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Department of Industrial Engineering and Management
Industrial Economy

Master`s thesis:

MODEL FOR MANAGING NON-CORE IDEAS TO NEW COMPANIES, PRODUCTS AND SERVICES IN A FINNISH FOREST COMPANY

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ABSTRACT

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The Finnish forest industry is on a brink of radical changes. In Finland there has been new about lay offs and shutdowns of paper mills and machines. Currently the industry in Finland is focusing on cost cutting and enhancement of productivity, but in order to keep Finnish forest industry competitive, new innovations and cross sector cooperation in becoming increasingly important.

The goal of this thesis was to form a model for UPM-Kymmene corporation to manage and develop non-core product and service ideas. This subject is, due to changes in the forest industries structures is very current, because new and innovative products are desperately needed in order to keep production in Finland. Therefore the created model emphasizes the importance of SME`s in the forest cluster and their potential to develop non-core product and service ideas originally discarded by UPM-Kymmene to new companies, products and services. This kind of model represents totally different way of thinking and requires fundamental changes in the traditional culture of UPM-Kymmene corporation and in the whole industry as well.

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Suomalainen metsäteollisuus on muutoksen partaalla. Uutisissa on nähty miten metsäyrityksen sulkevat tehtaita ja paperikoneita. Suomalaisessa metsäteollisuudessa keskitytään tällä hetkellä lähinnä kulujen alentamiseen ja tuottavuuden parantamiseen. Edellytys sille, että suomalainen metsäteollisuus pysyy kilpailukykyisenä, ovat kuitenkin uudet innovaatiot ja toimialojen välinen yhteistyö.

Työn tavoitteena oli luoda toimintamalli UPM-Kymmene Oyj:lle, minkä avulla ydinliiketoimintaan kuulumattomat tuote- ja palveluideat saataisiin hyödynnettyä. Aihe on erittäin ajankohtainen, mikäli halutaan pitää tuotanto jatkossakin Suomessa. Luotu malli painottaa pk-sektorin roolia ja potentiaalia kehittää UPM-Kymmeneltä peräisin olevia ja heidän ydinliiketointaan kuulumattomista tuote ja palveluideoista uusia yrityksiä, tuotteita ja palveluita. Malli edustaa uudenlaista ajattelutapaa ja sen käyttöönotto vaatii perinteisen yrityskulttuurin uudistamista UPM-Kymmenessä.

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Foreword

I want to thank Professor Tuomo Kässi for giving me the opportunity to be a part of a great project team and for his support and advices along the way. A big thank you also to my instructor Jorma Lehtonen, whose support and contribution during the making of this thesis was priceless. I am also grateful to Panu Riikonen, Jaakko Lehto, Markku Hokkanen, Tero Lehikoinen and Riku Kärri for their contribution to this thesis.

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1 Introduction

The goal of this thesis is to form a model for utilizing ideas that don't fit UPM-Kymmene`s business strategy. The thesis is a part of research project "Talikko- Creation of new concepts in the intersection of industries" done by Technology Business Research Center, Lappeenranta University of Technology. Main partners of the project are*:* UPM-Kymmene Oyj, TeliaSonera Oyj, Lappeenrannan Energia, Kainuun Energia, E. ON Finland, Lappeenrannan Kaupunkiyhtiöt, Summa Capital, and Enterprizer Technologies.

1.1 Technology Business Research Center

Technology Business Research Center (TBRC) is a multi-disciplinary research center at Lappeenranta University of Technology established in 1999 where knowledge from business administration, industrial engineering and management, information technology, electrical engineering, mechanical engineering and energy and environmental technology are integrated.

In the TBRC Academic experts create new understanding and strategic applications for companies competing in the complex and turbulent business environment where emerging new technologies create both challenges as well as possibilities for new business models.

In addition to academic research projects, TBRC offers task forces to solve fast track managerial challenges.

1.2 Talikko-project

The traditional boundaries of the industries are eroded and the new

business opportunities are emerging in the intersections of industries. Due to that the changing industry structures and business environment demand new approaches to understand and recognize the new opportunities for the companies and develop them to successful business concepts.

The primary objective of this research project is to identify new business opportunities in the intersections of Electricity networks and generation, Forest, and ICT industries, and to find out how to exploit them at company level. The secondary objective is to develop methodology for integrating industry analysis and company level business analysis.

The issues aimed to be solved in the project include:

- The accepted fact is that the industry changes have impacts, which are difficult to solve on company level.

- It is an accepted fact that changes and ruptures on industry level give risks and opportunities for individual companies. The results of this project are to give hints how to turn the changes and ruptures into opportunities in business.

- Simultaneously the project tries to fix procedures, methods, and tools to analyze the changes and opportunities in clusters and on borderlines of industries.

Main activities during the project are:

The project is divided into five interrelated work packages:

1. Analysis of industrial structures and business environments
2. Creation and selection of strategic alternatives
3. Concept definition and testing
4. Integration of methodology toolbox
5. Development of theoretical frameworks

The expected results of the project are managerial as well as theoretical as follows:

1. The industry analysis of changing structures and business environment in ICT, Electricity networks and generation, and Forest industries provides insights for strategic innovation processes of the companies:

   The changes in the structures of each industry and their effects in Finnish companies

   Recognition of intersections of the selected industries to reveal emerging business opportunities

   Technological discontinuities

2. Exploitation of the business opportunities located in industrial intersections on company level:
   Alternate idea development
   Configurations for implementation
   Idea portfolio analysis for further concept definition and pilot projects with the potential partners of the participating companies

3. Theoretical results
   Theoretical insights into the use of traditional research methods and applicability of methods in different contexts

   Theoretical insights into the changing innovation paradigm from closed to open innovation processes

   A managerial tool box for the collaborative industry analysis and business development

1.3 Research objectives and limitations of the thesis

Development of non-core innovations is becoming increasingly important as the current businesses of Finnish forest industry in general are becoming threatened, for example due to fierce foreign competition and labour related issues. The issue is very current as the Finnish forest companies are shutting down their over capacity and enhancing productivity. These measures are not enough to keep the Finnish forest industry competitive in the long run, because the real prizes of wood based products are declining and the production is being shifted to developing countries where production costs are a fraction of the ones in Finland. Thus, cost cutting can't go on forever and new innovations, services and cross sector cooperation are needed in order to keep the Finnish forest industry competitive in the global competition.

Objective of this thesis is to form a model, which enables UPM-Kymmene corporation to make use of its non-core product and service ideas. The role of the SME companies in the forest cluster (Figure 1). is crucial, because there is no point for the corporation to develop all the best ideas to new ventures. Thus, it is more feasible to let the SME sector's actors and interest parties to develop the ideas to new companies, products and services. This thesis will provide only the mechanism to the model, which will be validated and reviewed through three cases. The cases represent non-core ideas, which were refined in different ways to new companies and products and they are somehow related to UPM-Kymmene corporation's activities

In order to form the model, existing models and ways to handle non-core ideas are reviewed through literature research and interviews with new venture development experts and UPM-Kymmene corporation's representatives.

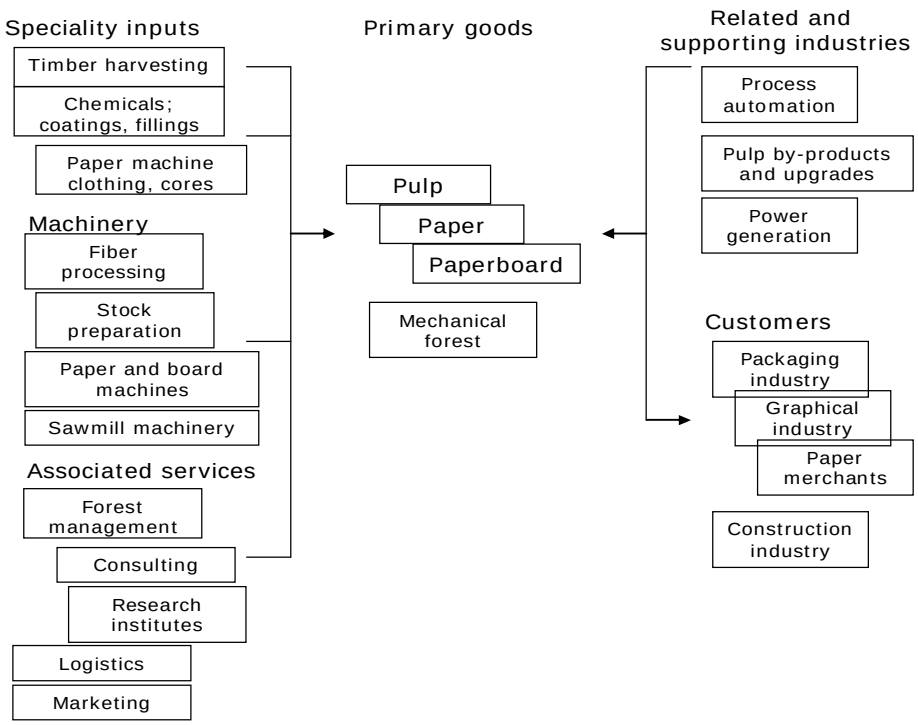

Figure 1. The most important parts of the Finnish forest cluster (Hazley 2000; Lammi 1994).

1.4 Theoretical framework and the structure of the thesis

The theories used are compiled mostly from recent articles about innovation- and non-core technology management. The theories include strategic resonance, concept of intermediating organizations and non-core technology management modes and their management. Theory of strategic resonance has raised a lot of questions, but it's fundamentally just a enabler of dynamic capabilities, which is a bit better known concept. The correspondence between input and output of the theories are depicted in figure 2.

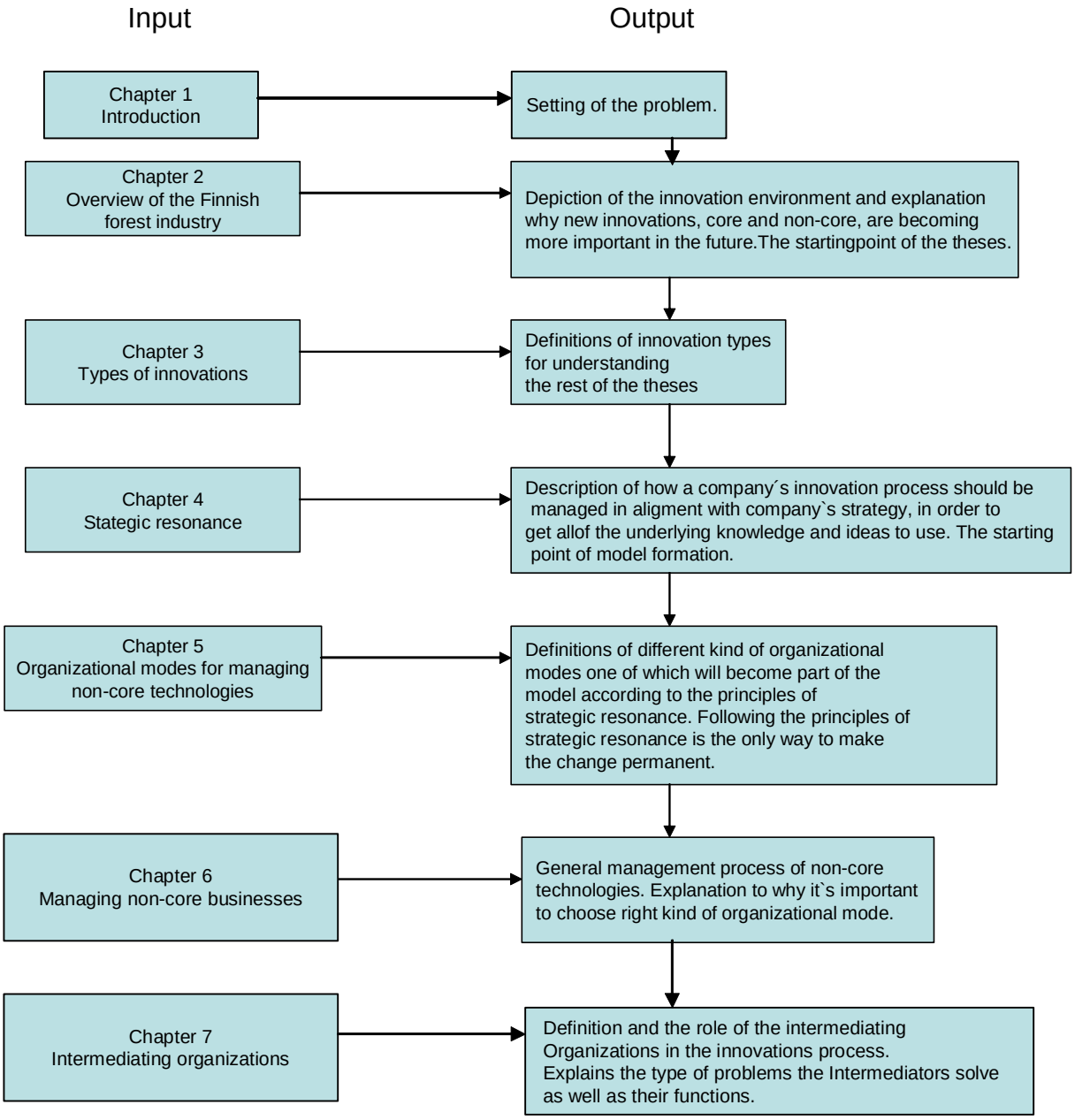

Figure 2. Input-output of the theories used in the thesis.

