innovation management of Vattenfall. One such conflicting interest could be long-term versus short-

term when it comes to development projects. It seems to us that if the former are to be kept in the overall portfolio of development projects, they need to be allowed a different assessment using slightly different criteria than the more short-term ones for which it is more easily demonstrated how they align with Vattenfall's business plan.

It seems to be a tricky management issue for the future of Vattenfall to decide on how strict to be in the implementation of the project governance model. Flexibility calls for the possibility to make exemptions and take certain risks. At the same time, it could undermine the ambition to make use of a standardised, transparent approach in the first place, rending it less efficient. Then, the competitive advantage that comes with being big would partly be lost. In addition, one could argue that long-term R&D projects that cannot be motivated using the same type of assessment as for the short-term simply should not be undertaken.

Maybe the middle way would be the most fruitful; apply the project governance model to *all* projects – no exceptions – but keep developing the model to make sure that the criteria used reflect the need for various types of projects. That is, projects that are more or less risky, more or less responding to immediate development needs and responding to various types of demands for the business of Vattenfall, both short-term and long-term.

5.2. Final thoughts about Bioprocess Control

Since the company is so small, we believe it would not make any sense for Bioprocess Control to define or structure how their R&D activities should be integrated with other parts of the company. Informal communication paths make sure that all activities in the company are connected to this R&D core. Further to this observation, we conclude that the innovation process of Bioprocess Control coincide with the overall business idea of the company. This might be a reason of why innovation is not addressed in a specific strategy – it is present in the tasks of everyone working in the company on a daily basis. Still, the interviews gave us the impression of that Bioprocess Control has a clear idea of what innovation is to them and how to optimise it for the company.

In spite of the informal, quick communication paths, the company is dependent on a certain structure or at least organised approach to ensure feedback in the innovation process. Unlike Vattenfall however, this is not about overcoming internal structural barriers but about making sure reactions from the market are immediately incorporated into the company's offer. Customers are closely incorporated into the innovation process of Bioprocess control and vice-versa. This in turn seem to put high demands on the task to identify the "right" customer – the early adopters – that have a high acceptance to new ideas and a willingness to try new work methods.

In addition to ensuring proper feedback and finding the early adopters, the main innovation management tasks that we identified in Bioprocess Control are to ensure creativity is not lost as the company grows, to manage (financial) risks and last but not least to handle the challenge that comes with the bulk of the development ideas originating from one and the same person. This current set up means that the range of ideas could risk to become somewhat limited. Based on the theories of Forsman and Rantanen (2011) about the necessity of integrating external knowledge in the process, we believe that further on more support functions around Liu will be needed. There is a limit as to how many tasks and roles one person can take on, especially as the company grows and its activities become more complex to overview. It could eventually lead to inefficiencies as the responsibility for who does what is not clear, not to mention the difficult task of killing your darlings. Without losing creativity, a more formal approach for deciding on future projects and using deviation templates could be beneficial. Using for example stage gates in the decision-making would relieve some pressure from Liu.

On the other hand, it could well be that the division of responsibility is in fact very clear internally in the company, in spite of the informal approach in how it is being managed. Still, when new employees join the company, it could be harder to figure out how one's own role relates to the other functions within the company in the absence of a formal company structure and structured work methods.

In either case, we can conclude that a development is currently taking place towards such a formal internal organisational structure, which will affect how the company conducts innovation – the innovation process –, as well as its management. Liu's role has already expanded into more delegating and less implementing and it is not unimaginable to think that Liu's role will continue to adapt towards a more supervising and supporting one, relying on the team as the core in the company.

5.3 Discrepancies when theory meets practice

When applying the theoretical framework to the company cases of this study, we immediately encountered difficulties to apply the definitions of innovation and innovation processes to the practice at hand. The interviewees of the study pointed out that companies do not talk about innovation, they just innovate. It does not make much sense to them to distinguish how their operations would relate to an overall innovation process. Their goal is simply to deliver on the business plan.