2 Overview of the Finnish forest industry

Purpose of this chapter is to depict the innovation environment and to illuminate why new innovations, core and non-core, are becoming more important in the future.

2.1 R&D within the Finnish forest cluster

The forest cluster as a whole includes various specialized sources of advanced knowledge in universities, private and public research institutes and corporate R&D departments. The critical factor in Finnish forest cluster now and in future will be human resources, education and R&D. Employees are highly-educated and the competitive advantages within the cluster come from skills and know-how of the personnel. The cluster as a whole includes various specialized sources of advanced knowledge in universities, private and public research institutes and corporate R&D departments. (Hazley 2000). The sources for innovation have been jointly owned research units, public research institutions, machinery production firms, and also companies themselves, though the share of research and development from the turnover has been traditionally relatively low within the forest industry companies (Lamberg, Ojala & Sajasalo 2006, p.14).

The pulp and paper industry is often characterized by a low level of technology creation and R&D expenditures are about 0.5% from turnover (Lindsröm, Martikainen & Hernesniemi 2004). Taking a broader view the situation is not so straightforward. In terms of new technology transfer and as an end-user, the pulp and paper industry is relatively innovative sector, being a strong investor in new technology and adapting it from related and supporting industries, such as from machinery manufacturers. (Hazley 2000). While chemistry, machinery, electronics and information technology products represent some of the main related and supporting industries in forest cluster technology, industries such as life sciences have become increasingly important.

Centralization of R&D is a universal phenomenon. The main reason for centralization is the desire to operate in the proximity of related know-how. The structure of the market poses great challenges to a small country like Finland. In addition in determination of fields of research require new kind of thinking. When the customer needs and demand change over time, the products have to evolve in the same pace. Thus the evolution requires customer oriented and bold approach of the forest cluster. The anticipation of changes in the surrounding market environment the companies must understand the needs of their customers to test and create new markets for new products and understand the nature of the global markets and understand how to operate in them. (Hernesniemi, Kymäläinen, Mäkelä & Rantala 2001)

In Finland, biotechnological research has primarily been carried out at VTT. Biotechnological Laboratory originally founded by the Finnish Brewing and Malting Industry but subsequently incorporated in a government-led technological research institute. This laboratory not only had its origin in industries which from the beginning favored biotechnology but also turned itself more to academia than a typical industry research institute. In addition, the research became directed by government technology policy and by academic interests to search for biotechnological solutions on energy and nutrition problems (Miettinen 1996).

In the 1980s the researchers shifted focus, influenced by the emerging international debate on the environmental impact of chlorine bleaching of pulp. The research interest was backed up with concern for the environment, by government policies for environment, energy and technology and from industries with a direct interest in biotechnology. The biotech competence was thus allowed to grow within an institutional context favorable for, and not threatened by, biotechnology. Although the break-troughs for biotechnology within forest industry still are in future, Finland presently seems to have a national cluster of competence in biotechnology which may turn out to be competitive. (Laestadius 2000).

Biotechnological applications in use in the industry are for example bioreactors, biological waste water treatment plants and partial enzyme bleaching of pulp (Laestadius 2000).

2.2 Education and competences

This chapter deals with the importance of education and skilled labor.

The educational system has supported the technological knowledge of the sector and forest education in Finland is widely offered (Hazley 2000). Skilled labor is an important success factor of Finnish forest industries according to Reunala (1998, 279-280). The significance of education as a strategic advantage will continue to grow in the future. The challenge of education is to prevent the possible deficiency of skilled labor in some fields in the future and also prevent oversupply of education in some other fields (Reunala 1998).

The sufficiency of labor is, however, one very possible problem also for the Finnish forest industry. The age distribution of the industry is the same kind as in other industries and the need of recruiting more educated work force will increase in years to come (Seppälä 2000, 31). Many reports on the ageing of the Finnish work force agree that new work force is desperately needed to fill the void caused by the retirement of the great age groups. On the other hand, the experts' views differ on the nature of skills that are needed. Some emphasize the need of occupational skills and others expertise. (Aho & Timonen 2002)

The fundamental issue for the Finnish forest industry is that what kind of structure it will have in the future. Will there be mere production lines in Finland or will the companies centralize their R&D as well. For example, in the Finnish forest cluster`s core, the companies have regarded Finland as a home base since the late 1990s and centralized their R&D here. But, in 2002, half of 202 million R&D investments were made in foreign

subsidiaries of the Finnish companies. (Tekes 2002)

2.3 Technology and engineering

This chapter reviews the pace of technological development of forest and related industries.

The technology development of the chemical forest industry can be divided into products, processes, supportive areas/production (e.g. automation, chemistry). The development of the products and the organization has traditionally been in hands of the companies themselves, whereas the processes and supportive areas have been the expertise of the machine and equipment producers. (Airaksinen 1988; Alajoutsjärvi 1996)

The technology in the industry has generally developed in small steps. Excluding automation, the amount of high tech is fairly low. Even the basic technological structures have not evolved radically for decades. For example, the oldest paper machine in use in Finland in the beginning of the third millennium was over 100 years old. Technological development in paper industry has made paper machines to be more efficient in terms of produced tons and machine breadth. For example, the average maximum speed of a paper machine has grown nine fold over the last 100 years from 200 meters per minute to 1 800 meters per minute. (Airaksinen 1988; Diesen 1998)

According to Utterback (1996), and Tushman and Anderson (1997), mature industries which have developed a dominant design over a long period of time, tend to be rigid towards technological discontinuities and to focus on incremental innovations and economies of scale. This is particularly normal in the case for process based industries where the rate of incremental process innovations quickly outstrips the rate of product innovation (Utterback 1996). The pervasiveness of information technology can also be studied in relation to the technological system for paper

technology. Since about the 1960`s information technology, in the form of process automation and control, has, in fact, dominated technological development in the system. Three generations of direct digital process control can be recognized: central computer controlled systems (around 1960–1975), distributed control systems (1975–) and the current integrated control systems (1990–). (Hagedoorn, Kalff & Korpel 1988)

The development of these process control systems has been the prerequisite for the enormous increase in speed, in precision, in paper quality, and in size of machinery which has occurred over the last decades. In addition, it may be argued that the process automation challenges established competencies and thought styles, basically have enforced the dominant technological paradigm of increasing the economies of scale within the established technology, rather than turning over a new page (Laestadius 2000).

2.4 Related and supporting industries

In this chapter, some of the most important related and supporting industries for the Finnish forest industry are briefly introduced.

2.4.1 Machinery and equipments

Investments in machinery and equipment is a more appropriate measure of R&D in so-called low tech industries such as the forest based and related industries, since the most R&D is carried out by suppliers of machinery and equipment and other specialty inputs. A review of machine building industry companies provides evidence of close cooperation and sources of innovation to the forest-based industries and confirms their role as related and supporting industries. European companies are the world leaders in the pulp and paper machinery and equipment with Finland, Germany and Austria, accounting for much of the market.(Lammi 2000)

According to Lammi (2000), machine workshops and manufacturers of automation and process control systems are the most important supporting industries for the forest industry. For instance, about 80% of the Finnish machinery and automation companies' total turnover comes from pulp and paper industry. This has driven the machine and automation system producers in search of new companies to lower the level on dependence of the forest industry. Though, the intense cooperation of these industries has elevated the Finnish forest industry to global technological leadership. (Lammi 2000) On the other hand the forest industry does not have patented technology know-how, because all of the innovations have been made patented by machine workshops and manufacturers of automation and process control systems. Thus, the technology does not offer competitive advantage, because patented innovations are available to competitors who are willing to buy a license (Tekes 2002). There have been speculations about for how the machine and process equipment manufacturers are willing to invest in new innovations, when potential declining productivity of the field is glimmering in the horizon (Lindström et al. 2004, 22).

2.4.2 Chemical industry

The Finnish chemical industry produces most of the chemicals used in the pulp and paper industry in Finland (Finnish Forest industries, 2004). Especially high quality paper and board grades require many kinds of paper chemicals, function of which is to improve properties to meet customers' needs. All chemicals used in paper production, such as adhesives, fillers, coatings etc., are specified as paper chemicals. In fact, only a fraction of paper products is produced without adding chemicals to the process (Reunala, 1998). The significance of pigments, which are used as fillers and coating in paper manufacturing has accented due to increased production of coated paper grades. Developments, which occurred in the end of 20th century, changed the Finnish paper industry dependent on imported pigments. Significance of this change is

emphasized by the fact that pigment know-how is mostly needed in production of paper grades on which the Finnish paper industry is based on (Seppälä 2000).

2.4.3 Logistics and other related services

For the forest cluster the significance of functioning and environmentally friendly logistics services is great, because the logistics chain from round wood to end customer consists of many phases. Forest industry is the most important user of transportation services in Finland. Thus, the logistics sector is a vital partner of the forest industry. (Saurio, Karvonen, Ryynänen & Julku 2003)

Another important service sector in the developing globalization and internationalization to the cluster is consulting services. For instance, in 2003 the forest industry companies invested in IT-services twice as much as in 2000. The core of the forest industry sector has shifted more and more towards such elements like the ability to innovate, the ability to acquire and apply new technologies and the ability to get new markets (Lindsröm et al. 2004).

2.4.4 Energy

Pulp and paper production is an energy intensive activity and one of the Finnish forest industry's competitive advantages has been cheap energy. The Finnish forest industry produces almost half of its electricity need itself and the rest is bought from external sources (Pohjola 2000, 36-37). Use of electricity produced by fossil fuels and nuclear plants has reduced over the past few years. The most of the energy used by the industry is nowadays produced by renewable energy sources such as wood and gas. The most important source of renewable energy in Finland is wood. (Seppälä 2000).

In 1997 the Conference of the Parties to the Climate Convention drafted a first protocol in Kyoto to answer the concerns about emission limitations by countries and by groups. The Kyoto Protocol gives emission quota to industrialized countries (i.e. the OECD Countries) and countries with economies in transition. According to the Protocol, the industrialized countries should limit their emissions about 5% on average (Energy Visions 2030 for Finland 2003). For those parties who have committed to reducing emissions under the Protocol in compliance with the ambitious commitments is challenging in view of the sustained growth in industrialized countries. Energy intensity of industry has always been a serious incentive for the companies to invest in improved energy efficiency as the significant progress achieved over the last decade shows: The industry's specific primary energy consumption decreased by 16% and the specific electricity consumption decreased by 11% in Europe thanks to measures such as improved process technology and investment in combined heat and power. Specific carbon dioxide emissions from fossil fuels decreased by 25% thanks to process-related measures and the increased use of low-carbon containing fuels and biofuels. (CEPI 2002)

2.5 Company structure, strategy and rivalry

This chapter explains how actors in the forest industry have conducted their survival in the fierce international competition.

2.5.1 Concentration

Though the forest industry sector, especially the paper and pulp production sectors seem to have concentrated significantly, the concentration is still lagging behind many other lines of businesses and vast majority are comprised of SMEs. Within pulp, paper, printing and publishing, SMEs account for about half of the employment. Mergers and acquisitions have led to growing consolidation within the industry. For

example, 1999 the global top five companies made up 35% of total production of newsprint, 35% of uncoated papers, 50% of coated papers mechanical papers, and around 40-45% in market pulp. (Rowland 1999)

Especially since 1999, mergers and acquisitions in the North American pulp and paper industry have substantially increased concentration of market share for the producers of many grades. Especially within newsprint there has been significant increase in the market concentration. This is a natural as newsprint was and still is a slowly growing line of business in which concentration is more typical than in the businesses where new capacity continues to be built (Lamberg et al. 2006, 11). Overall, the forest industry is not as concentrated as many other manufacturing industries. According the experts' opinions, the concentration will continue to be very intense in the near future. Compared to other manufacturing industries, the forest industry is very fragmented whereas top five companies of the world has control under 20 % of the overall global market. (Hernesniemi et al. 2001, 84)

2.5.2 Strategy

Cost leadership seems to be the dominating strategy of the actors in the chemical forest industry (Lamberg et al. 2006). The development that has led to this, began in the beginning of 1980, when the real prices of pulp and paper products began to decline and have continued to do so ever since at a rate of 1 per cent per year (Nopanen 2004). This type of price development has had an effect on the investment pattern within the industry. The size of the investments has grown from large to huge, when companies are trying to achieve cost leadership trough economies of scale. Thus, the production is typical of the manufacturing industry in which economies of scale is a decisive factor to be exact, the scale effects acquired by production technology and by the concentration process. Both, technology and concentration are closely interlinked with decisions made by the companies in the past. Path dependency of the industry is

obvious: the companies chose their paths for decades to come e.g. the technology decision processes (David 1986; Dosi 1997). This has had both positive and negative side effects. On the positive side, the companies are able to commit to long term planning and commitment. The negative effects are the damage to the future development due to unsuccessful investments. (Lamberg et al. 2006)

2.5.3 Rivalry

In the global competitive environment the changes in the demand conditions are constant, whereas the industry development is relatively slow. Demand conditions are dependent on development of the global economy. In fact, the demand of forestry products has almost directly been interlinked with the changes in the gross domestic product (Rytkönen 2000).

In many cases, subcontracting arrangements are being utilized to take advantage of lower wage production and even new production facilities are being established. Even though it is claimed that most of the production being outsourced or transferred may be termed lower value added, the trend still points to major structural change within the forest clusters (Hazley 2000).

The global insight on paper and board demand point out that the market growth in Asia and Eastern Europe is significantly faster than in other regions. From this point of view it is not a surprise that the biggest forest corporations are expanding their functions to those regions. The internationalization on the Finnish paper companies has led to a situation where over a half of their incomes come from foreign subsidiaries. As a result of internationalization the Finnish forest corporations have and still are investing more and more abroad. For example, 60% of Finnish based paper production capacity is abroad. (Finnish Forest Industries 2004). The drawback of the increasing internationalization and transferring of the

production capacity are lay offs and shutdowns of production facilities at the home market.

In order to keep the Finnish forest cluster competitive the companies have to invest in people and know-how, which leads to new innovative products and processes. This includes joining forces at European level to strengthen the innovation system and promoting knowledge and technology transfer in order to transform the R&D investments into to competitive edge for the cluster. Cross-sector cooperation is a crucial factor on the road to better performance, because it creates a breading ground for new business opportunities. (Saarnivaara 2006)

2.6 Government and political climate in Finland

This chapter deals with the relationship between the Finnish State and the Finnish forest industry in the past. Furthermore the impacts of that relationship are also discussed in the chapter.

When the high investment and productivity ratios of the Finnish firms in the late 20th century are considered, links with the national setting can be found. State subsidies for paper industry research and education, the acceptance of capital expenditures as tax reductions and so forth has been considerable. The most important way in which the Finnish state contributed to this form were the regular devaluations of the Finnish currency, the last of which took place in 1995 to revive post depression economy in Finland. (Lamberg & Laurila, 2005)

In brief, when the Finnish paper industry firms suffered from low profitability, they regularly demanded devaluation of the Finnish currency (Kuisma, 2004). Although the particular interests of individual firms varied, they all benefited from these devaluations, whose costs were then borne by other parts of the national economy. Thus, the influence of the national setting on the creation of the distinctive organizational form seems vital.

According to Lamberg & Laurila. (2005), the Finnish paper industry in many ways followed the paths of their US competitors in terms of international expanding, mergers and acquisitions, and was able to create a distinctive organizational form with the support provided by their central position in their national setting.

Finland joined the EU in 1994, which led to unification of Finnish economical and monetary policies with rest of the EU. After joining the third phase of the EMU in 2001, the Finnish currency changed to euro. Thus, devaluation of currency as a remedy to low profitability of the Finnish paper industry was not possible any more, because the control of Finland's monetary policy shifted to European Central Bank in 2001 (Saukkonen, 2006).

Furthermore, the analysis made by Lamberg & Laurila (2005) points out how the Finnish State protected paper industry firms from too fierce international competition and thus prevented the companies from maximizing short-term profits at the cost of not investing in new production capacity and improved productivity. In other words, the protectionist behavior of the Finnish government and its different systems to promote the development of Finnish paper industry companies encouraged their management to take risks in their investments and prefer growth instead of profitability. Overall focus was, in fact, on longer-term strategic goals instead of market-driven short-term objectives.

In the beginning of the 1980s the finance markets in Finland were unfrozen to foreign capital investors and regulations of competition were relieved (Saukkonen 2000). Impact of these measures hit the Finnish forest industry in the late 1990s in terms of share of foreign voting rights in the biggest forest companies in Finland. Over 50% share of voting rights in Stora Enso and in UPM-Kymmene were exceeded by the year 2000 (Laurila & Ropponen 2003).

3 Types of Innovation

This chapter contains definitions of different kind of innovations and their strategic advantages. Innovation types are defined in order to gain better understanding of the rest of the thesis.

Innovations are essentially about change, which can relate to products and services or to how they are created and delivered to customers. Traditionally types of innovation are referred as product and process innovation, but this kind of classification can be confusing sometimes. (Tidd, Bessant & Pavit, 2001, 6). Table 1 indicates some ways of achieving strategic advantage through innovations.

It is possible to perceive new products as stand alone elements or components that are parts of broader systems of architectures. Innovation is rarely found elsewhere than at the component level and has greater impact. For example, a new type of disc drive enhances a larger computing system. In other words, it's easier to enhance a system part by part than to make a radical shift towards to a whole new system. (Tidd et al. 2001, 12)

Technology fusion occurs when two or more different kinds of technological streams converge in a way that products used to have discrete identity fuse into new architectures. Automation industry is a good example of this, as it fuses ICT, computing, process control etc. (Tidd et al. 2001).

Even if emphasis is usually on radical developments, it's important to not neglect incremental, sustainable change. Studies of incremental process development suggest that compared to dramatic and radical change, incremental results better efficiency and greater cumulative gains over time. Attention to this has been drawn in the last decade by Japanese originated total quality management, as they have gained considerable

improvements in quality and productivity through sustained incremental change. (Tidd et al. 2001)

Table 1. Strategic advantages through innovation (adopted from Tidd et al. 2001)

Mechanism	Strategic advantage	Examples
Novelty	Product or service no one else can offer	
Novelty in process	Faster, lower cost, more customized etc. production	Internet banking
Complexity	Offering something which others find hard to imitate and master	Rolls Royce aircraft Engines
Industrial property rights (IPRs) protection	Offering something that others cannot do without buying a license	Blockbuster drugs
Add/extend competitive Factors	Move basis of competition eg. From price of a product to price and quality	Japanese car Manufacturing
Timing	First mover advantage: first in market gains the biggest market share. Fast follower advantage: first in market encounters teething problems and fast follower can avoid them by learning from the first's mistakes	Amazon.com, there are followers but it still has the first Mover advantage
Robust design	Offering a platform on which several product variations and generations can be built	Black & Decker Power tools
Rewriting the rules	Offering something which provides completely new product or process concept, a different way of doing things and making the old ones obsolete	Typewriters vs. Computers
Reconfiguring the parts	Rethinking the in which the bits and pieces work together, eg. forming effective networks, outsourcing etc.	Toyota's supply chain

It is possible to perceive new products as stand alone elements or components that are parts of broader systems of architectures. Innovation is rarely found elsewhere than at the component level and has greater impact. For example, a new type of disc drive enhances a larger computing system. In other words, it's easier to enhance a system part by part than to make a radical shift towards to a whole new system. (Tidd et al. 2001, 12)

Technology fusion occurs when two or more different kinds of technological streams converge in a way that products used to have discrete identity fuse into new architectures. Automation industry is a good example of this, as it fuses ICT, computing, process control etc. (Tidd et al. 2001).

Even if emphasis is usually on radical developments, it's important to not neglect incremental, sustainable change. Studies of incremental process development suggest that compared to dramatic and radical change, incremental results better efficiency and greater cumulative gains over time. Attention to this has been drawn in the last decade by Japanese originated total quality management, as they have gained considerable improvements in quality and productivity through sustained incremental change. (Tidd et al. 2001)

The ability to modify and develop new designs is not enough. One must be able to establish a strong basic platform or product family that can be extended. This kind of robust design can be stretched or modified to prolong the lifecycle of the product. In process development, improving and enhancing performance over a long period of time from the original concept has been in use in chemical and steel industries for example. (Tidd et al. 2001)

Innovation is not always realized as a product or a process as it is often associated. Innovation takes an intangible form when new techniques and methods are created. For example the Japanese manufacturing

techniques, which fall under the concept of lean manufacturing, offered new ways to manage and organize basic functions or process stages in manufacturing industries. As most companies have a portfolio of innovations, some of which represent incremental improvements on existing products and processes and others radical innovations. Yet, the key to successful innovation management in a company is to recognize the capabilities and competencies in technology and market, and balance the portfolio into alignment with them. (Tidd et al. 2001)

4 Strategic resonance

This chapter describes that strategic fit in innovation process is not as important as it seems. In addition, it will be explained how changes to innovation process should be implemented in order to make the change permanent and why it's important to be able to change strategy if an opportunity to move to a new market emerges. Furthermore, this chapter gives an idea how a company should be organized in order to draw all underlying ideas and knowledge from the organization.

According to Brown's (2000) definition, strategic resonance is: "an ongoing, dynamic, strategic process whereby customer requirements and organizational capabilities are in harmony and resonate. Strategic resonance is more than strategic fit—a term which has often been used (rightly in the past) to describe the 'fit' between the firms' capabilities and the market that it serves. Strategic resonance goes beyond that. Strategic fit may be likened to a jigsaw where all parts fit together. This is a useful view but it can have a very static feel to it. In strategic fit it is as if once the 'bits' are in place, the strategic planning is done. By contrast, strategic resonance is a dynamic, organic process, which is about ensuring continuous linkages and harmonization between:

• The market and the firm's operations capabilities

• The firm's strategy and its operations capabilities

• All functions and all levels within the firm.

Firms need to find and exploit their strategic resonance—between markets and the firm; within the firm itself; and between senior level strategists and plant-level, operations capabilities". The fundamental idea of strategic resonance is shown in figure 3.

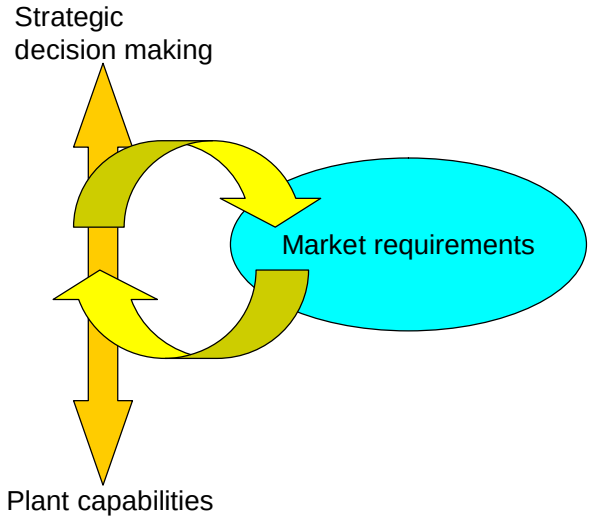

Figure 3. A model of strategic resonance (adapted from Brown, 2000).