Nevertheless, along the way to achieving their goals, the companies we have looked closer at do indeed innovate and we conclude an important and complex innovation process exist in these companies. However, their innovation process is unarticulated. Just because internal processes are not labelled as a distinct innovation process, it does not mean innovation is any less important for the companies. In the case of Bioprocess Control, the company's forth living relies on its ability to stay creative and keep innovating, being at the forefront of development. Research & development are the core activities in the company. In the case of Vattenfall, we conclude that innovation is essentially about hands-on problem-solving and the identification of development demands in the core operations.This discrepancy between theory and practice could have implications on whether external observers, for instance policy-makers, would categorise companies as being innovative or not and what incentives they might create to stimulate more innovation.

Although interesting results were found that could be linked to, and sometimes supported, by the literature we had gone through, the handbook approach to innovation processes and its management often felt obsolete in the contacts with the companies. Real world innovation processes are not so easily distinguished from other company activities and fitted into some model or framework. Even in the case of Vattenfall, where we could identify certain similarities with innovation management models of the literature, it is clear that for any model to be useful when applied to the daily life of the company, it would have to be adapted to its specific circumstances beyond the point of recognition.

5.4 Innovation management - what does it look like in different organisational structures?

Recalling our initial problem formulation, we now wish to explicitly comment on what innovation management looks like in different organisational structures. But first, can we conclude that a specific management work within these companies could be distinguished that should be called innovation management?

5.4.1 Is there such a thing as innovation management?

We believe so. When looking closer at these particular company cases, the management of innovation appears to be a management task that is more than just change management in general, contrary to what Berkhout et al. argued. There are certain types of management tasks that we came

across in both companies and that are closely linked to their innovative capability. However, the content of these tasks differs from one company to another; it means different things for Vattenfall and Bioprocess Control. This will be exemplified in the below where we present the management tasks identified. Furthermore, innovation management plays different roles in the two companies; whereas it is basically synonymous with company management overall in Bioprocess Control, it could be seen more as one group of management tasks among many of Vattenfall. This group of management tasks that together form innovation management in the company are not only more structured and formalised than in Bioprocess Control, they are also more easily derived from the overall strategy of the company. Clearly, the form in which the innovation process takes place does impact on the content.

It is a rather natural thing that there are differences in what the innovation process looks like in a small, young university spin-off compared to a large, almost 100 year old company. That different organisations have different ways of managing innovation is not very surprising and has already been discussed by Tidd, Bessant and Pavitt (2005). Perhaps a bit more surprising were the many similarities we found in the concept of innovation management in these different companies – in spite of their different organisational structure and the more structured approach to innovation management in Vattenfall.

5.4.2 Innovation management tasks identified – differences and similarities of how they are carried out in Vattenfall and Bioprocess Control

Implementing the R&D results – working with feedback and acceptance

Coming up with a new invention is not in itself an innovation. First, it has to come into practical use. This approach to innovation described in chapter one is shared by many authors, but also by our interviewees. Derived from this line of reasoning, innovation management is not just about the R&D activities. It's just as much about making sure the results of such activities are implemented and turned into practical use.

Both companies interviewed presented this as a major management challenge that they tried to tackle in various ways. However, a common feature was the importance of feedback, making sure that end users were involved all along the development process. In the case of Bioprocess Control, the measures to ensure feedback mainly focused on involving the customers. Through Roesen's role as sales manager, the market's perspective was reported back to the lab. In Vattenfall, an important part of innovation management is about overcoming structural barriers to make sure development

results stay relevant to the core operations and can be integrated in these. To this aim, feedback from the colleagues at the units for which the development projects are being made is crucial.

While the approach to ensure feedback is rather structured in Vattenfall, it seems more floating and ad hoc in Bioprocess Control. Currently, the informal and close relations between the few co-workers of the company compensates for this. There are no departmental barriers to overcome, communication runs smoothly and ad hoc. However, it also means a less systematic assessment of the input that is being fed back into the development activities. Just because they are a small company, it does not mean they haven't got a range of aspects to take into account to optimise the innovation process. A more structured approach for how to deal with feedback could help the company get a better overview of possible improvements.