Two sets of capabilities must be in order at the same time before strategic resonance can occur. These are capabilities are (Brown & Fai 2006):

1. The firm's functions and strategic alignment within them.

2. The firm's capabilities and the market segments in which the firm wishes to compete.

Strategic resonance is also about making sure that the firm will develop and protect capabilities that enable it to exploit market opportunities. These types of capabilities do not come about by chance. (Brown & Fai 2006)

Strategic resonance is not a mere ‘fit’ between the firm and its chosen market or compatible ways to define functions in the firm and between it and its external stakeholders. Resonance is dynamic activity that should allow relationships to develop. It is important for companies recognize resonance as a real issue that must be addressed, because of the current competitive environment, which is characterized by rapid technological development and changes. (Brown & Fai 2006)

Thus, strategic resonance could be seen perhaps as an element within the broader concept defined by Teece et al. (1997) of dynamic capability. However, in order to benefit from of strategic resonance, one must first understand current problems within strategic-level processes that need to be aligned. As a result, capabilities can be developed over time and employed to create or respond to market opportunities. Although strategic resonance was originally used to describe the need for change in the process of strategic formulation and implementation in order to cope with the current era of hyper competition. Brown & Fai (2006) suggest that it is particularly applicable to the innovation process within and between organizations.

Strategic management has fundamental importance for innovation. As Dosi et al. (1988, 7) point out, ‘Strategic management may and does orient market position and learning trajectories in the long term’. Scott (1999, 77) in his research into innovation difficulties, found that strategic planning for technology products was the hardest task for firms to accomplish.

Pavitt (1998, 433) concludes that firms rarely fail because of their inability to utilize a new field of technology, but because they do not succeed in matching the firm's systems of coordination and control to the requirements to the available technological opportunities.

This observation goes to core of internal strategic resonance. A necessary requirement here is for various functions, especially R&D, operations and marketing, to resonate in order to maintain the functions “on the same page”. At the same time the firm has to resonate with its current and potential customer-base (see figure 4 for further elaboration). This can be strengthened with strong strategic formulation, but the firm must also grasp that new information coming from various sources (i.e. buyers) need to be considered, and incorporated into the evolution and continual refining of the strategy itself. (Brown & Fai 2006)

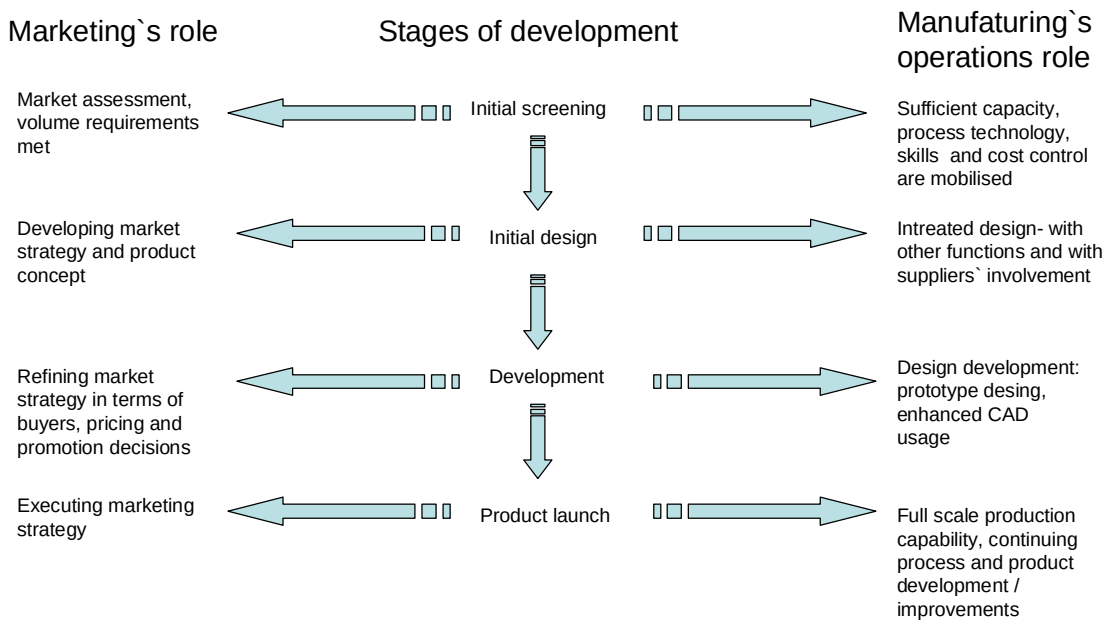

Figure 4. The interface between marketing and manufacturing operations in the innovation process. (Brown & Fai 2006)

It can be concluded that that internal alignment is not enough, because resonance is also about diminishing the gap between a company (and its infrastructure) and its customers (Brown & Fai 2006). This is important, because as Thomke and Von Hippel (2002, 5) point out that product development is often problematic due to the ambiguity of customer needs, and know-how of how to satisfy those needs lies with the manufacturer. Thus, Internal strategic resonance is about rectifying both the process and content of internal strategic planning and formulation.

Having the resources to produce patentable innovation is not enough. Firms must also have capability to transform these patents into useful products and processes in order to benefit from their innovation capability in the marketplace. This is seamlessly tied to the organizational structure, as well as to mechanisms utilised to facilitate communication, coordination and control across the organisation. Furthermore, these facets should be multi-lateral between the different plants, subsidiaries and functions of the firm. Thus, the relationships fusing strategy, R&D and manufacturing operations are crucial to innovation based competitive success. (Brown &

Fai 2006)

In the last few years, firms have created many approaches enabling them to deal with the changing market conditions that require more efficient innovation process, flexibility and responsiveness. Speed of innovation processes has become an important issue, and as a result, a number of players have focused on enhancing their ability to create new products and services faster than before. (Brown & Fai 2006)

4.1 Criteria of strategic resonance

This chapter explains that what has to be done before strategic resonance occurs and how positive changes to organization can be made permanent.

Many companies have found that the changes made in functional or product divisional structures haven't met expectations as they, for example, focused on core competences. One reason to these kinds of findings is that the changes themselves were insufficient. As many firms have had difficulties to adapt to the current era of production that includes aspirations of being Lean (Womack et al., 1990 and Womack and Jones, 1996), Agile (Kidd, 1994) and possessing mass customization capabilities. Brown & Fai (2006) concludes that the problem is robustness of cognitive divisions which result relations to clearly defined and strictly hierarchical physical structures of the past. Thus, changes in the boundaries of physical structures have had no effect in the behavioural outcome. As a consequence, changes in manufacturing paradigms with concrete impact on a company's strategic formulation and implementation are yet to be seen (Brown, 1996).

Rapid technological development has brought a problem with a number of large companies: they cannot seize opportunities that the technological advances may offer. And at the same time other large firms continue to grow and keep up with the developments. It is possible that the firms that are not able to utilise new technology have rigid manufacturing paradigms which derive from the past. For example, one of the mass production

paradigms is that R&D functions are remote from operational level. Those companies who have adopted more flexible structures, R&D functions are co-located in the same region with production and are able to communicate vertically with each other, not through senior management as those locked in the mass production paradigm.

Another reason for failure to grasp opportunities may be that in the rigid structure technological advancement may be seen only as advancing understanding whilst the flexible may recognize technological advancement as both a body of understanding and practice (Nelson, 2000) bridging the gap between researchers, scientists, engineers and line managers. The latter may also recognize that new products, more efficient processes and equipment must be built on and extend from established operational competencies, whereas the former might only recognise the path-dependent nature of progression within its own area of functionality. Still, organizational practices will inevitably restrain at some level which opportunities can be embodied in new products and processes for competitive success. (Brown & Fai 2006)

Therefore, there must be understanding of technology and practise and a mechanism to integrate them, in order for technological improvements to reach the market place (Malerba and Orsenigo, 2000). As Brown & Fai (2006) concludes: ”The clear cognitive division between the roles and responsibilities of R&D, manufacturing and marketing functions need to be blurred so that they are diffused across the whole organisation beyond any technical definition (Burns and Stalker, 1961) or functional-specific myopia (Brown and Bessant, 2003).”

Strategic resonance is fundamentally about breaking traditional organizational architectures and rigid bureaucratic structures. Evidence of this can be seen in organizational behaviour from the last decade as companies have eliminated organizational layers trough downsizing (Nelson et al. 1996), divested non-core activities and strengthened core ones trough acquisitions or organic growth. These kind of changes have been necessitated by stringent competition in hi-tech and related sectors,

for example, and their need to maintain understanding of breadth of technological fields in order to produce products and processes and depth of knowledge needed to operate in the fields (von Tunzelmann, 1995 and Wang and von Tunzelmann, 2000). This has blurred the organizational boundaries of the company and strategic resonance has, and will continue to be vital between internal networks as well within external network (e.g. buyers and suppliers). This results significant challenges for the firm's organizational abilities. (Brown & Fai 2006)

Although it is not realistic to assume that strategic resonance is a universal prescription that will apply in all cases of strategic formulation. There are certain factors that need to be in place for resonance to occur (Brown & Fai2006):

(i) Operations/Manufacturing personnel need to be in place at senior management/director levels of the firm in order to empower them to make necessesary changes to the right direction. Such senior-level presence is not common in many firms (Hayes and Wheelwright, 1984 and Hill, 2000).

(ii) Organisational gap between the company's Chief Executive Officer and Chief Operating Officer must be bridged and there needs to be very high cohesion between them. In mergers and acquisitions lie threats to this cohesion due to, for example, collision of different organizational cultures.

(iii) Senior-level manufacturing/operations personnel must be included in the business strategy planning process rather than considered merely as a team of technical specialists.

(iv) Large companies must form explicit, plant-specific, manufacturing strategies that tap into, and constitutes a part of the business strategy. A key element of this the cohesion in timing between manufacturing/operations and business strategies.

The importance of these manufacturing/operations strategies leans on

innovation because all of the following usually involves, ‘business level’ strategic decisions of the firm's operation (Brown & Fai 2006):

- Type of the supply chain
- Degree of vertical integration and nature of buyer–supplier relations
- Level manufacture vs. outsourcing within the firm
- Adding to, or reducing the firm's manufacturing/operations capacities within new and existing plants
- Levels of productions of existing products and models of the firm's product portfolio
- Degree of product development in existing markets
- Differentiation, diversification or creation of new products

Weighting of these strategic factors are shared between business and operations strategies are part of the necessary judging criteria of strategic resonance within the company. (Brown & Fai 2006)

4.2 Applicability of strategic resonance

This chapter shows what kind of companies benefit most from strategic resonance and what are the consequences of the resonance in an optimal situation.

Strategic resonance can be most useful to companies that are dealing with incremental change, or the fusion of new technologies to established core products in order to emphasize and improve their underlying features. Transition process from craft to mass through to the current range of manufacturing paradigms offers the best view to the application of strategic resonance. (Brown & Fai 2006)

Strategic resonance lies somewhere between the two scalar polarities of Burns and Stalker's (1961) mechanistic and organic management. An organisation with strategic resonance would have well defined and bedded managerial and divisional structure with established routines and behaviour models that address broad strategic aims.

Having senior-level operations personnel is seen as a necessary, but not sufficient, element to the bedded management structure, while it is important to feed into, and form part of, the process of decision making that might threaten operations capabilities and, subsequently, innovation outcomes. At the same time, higher-level management assigns some level of autonomy to the various divisions and enables the creation of communication channels between the divisions, which are encouraged to continually exchange ideas, concerns and other types of information. As responsibility is shared across the organisation, it may result to an observation that knowledge to perform tasks of commercial or technical in nature may be found anywhere in the organisation.

This leads to an organisation in which orders and instructions are replaced by sharing of information, advice, and knowledge through constant dialogue. If the change is permanent and overthrows old and rigid structures, a generation of resonance between functions should be created so that they are able face challenges as a team, instead of individuals.

5 Organizational modes for managing non-core technologies

In this thesis, only the external and hybrid modes are considered to be interesting. External modes include sell-off, spin-off and donation to a suitable recipient (Parhankangas, Holmlund and Kuusisto 2003, 46). Hybrid modes include Technological collaboration, joint venture, internal capital venture and licensing (Parhankangas et al. 2003).

5.1 Spin-off

Spin-off is, according to Garvin's (1983) definition "a company that is created for the purpose of commercializing one or more research discoveries outside the main business of the parent corporation".

5.1.1 Motives for spin-offs

Motives for spin-off arrangement are various. Some of the reasons may be overcapacity, strategic mismatch of parent and spin-off unit or fierce international competition (Woo et al. 1992). Motives may also lie with the not-invented-here syndrome or possible integration problems, which usually occur when a spin-off is a company, which was acquired in order to be integrated to the parent corporation (Lindholm 1994).

In some cases, a new organizational entity may be the best way to allow the venture team to explore the possibilities and strategic alternatives in a non bureaucratic and operationally free environment (Parhankangas 1999). As a result, the parent organisation can focus on its core areas.

Founding of a spin-off may occur, when an employee's proposal for a new innovation or business is rejected. There are two options for him or her: the employee can either sit on the proposal or do nothing with it or spin-off

a new venture without parent corporation's approval (Abetti 2000). In this kind of situation, the spin-off may be a "protest" of an internal entrepreneur, who feels that his ideas are always rejected, and that they are trapped inside the corporation (Lindholm 1994).

5.1.2 Managing spin-offs

Spin-off related technology transfer require negotiations, in which the managements of the parent corporation and the new venture determine terms of transferring the intangible and tangible, and technology. Negotiation phase is very important, because the transferred resources determine the viability of the new venture. In addition, it is important for the corporation to decide whether to retain a share of the new venture. (Parhankangas et al. 2003). However, it has been concluded that the bigger share the parent owns, the more it unhinges the growth of the found spin-off (Ito and Rose 1994).

From another perspective, it has been concluded that the partial ownership itself doesn't have the growth diminishing effect, but the corporation's involvement in everyday management has. Keeping this in mind, it can be said, that successful management of the spin-off requires governance structures that promote seizing new technical as well as market opportunities. (Parhankangas 2003, 11). Chesbrough`s study (2003) on the matter suggests, that spin-offs with outside CEO and professional venture capitalists on their board grow faster than others.

Relationship between the corporation and of the spin-off may be competitive, collaborative or independent. Lindholm`s (1994) study point out that collaboration, business or R&D related, during the first few years after being found has a positive effect on growth and innovativeness of the new venture. The arrangement of the relationship also dictates, whether the parent company has access the spin-offs` revenues or technological assets or not.

5.2 Sell-off

Sell-of is simply about selling divested assets to an external party or parties (Woo et al. 1992). As it has been previously discussed, the assests that can be sold may be tangible or intangible. Tangible assets can be a complete business unit and intangible may be a patent or other kind of intellectual property.

Motives for a sell of are often financial as a company needs cash for debts or reduce its equity ratio (Steiner 1997). Other kind of motives for sell-off may be restructuring of the technology portfolio the company towards its core businesses. Dranikoff et al. (2002) found that keeping business portfolio intact reduces the firm's ability create shareholder value compared to the companies that managed their portfolios through divestures and acquisitions.

Changes in external conditions work as an incentive for a company to divest non-core technologies as well. These changes are for example deflation, slow growth, and overcapacity. Motives for sell-off are, in other words, quite similar than the ones behind spin-offs. (Parhankangas et al. 2003, 10)

In addition, if the corporation detects that the non-core technology is more valuable to some other company, sell-off may occur due to technology's low level of synergies with the corporation`s units (Woo et al. 1992).

In conclusion, sell of is a quick way to cash out a non-core technology. On the downside, the corporation does not have any rights to the technology, its development or the profits it induces.

5.3 Donation

Donation of patents occurs rarely, as acquiring IPRs always carries costs

with it. However, popularity of donating has been growing in the last decade and the most important for this is that the cost of maintaining a non-core patent is greater than donating it away for free. In the USA, where donating was originally taken in the non-core management toolkit, donating has become more popular than in Europe (Parhankangas et al. 2003).

One reason for this may the difference between American and European patenting procedures. In America there is first to invent (wikipedia 2006) type of procedure, and in Europe first to file (wikipedia 2006). Because of the procedure in America the companies may be more eager to file a patent application in an early stage of development being unsure is the technology viable or a part of the core business. This may cause a portfolio of shelf warmer (Grimpe 2006) patents of which the company pays a yearly maintenance fee regardless is the technology in use or not.

Corporation may consider donation is when it cannot find a buyer for the technology. An incentive for donating may also be country specific tax relieves and networking with non-profit organisation such as universities and research institutes (Parhankangas et al. 2003). For example, DuPont donated 23 patents to universities in 1999. The Company got a 64 million dollar tax-write off, instead of paying the maintenance costs (Rivette and Kline 2000). The challenge in donation is to find suitable recipient to patents, because non-profit organisations often lack the ability to commercialize technologies (Parhankangas et al. 2003). Similar to sell-off, the parent has no rights to technology or possible profits after donating.

5.4 Collaboration

In the 1990s arose the term strategic alliance, which means a planned cooperation between corporations. Alliances can be separated to two different types: (i) cross ownerships such as joint ventures and (ii)

Technology based alliances in which exchange of knowledge, services or resources occur. Technology based alliances differ from joint ventures, that are newly found and jointly owned independent business units, established for serving common interests of the parties involved. (Parhankangas et al. 2003)

5.4.1 Motives for collaboration

When non-core technology is put to use, there are a number of reasons to cooperate with universities or other companies. For example, sharing of costs and risks may be the best incentive for a corporation to look around for partners. As Parhankangas et al. (2003) point out; collaboration is the best way to go when the limits of knowledge in the parent corporation are reached for further development of the technology. In this case, collaboration with universities, for example, may help to solve the problems related to the development.

5.4.2 Types of technology based alliances

Parhankangas et al.(2003) (orig.Dussauge et al. 1992) found three types technology based alliances with two types of different strategic purposes. These types are depicted in table 2.

Table 2. Types of technology based alliances (adapted from Parhankangas et al. 2003)

Type of the Alliance	Example	Strategic Purpose	Special features
Complementary	Cross licensing	Technology transfer	
Pre-competitive	Common research center	Technology development	Alliance is restricted to joint R&D
Joint production agreement	Large scale programs	Technology development	Alliance include development and infrastucture

Purpose of complementary alliance is to ensure that the technology's transfer to a new market is as easy as possible. By exchanging

complementary technology, the corporation hopes to gain a market entry and share from a foreign country in return. This type of alliance is convenient for companies that are not able gain big enough market share to cover the development costs of the technology. (Parhankangas et al. 2003)

When committed to a pre competitive alliance, the corporation has access its partner's technological capabilities. Goal of the alliance is to produce new products and co-develop new technologies. At best, the alliance may result separate organizational units dedicated to collaborative R&D (Parhankangas et al. 2003)

Joint production agreement is useful in large scale R&D programs, which are too big and expensive for an individual organization to handle (Parhankangas et al. 2003),

5.4.3 Collaboration with non-profit organizations

Usually a corporation developing technologies in collaboration with universities and other publicly-funded research facilities, benefit from the government intervention. But as there are no free lunches, the corporation must take into account that when cooperating with universities carries a commitment to share future income with them. Therefore, before encaging further collaboration, contractual specifics have to satisfy both parties to avoid any kind of disputes about rights and responsibilities in the future. It is also important that cultural and operational differences between partners don't come as a surprise and that they are taken into account before the beginning of the collaboration relationship. (Parhankangas et al. 2003)

5.5 Joint ventures

Joint ventures are newly found and jointly owned independent business

units, established for serving common interests of the parties involved.

5.5.1 Motive for establishing a joint venture

Joint venture is a reasonable option when the costs of technology are high and both partners` skills are needed in creation and development of the technology. Sharing the risk and cost of possible failure, works as one incentive for founding a joint venture as well. (Parhankangas et al. 2003).

Joint venture arrangement offers at least four benefits for the buyer and the seller during a divestment process (Nanda and Williams 1995):

- The profits for the parent company are exactly what the business is worth.
- The real value of the technology is revealed for the buyer over a period of time.
- Joint venture arrangement keeps the business healthy.
- The technology transfer is facilitated between the buyer and the seller.

5.5.2 Managing joint ventures

Because of their high failure rate, founding and managing processes are extremely important for the success of joint ventures. As joint ventures are naturally jointly owned, there lies a breading ground for conflicts concerning ownership structures. If the partners` bargaining powers are asymmetric, the contributions to the venture are as well and so are the rights to the profits. If these are not related to each other, the partners are bound to clash. It can be said that managing a joint venture is many times more difficult than managing an individual parent firm. (Parhankangas et al. 2003)

5.6 Licensing

Technology licensing has grown to a significant tool to capitalize intellectual property in the last decades. Licensing is fundamentally about selling to the rights to use or manufacture a patented or otherwise protected innovation or new technology in certain geographical area. Original property rights are not transferred to licensee and license rights can be sold to several licensees. The fee paid to the licensor may be yearly paid royalty, up-front payment, equity or a combination of the mentioned. (Kivi-koskinen 2000, 84.)

As in the case of sell-off, licensing is a fast way to cash on a non-core technology. The difference between these two is that in licensing the parent has control of the IPRs after licensing. Licensing can also be used as a mechanism to control and monitor joint ventures and strategic alliances .If a firm takes on a licensing strategy, it's important to grasp that there are no similar licensing agreements and each is different to another, which creates variation to time consumptions in each case. After the licensing agreement is done, the licensor may or may not help the licensee to take the licensed item to use. (Parhankangas et al. 2003). In cases, that the licensor royalties depend on the licensee's sales, it's wise to help the licensee to take the licensed technology in use.

5.7 Internal venture capital business model

Internal venture capital-model (Grimpe 2006), referred later as IVC, is a mixture of sell-off and spin-off. The goal of the model is to incubate non-core technologies and ideas to viable businesses and sell them out with profit or to the corporation's business units. The fundamental idea of the IVC is that not one good idea or innovation goes to waste or is put to side because of the lack of fit in the corporation's technology strategy. Originally the model was designed to take so called shelf warmers in use (Grimpe 2006).

There are two dimensions, along which shelf warmers can be characterized: intention and commercialization. Intention in these cases refers to the corporation's official strategy, not to the intention of an individual researcher. When R&D outcome is intended but not commercialized for some reason, it becomes a shelf warmer. Bootlegs emerge when R&D outcomes are not intended, but have a high marketability and are not commercialized because they don't fit in the company strategy. Another interesting group of unintentional innovation are so called gadgets, which emerge in the R&D process towards intentional innovation. Gadgets can be, for instance, some piece of machinery built to aid functionality of the technology under intentional research. (Grimpe 2006) The IVC business model is illustrated in figure 5.

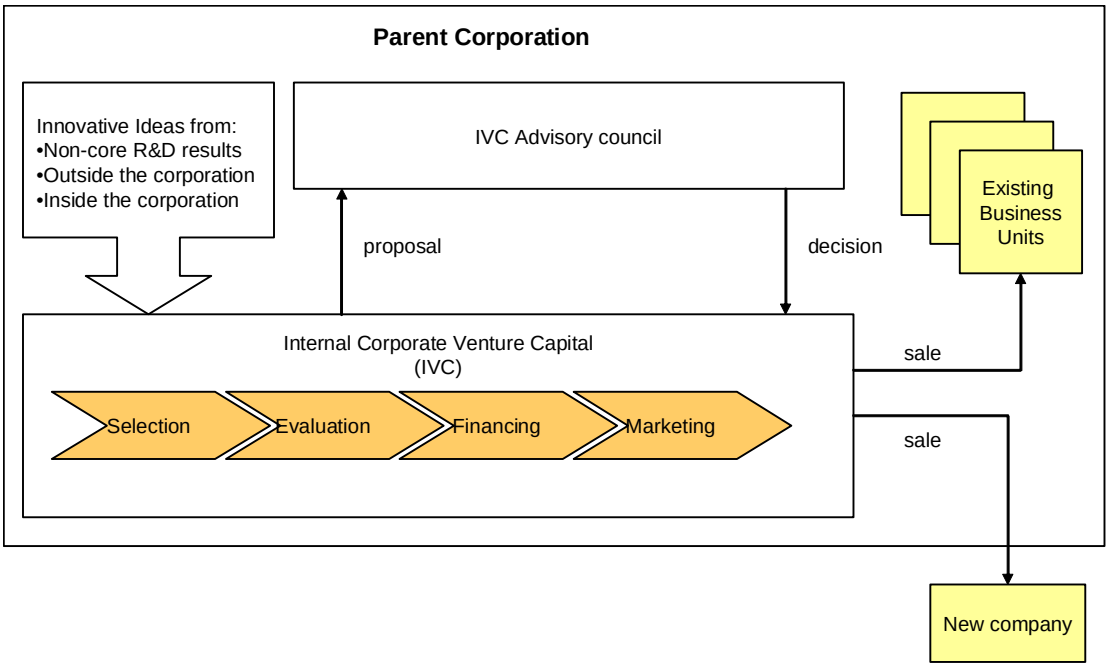

Figure 5. The IVC business model (adapted from Grimpe 2006)

5.7.1 Managing IVC business model

The sole purpose of the IVC is to build independent businesses by taking over functions that are needed in the process: consulting, financing and business building, aim of which is to achieve marketability and to spin out

or spin in the created business (Grimpe 2006).