The continuous use of feedback loops creates an iterative process both in Vattenfall and in Bioprocess Control. This is not only a matter of making sure the results are relevant, it is also about being in control. Through feedback, the management gains awareness of where problems could arise along the way and how the development activities could be adjusted to overcome these. A vital component in successfully implementing the results of development activities is acceptance. In Vattenfall, this is mostly about gaining internal acceptance within the organisation. In Bioprocess Control, this management task is about gaining the clients' acceptance. In both cases, the key to achieve acceptance is to ensure the stakeholders have a say early on in the process.

Individualism for creativity

The individual plays a great role both in the innovation processes of both Vattenfall and Bioprocess Control, which contradicts Lindholm Dahlstrand, (Benner, 2005) who argued that this mostly is the case in smaller companies. The need for driving spirits or innovators is emphasised by both Liu and Bergman. According to them, innovation is driven by people and thereby dependent on skilled and creative individuals.

Certain observations made in innovation literature point to the growing importance of the individual whereas other sources claim that the role of the organisation and its "muscles" in terms of resources becomes more and more important for innovation. Regardless of which trend is the more accurate one, it seems managing individuals' innovative capacity is one of the core elements of modern innovation management. This holds true both in the small company structured around the "key innovator" Liu as well as in the larger company where the challenge is to bring together competencies of individuals from different units of the company.

How to kill your darlings

Another joint innovation management challenge identified is that of how to kill your darlings, meaning how to decide on which projects (that have been given a lot of resources, time and attention) to shut down and which ones to continue working on. This management task seems to be highly structured in Vattenfall through their gateway approach. It seems logical that the more stakeholders that would want to have a say on the continuation of a project, the more the uncomfortable decisions of shutting down a project must rely on objective, standardised and transparent methods.

In Bioprocess Control, the way this task is dealt with is much less structured. The decision is by and large centred to one and the same person, who on the other hand has to take on a lot of different hats in his efforts to bring in different perspectives in the prioritisation process and decision making. Perhaps a formal methodology could help Liu to stay objective and rational in his choices.

Risk management/financial considerations

The issue of how to manage risks came up in the interviews with both companies when discussing what innovation management is to them. For Bioprocess Control, taking risks follows as a necessity from grasping opportunities in their ambition to become a market leader. Identifying early adopters among potential customers could help reduce their exposure to risks. For Vattenfall, uncertainty reduction could be achieved partly through the new approach to project governance, putting in place a more thorough methodology to decide on what projects to go for.

6. Conclusions

The main results of this company case study can be grouped into three themes. The first theme is about how the theoretical framework did not really match the practice at hand. The main discrepancy was how unarticulated innovation processes and innovation management were in the companies compared to the detailed theoretical framework developed around these concepts in literature. Although these concepts are subject to the research of many authors, the companies do not talk about neither of them. It was only after some discussion with the interviewees that we could start to distinguish that an innovation process existed in the first place.

The second main theme of discoveries relates to the first part of our problem formulation- what innovation management is about – if it even is a specific type of management. As we will describe in the section "Innovation management - what does it look like in different organisational structures?", innovation management is indeed a real thing. It might be that the theories we came across did not easily fit with how it is carried out in the two company cases (for instance how the innovation process of Bioprocess Control neither fits with linear or cyclic models of such processes), but it does not make innovation management any less important for the individual companies in practice. We base this conclusion on the identification of a number of management tasks that are vital for the innovative capacity of the companies.

The third theme that we would like to raise among our key discoveries answers to the second part of our problem formulation, namely what innovation management looks like in different organisational structures. Although a set of shared management tasks were identified as forming part of innovation management in both Vattenfall and Bioprocess control, they way in which they were carried out was greatly affected by the organisational structure of the companies. The difference in organisational structure accounted for differences in what extent the innovation process itself was structured; the formal organisation of Vattenfall called for a more formalised approach to how to work with feedback, choose what projects to go for etc. than in the informal small start-up company Bioprocess Control.

Suggestions for future studies

An interesting continuation on this study would be to complement the two company cases explored with more companies of different sizes and organisational structures. If we were able to jump ten years in the future, it would also be very interesting to investigate how Bioprocess Control then arranges innovative activities, considering their concern about the difficulties for larger companies.

Another issue to follow up on would be how companies of the size of Vattenfall collaborate with other organisations in different collaborative structures, for instance the one of InnoEnergy, to fill their need for more long term R&D.

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