As illustrated in figure 5, the IVC is organized as an independent company inside the parent corporation. Before taking on a project, it must be proposed to the IVC Advisory Council consisting of parent's top management as well as industry experts. The idea for a project is selected and evaluated by the IVC organization. The proposal is made in cooperation with parties that originally invented the idea.

In order to get IVC financing, the idea has to meet stringent requirements (Grimpe 2006):

- Business units are not willing to implement the idea.
- Draft concept of the business plan based on the idea must be attached to the proposal.
- Clear customer benefit has to be visible.
- At least one of inventors of the idea must have strong entrepreneurial capabilities in order to be able promote the idea within and possibly outside the parent company.
- At least one of inventors of the idea must have abilities to lead a management team brought together by the IVC.

Based on the facts presented to it, the Advisory council decides whether the venturing project gets funding or buried. When the proposal is accepted and financing is confirmed, the IVC starts to build up the new unit based on the business idea. At this point, external capabilities and resources are selected to combine with the internal ones. (Grimpe 2006)

In case of successful project, the IVC prepares its exit by spinning in or spinning out. The choice between the alternatives is based on the projects prospects of contributing significantly to performance of existing business unit. If these prospects don't exist, the outcome of the project is sold at the market as a new company. Resources that are needed for the projects success are continuous R&D, vigorous marketing and production. (Grimpe

2006)

A fundamental requirement for the IVC to be useful is that the corporation's organization must have the ability to tolerate and accept irregular projects which don't fit to the corporation's strategy (Grimpe 2006)

5.8 Summary of external and hybrid modes

Summary of organizational modes and their characteristics are depicted in table 3.

Table 3. Summary of the hybrid and external organizational modes for non core management (adopted from Grimpe 2006; Parhankangas et al. 2003)

Type	Mode	Financing	Degree of commitment	Future access to		Resource sharing with parent
				Technology	profits	
Hybrid	Technological collaboration	Shared	Moderate	Shared	Shared	According to contract
	Joint Venture	Shared	Moderate	Shared	Shared	According to contract
	Licensing	Licensee	Moderate	Shared	Shared	According to contract
	IVC	Parent	High	Depends	Depends	According to contract
External	Spin-off	Depends	Depends	Depends	Depends	Depends
	Sell-off	Buyer	Low	None	None	None
	Donation	Recipient	Low	None	None	None

6 Managing non-core businesses

This chapter is about how an optimal organizational mode should be chosen and how it should be managed in order to be successful on the chosen path.

Large corporations are able to pursue innovations through extensive R&D activities. Even they are not capable of exploiting all of the emerging technologies or ideas. It has been estimated that a fairly high number of 70 per cent of all patents are put to side (Parhankangas et al. 2003, 62). With a more efficient utilization of this amount of intellectual property has naturally a vast potential in creation of new businesses, well being and new jobs.

As a company's research processes produce ideas, some of them end up outside the parent corporation either during the research project or over time in a life cycle of a technology based venture. Divestment of some business idea derives from their nature of being non-core in terms of corporation business strategy. These types of ideas are usually discovered by accident, possibly by R&D activities.

In some cases, the parent corporation may recognize that one or more of its core technologies would be in better and more efficient use when utilized in entirely different sector of business. Mature businesses are more rigid in terms of recognizing possible new businesses and are eager to hold on to their established technologies (Parhankangas and Arenius, 2003). As a result the diffusion of ideas to the outside of the parent corporation is more probable than in a "younger" line of business. According to Lindholm (1994), the ventures acquired by large corporations are divested mostly because of problems related to integration. Mechanisms for "technology leakage" include external licensing, joint ventures, sell-offs, spin-offs and strategic alliances. (Parhankangas et al. 2003)

The process of managing non-core technologies can be divided into three steps (i) Review of technology portfolio and identification of non-core technologies, (ii) Choosing an organizational mode that provides an optimal home for non-core technologies, (iii) The aftercare activities of the internal and hybrid modes. General process of non-core management is depicted in figure 6.

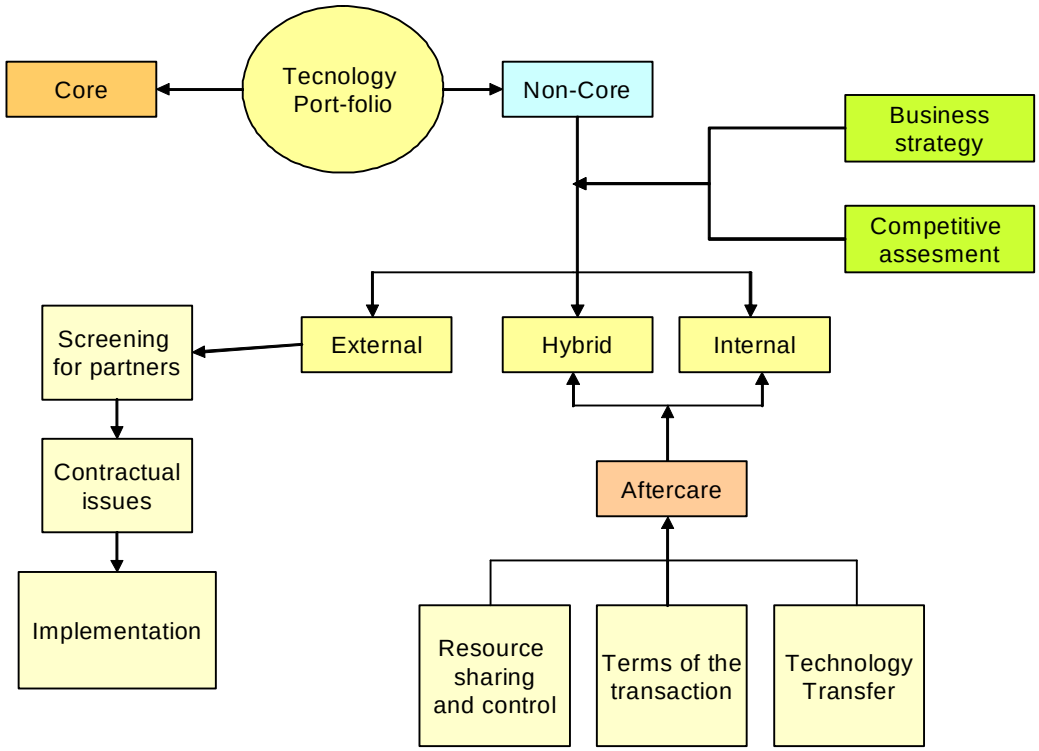

Figure 6. General process of non-core business management.

6.1 Steps 1 & 2: Review of technology portfolio and identification of non-core technologies and choosing the organizational mode

The first step in the process of managing non-core technologies to understand the size and strength of the technology based assets possessed by the corporation. Review is about inventory and categorizing of corporate technology portfolio and analyzing of value extraction possibilities of the technologies in the portfolio. (Parhankangas et al. 2003)

Although the step may seem obvious, it has been studied that a companies have generally very little information concerning the value of their technology portfolio (Rivette and Kline 2000) and no more than a handful of organisations compile information about technology based assets (Parhankangeas et al. 2003). It seems that coordination of technology management between divisions of a corporation is inefficient and limited

Corporation managers should view technologies at hand as a set of intangible and tangible resources. They also remind that mapping technologies is easier when they are identified as products, processes and services. The technology portfolio can be seen as a part of the corporation's intellectual capital consisting of its human and intellectual assets. The technology related capabilities of interest groups that are associated in the value creation of the company can be seen as a definition of the technology related human capital. (Parhankangas et al. 2003)

Intellectual property such as patents, copyrights, trade secrets, and trademarks are not valuable if they aren't` a part of corporation's structural capital. This capital includes methods, both technical and administrative, as well as customer capital, processes, procedures and organizational structure (Sullivan, 1998; 2000). It can be stated that complementary business assets such as manufacturing facilities, distribution networks, customer lists and relationships, supplier networks, and complementary technologies are more important than the infrastructure of the company. Sullivan (1998; 2000) divides the complementary assets to generic and specialized. Generic complementary assets are available from open market whereas the specialized are held exclusively by a company or a consortium of companies. Thus, at this point where all the aspects of the technology portfolio's contents have been reviewed, it can be concluded that the technology portfolio of a firm consists of technology-related human capital, intellectual property and structural capital. It's important to

understand that the components are not being treated as individual sub-areas, but as an entity (Sullivan 1998; 2000).

For step 2, there are a number of various to organizational modes which can be used to gain value from the non-core technologies. As managers decide the most viable mode, they are also likely to pay close attention to their desire to access the technology in the future. Other things that affect the decision making are strategic importance of the non-core technology, characteristics of the technology and challenges and benefits attached to each mode.

6.2 Step 3: Transaction related issues and aftercare

When the organizational mode is selected, the terms and implementation of technology transfer must be agreed upon. Contents of the agreement is naturally is tied to the chosen organizational mode. However, there are basic elements that must be considered in each case. These elements are illustrated in figure 7.

Careful definition of terms and conditions is important especially in cases, in which the intellectual property rights are transferred as well or when the development of the technology continues with external parties. This is usually the point when the corporate managers and venture managers should list all the resources needed to commercialize the technology at hand. As important as listing the resources is to map existing synergies between mainstream corporate business and the technology based venture. The goal of step three is to identify the intellectual property and intellectual capital as well as complementary resources that need to be transferred to the technology based venture. Even if the transfer is done internally, it’s important to get a profound understanding of the scope of the venture in terms its resource needs and linkages to the rest of the parent organization. (Parhankangas et al. 2003, 7-8)

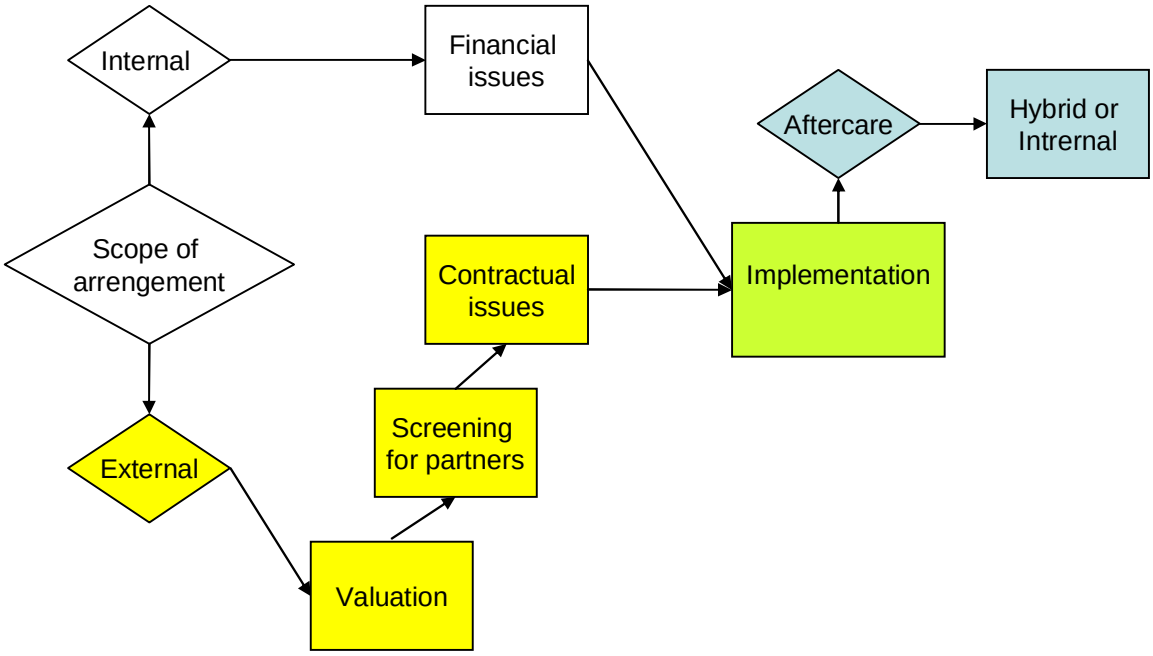

Figure 7. Step 3: Terms of transaction and aftercare activities.

In cases of hybrid and external modes the parent corporation has to find external partners or a suitable recipient for the technology transfer. Ties, personal or professional or technology brokering services as well as active marketing of intellectual property rights may speed the implementation of this step. (Parhankangas et al. 2003)

Negotiations around the technology-based transactions focus on two sets of factors (Harbison and Pekar 1998, 4). The first set can be described as “business fit”, which includes issues such as purpose, objectives, due diligence, transaction price, and conformity of goals, contract writing and exit strategy. The second set consists of implementation factors like relative level of contributions, ownership and control and managerial issues (Rigsbee, 2000).

7 Intermediating organizations

In this chapter we take a look at organizations that operate between industries, universities and governments. These kinds of organizations have significance as the model for managing non-core ideas in UPM-Kymmene corporation is formed and implemented.

7.1 Definition

Organizations between public and private entities have been found to actively support the formation of Business-University-Government networks through the exchange of actors, resources, and commerce. These so called “intermediating organizations” are usually nonprofit organizations, including professional associations, foundations, consortia, independent research support organizations, and special interest groups. (Metcalfe 2005). For example, the local governments support the creation of research parks and industry training centers, often in an attempt to create clusters of innovation that will offer regional competitive advantage in the U.S. and Canada (Fisher, Atkinson-Grosjean, & House, 2001; Tornatzky, 2000)

The concept of intermediating organizations has been tied to theoretical frameworks that have addressed the changes in higher education. The changes are caused by the New Economy and globalization.(Metcalfe 2005). In the New Economy, the external organizational environment is characterized by intense competition, innovation, flexibility and risk (Carnoy, 2000; Carnoy, Castells, Cohen & Cardoso 1993). Globalization, as described by Levin (2001) manifests itself in organizations such as higher education institutions through production processes, technological innovation, and dependence upon these innovations. The extensive use of information technology has stretched the concepts on time and place. As a result, new commodities of exchange have emerged (Castells 2000). The

current trend is that companies have to find new, ICT-embedded and networked ways to compete in global markets and universities are pressured to rapidly and efficiently produce relevant knowledge and governments must find the policies that support the ongoing development process. Thus, a need for dedicated intermediating actors, who facilitate interaction between the three key sectors of economy, is apparent.

7.2 Business-University-Government context

Etzkowitz and Leydesdorff have created a model called “Triple Helix” through which these changes can be explained (Etzkowitz & Leydesdorff 1999, 111). A triple helix of business-university-government relations originates from previous models of institutional relationships, in which either the polity or economy is predominated and the knowledge sector is in a smaller role. The triple helix model is an attempt to visualize the institutional forces within innovation systems. (Etzkowitz, Webster, Gebhardt, Regina & Terra 2000, 314). The model itself is so complex, that there was no point to depict and explain further it within the boundaries of this thesis.

In short the Business-University-Government context relates to the increasing need for even closer cooperation and partnering across the different sectors of the society. This phenomenon is related to the shift from industrial based society to knowledge based society. To see the driving force behind the cooperation in more detail, Elmuti, Abele and Nicolosi (2005) have gathered together reasons why businesses create strategic alliances with academic institutions:

Rising global competitiveness. Rapid change in the intensity of competition has created increasing demands on companies to develop new technologies.

Increasing need for innovation in products and processes. The new technologies have to be created with hard work and some of them can be developed from existing ones. Both intra- and inter organizational methods are used to create them, but as Kaufmann and Tödtling (2001) conclude: the non-business systems stimulate innovations more effectively.

Lower R&D expenditure. Companies with university linkages have lower research and development expenses per employee. In addition, these businesses might develop the relationships even further to supplement their internal research resources. (George, Zahra & Wood 2002, 604-605)

Technological transfer opportunities. This incentive is especially important factor in the business-university partnership. Technology transfer programs usually attempt to integrate university-driven research into applied initiatives. (Elmuti, Abele & Nicolosi 2005, 118)

The development from relationships between two parties into ones which have three parties is also generated from the need to increase interaction between companies and science makers. A reasonable goal for policy makers is to find ways to make possible for these sectors to interact. (Kaufmann & Tödtling 2000, 803). As knowledge is currently becoming an increasingly important part of innovation, the role of the universities as knowledge-producing institutions are becoming more and more important. (Etzkowitz, Webster, Gebhardt, Regina & Terra 2000, 315)

7.3 The Role of intermediating organizations in the innovation process

Intermediating organizations are expert organizations of innovation development. Their function is to speed up innovation processes, take innovations forward and reduce risks related to commercialization of innovations. Transfer of knowledge and information between universities and companies depends on the demand of the offered information and

knowledge and the companies` ability to absorb them. (Koskenlinna 2005, 12)

According to Koskenlinna (2005) the fundamental role of the intermediating organizations in the innovation process is to:

- Develop innovations
- Develop and uphold cooperation between companies, universities and other instances
- Develop innovation environment and its structures
- Offer expert services to different stages of the innovation process

In an ideal situation the developer or utilizer of an innovation comes to an intermediating organization for a certain service the intermediator offers. The utilizer may be a researcher from a university, a start up company, a growing company or a start up established by a researcher from a university. The intermediator reviews the situation, make plans and an offer to the utilizer, which chooses the most feasible option. The most feasible option is not necessarily the cheapest. These functions happen without government intervention.

In reality the situation is not always as straightforward as above. The prize-quality assessment may me difficult for the utilizer and in some situations the prize of the intermediator`s services is so high that the utilizer doesn`t have the resources to acquire it. (Koskenlinna 2005, 13)

Asymmetry of information is not clarified by choosing the best offer. In evaluation of the innovation the traditional parameters like expected return on investment won’t necessarily shed light on the viability of the innovation. Thus asymmetry of information related to resource and knowledge needs as well as market size remains until the service from the intermediator is received. In this sense the more experience the utilizer has from innovations the better decisions it can make and asymmetries of information are insignificant. (Koskenlinna 2005)

Evaluation of the Finnish innovation environment (Georghiou, Smith, Toivanen, Ylä-Anttila 2003) stated that the role of the intermediating organizations in Finland should justify their functions by pointing out the type of market failure they are specialized in. The evaluation emphasizes collaboration and coordination of the activities between companies and intermediators. The evaluation also indicates that the changes in the laws related to immaterial rights may create a need to change other parts of the innovation systems as well. The characteristics of market failure are (Koskenlinna 2005):

- In a normal market situation companies don't allocate resources to innovation activities as much as it would be optimal for their own sake in surrounding financing markets. Reason for this is lack or asymmetry of information. As a result, available financing is scarce or unavailable and companies are unwilling to take risks that would be worth taking. The significance of government intervention is that the companies begin to allocate resources to innovation activities and change long-term goals to more innovation oriented.

- The society benefits from the companies` innovations though the external effects like new jobs in new business units. Researches on the matter (i.e. Lehto 2000) show that if R&D activities increase in a company, the productivity of the companies in the same region increase as well as the created know-how spreads across the region. It has been stated that the external effects are many times greater than the economical benefits of the company that actually invests in an innovation.

When there is a market failure, systemic failures are not far away. Systemic failures mean the problems caused by multilayered and fragmented structures between the private and public sectors. Systemic failure has an effect, for example, on the quantity and quality of networking

within a region. (Koskenlinna 2005). It could be possible that systemic failures cause negative effects within clusters as well.

Systemic failures may cause a company to hide technology needs, which results that the company won't get any offers and the company can't therefore utilize new technologies. As technological development gets faster, innovation system should be developed as a wide entity. This emphasizes the need to correct problems caused by the systemic failure. In practice this means that companies and non-profit organizations must enhance their activities, procedures and interaction to utilize innovation activities and emerging technologies better.(Koskenlinna 2005)

8 Forming the non-core idea management model

The goal of this thesis is to configure a model for managing non-core ideas and potential innovations as effectively as possible. For the forming of the model, experts Markku Hokkanen and Tero Lehikoinen on new venture development were interviewed.

8.1 Starting point

As discussed in chapter 6, large companies tend to utilize only a fraction of good new product or service ideas. UPM-Kymmene corporation is not an exception. On the basis of the discussions with UPM-Kymmene representatives, it can be concluded that they have some ideas in store and others are constantly generated by their organization. Problem with this is that the unused ideas tend get forgotten in drawers, shelves and databases. Reason for this usually is the ideas` of fit in the company`s business strategy or their expected turnover is too small.

One reason for the reluctance to take risks with investments may be found in the past. As discussed in chapter 2.6 all the large Finnish forest corporations took big chances in their investments in the 80s and 90s backed up by the Finnish State by devaluations of the Finnish currency. Devaluations are no longer possible and the corporations are shutting down their over capacity built in that time. Thus, the era of long term strategic goals and growth over profitability has come to an end.

As discussed in chapter 2, the only way to keep the Finnish forest cluster competitive is that the companies invest in people and know-how, which leads to new innovative products and processes. The difficulty in doing this is that the change towards more radical innovativeness takes a lot of time. This is because the change has to be financed by the current businesses. Thus, the companies will have to continue the lay-offs and shutdowns in

order save money for the investments in new innovations and R&D. This is the fundamental problem in Finland that must be solved, because time is the resource that is running out. The type of the problem seems to be a market failure (chapter 7.3).

The production of the bulk products like board and paper is already being shifted to the developing markets like China and South- America. Furthermore, the change towards more radical approach requires skilled labor and experts. As discussed in chapter 2.2, availability of this kind of people will possibly become a problem in the future. You can't blame the young and highly educated pulp and paper engineers for leaving Finland, because the forest industry here does not, at the moment at least, offer youthful, dynamic and stable working environment.

Solution to the market failure begins with the fact that UPM-Kymmene is located in Finland where the forest cluster is the strongest one in the country and the past has shown its importance to the State as well. This means that the corporation doesn't have to do and finance the change by itself. Another fact is that there are many good unused product and service ideas with the corporation and more is being produced. And finally, there is a solution to every problem. Based on these facts, there is a solution which can provide well being to the companies within the Finnish forest cluster, new companies and produce new products and services, which can't be produced in the developing countries. In this case, the solution could be a new model for development of non-core ideas within and outside UPM-Kymmene corporation.

8.2 Requirements of the model

As reviewed in the theories about non-core managing modes, there are many options to manage non-core ideas. The problem with the traditional modes is that they require a big organization if the best mode for each idea is reviewed individually. Thus, a linear system, which enables to

make decisions fast and regardless of the type (chapter 3) of the ideas or potential innovation, is needed. Furthermore, the people making the decisions play critical roles, because the decisions must be based on facts and figures, not on gut instincts or prejudices.

It`s a known fact that if an employee invents something or has a really good idea, it has to go through several desks in the chain of command before any decisions about its feasibility can be made. If you want to speed decision making up, you have to take the idea straight to the final decision making body as well prepared as possible. For this, only one mode of non-core management is suitable: the internal venture capital (IVC) business model (chapter 5.7). It offers the channel, which goes through every decision making body needed to determine, is it reasonable for the corporation take the development in it`s own hands or kill the idea.

The nature of the IVC business model is that its sole purpose is to benefit only the company that it is located in. What if there were an interest party that could utilize the ideas that are currently killed? Hokkanen (2006) said in the interview that there is a huge amount of capital venture money in Finland, but a cronic lack of viable businesses to which it could be invested in. He also said that the money is not intelligent, which means that a typical venture capitalist doesn’t have anything but money to contribute to the business process itself. Thus, if discarded ideas could be given, according to a contract with UPM-Kymmene corporation, to an interest group and eventually funded by a venture capitalist, the result would be new companies, products, services and well being.

In short, the discarded ideas won`t have to be killed, unless they are simply bad of course. It is more feasible to take the ideas outside the corporation to an interest party, which is able and willing to develop the idea to a new innovation based company or to a new product or service. Based on these conclusions, so called open Internal Venture Capital-model was formed.

8.3 Internal Venture Capital inside UPM-Kymmene corporation

Idea sources of the model are open, meaning that they are not specified within the boundaries of this thesis.

As mentioned in the theory of the IVC-model, the most important tasks of the Internal Venture Capital is to select, evaluate, finance and market (Grimpe 2006). The open IVC model differs slightly from Grimpe`s one. In this model, the most important and critical tasks of the IVC are selection and evaluation, because in a company this big it can be anticipated that most of the ideas are discarded during these tasks and only the very best are selected to be proposed to the IVC-Advisory council. The amount of ideas that are proposed is expected to be very small. This of course depends on the specifications that the corporation requires of them in terms of future earnings etc.The model is depicted in figure 8.

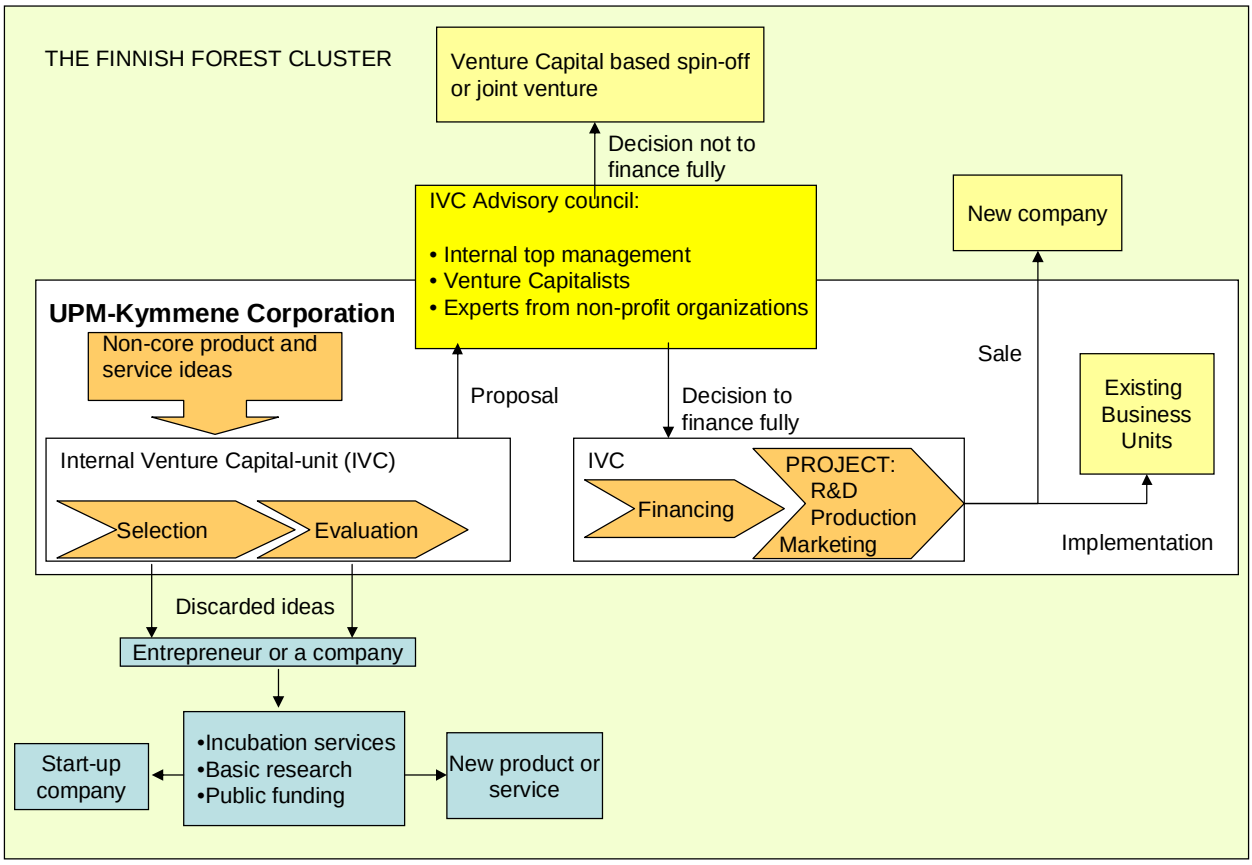

Figure 8. The Open IVC- model

Some of the incoming ideas to the IVC-unit may have undergone some level of evaluation and are obvious choices for further evaluation. The rest must be handpicked from databases and shelves, for example. It's important that the simply bad ideas are deleted as they appear that they won't come up again. After this is done, the selected ideas must be evaluated.

Evaluation may be good to be carried out in two phases. In the first phase at least these characteristics of the ideas must be evaluated:

- Novelty value
- Market size, entry barriers and growth prospects

If these don't meet UPM-Kymmene's specifications, the ideas are discarded and transferred some to the interest party that is willing to refine the idea. This kind of party could be the inventor of the idea, someone else from within or outside the corporation or another company or a local SME. For the survival of the idea, it is critical to find this kind of party or it dies. If an interest party is found, the idea can be refined to a start-up company. In case of a SME or a bigger company, the idea can be refined to a new product or service.

In the second phase of evaluation, complete business and marketing plans are created in close cooperation with the inventor of each idea. One alternative contents for the business plan is shown in appendix 1. On the basis of these plans, the IVC-unit`s representatives make a financing proposal to the IVC-Advisory council. The plans are presented by an IVC-unit`s representative to ensure the quality of the presentation, and on the other hand make sure that the presented plans are based on hard facts.

The IVC-Advisory council consists of the top management of the corporation, venture capitalists and experts from non-profit organizations such as universities or other research facilities.

The experts have no power of decision and their role is merely to broaden the top management's view in each case. Every proposal is processed separately and the experts are chosen on the basis of the field of the proposal.

The Venture capitalists` role are more complex than the experts` and like them, the venture capitalists have no decision power either. Their role is to take on a portion of the financing risks involved to a proposal or they can take over the whole project. Their role is, in other words, defined by the decision that the top management of the corporation makes. The alternatives, which include venture capitalist involvement, are spin-off and joint venture. In case of joint venture, the corporation management decides that it's reasonable to keep a share of the developing business. The terms of Spin-off arrangements agreed upon separately in each case.

If the management of the corporation decides that the IVC can finance the implementation of the plans, the IVC gathers a project organization to do it.

The IVC-unit has limited funds for the financing stage and project ideas should fit with that budget. Keeping in mind that only a very small fraction of the evaluated ideas survive to this stage, this should not be a problem. The IVC-unit requires strong entrepreneurial capabilities as the idea is promoted in close cooperation with the inventor. The IVC-unit forms a management team that will implement the project plans. The role of the inventor in the project organization is to be an expert. This way, difficulties related to the lack of general management capabilities or interests of the inventor in that field are avoided.

The IVC-unit employs traditional venture capital instruments connected to the three phases of financing: seed, start-up and growth (Grimpe 2006). Resource needs increase with the proceeding of the financing steps. The IVC-unit takes over financing until the new company or a new business unit is founded or the created business is implemented in an existing

business unit. After that, further growth financing is provided by business units or external sources.

8.4 Strategic resonance within the corporation with an IVC-unit

The open IVC-model would, if utilized, result strategic resonance by itself, because most of the criteria for making resonance possible are met in principal. These criteria were discussed in chapter 4.1 and the most important of them was the one about grasping opportunities that the rapid technology development provides.

In the case of the open IVC-model, the ideas for technology development come from within the corporation and the model enables it to seize the opportunities. Another very important criterion is the strong thrive to discard old and rigid hierarchical structures in a company. This is also met, because the IVC-unit is an independent body with straight information channel to the top management of the corporation. In this light, the resonance will happen between the IVC-unit's and the corporation's strategies. The IVC-unit's strategy is to create new business within and outside the corporation whereas the corporation has its own strategy, which was in the chapter 2.5.2 said to be cost leadership.

The results of the strategic resonance are so called strategic boundaries, which restricts the corporation to be good at wrong the things as the IVC-unit carefully evaluates the inflow of non-core ideas. On the other hand, the boundaries prohibit the corporation to drift to a market that it has no chances to be successful. This boundary is drawn as the IVC-unit discards ideas and an interest party, to whose core business the discarded idea relates to.

The project organization itself must be lead within the principals of internal strategic resonance. This means that as the project goes ahead, all the people working within every function have to be on the same page. When

a project starts, it usually exists on paper and the actual project work begins from basic research. The starting point of the development is of course reviewed individually in every case. The roles of different functions during the IVC financed projects are depicted in figure 9.

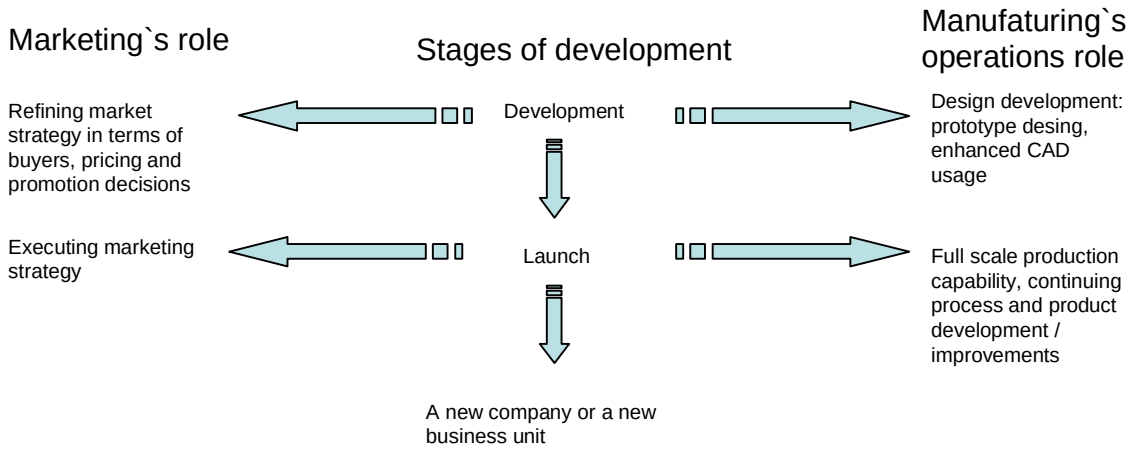

Figure 9. Role of functions in an IVC-project.

As the new company is sold to another corporation or it becomes a new business unit of UPM-Kymmene corporation, it's important that the principals of the internal strategic resonance and an innovative culture exists. This is the only way to make sure that the rigid structures and the culture of the forest industry aren't shifted to the new companies.

8.5 Human resources related issues and other challenges

When the projects are carried out, there may emerge a number of human resources related issues and other challenges that must be adressed

For instance, the employees who decide to pursue their project stay within the UPM-Kymmene organization, but they have to given a chance to switch to the IVC-unit. If researcher or an employee wants to switch to the IVC-unit, his or hers former position will not have to be kept free, but the chance for returning into the former working environment should be made

possible. This kind of job guarantee may encourage an inventor of an idea to step up and work as a full time expert in an IVC project, which makes the progress of the project faster.

Difficulties could arise when it is not possible to quickly fill positions that the researchers or other employees leave behind. Although it is IVC-unit's principal objective to sell successful projects internally or externally. If innovative people, knowledge and other resources go with sold projects as well, it could endanger the parent company's innovation capabilities. Situation becomes even more difficult if some of those leaving UPM-Kymmene corporation are so called key inventors. The concept of key inventors states that inventive capabilities are highly concentrated within the company (Grimpe 2006).

Some companies have to hold on to a few inventors with an extraordinary patent activity and an above-average patent quality. Key inventors contribute most of a company's technological progress and therefore can be designated as technical innovators. By doing that, they have a big influence on the competitiveness and success of the company they work for. (Vitt, 1998: 5). Apart from the concept of key inventors, there are in every company always a number of employees that play an important role in the R&D process or have a key influence on the R&D.

Many firms that have tried corporate venturing, which is quite close to functions of the open IVC-model, wish they never had and there are many empirical studies on the subject (i.e. Chesbrough 2000). According to Michalski (2004) there are two major reasons why corporate venturing have failed. Firstly, corporate ventures have been tied to parent corporations medium and long term strategic planning. In practise this means that non-core businesses have no chances of being ventured, because they are discarded by the management before any decisions are made. Secondly, the established ventures and corporate core businesses share the same resources, which lead to conflicts in the form of hierarchy and remuneration. Thus, past experiences shows that it`s less problematic

to change strategic planning and management than to reduce the risks of conflicts.

Nevertheless, the open IVC model doesn't require change in the strategy planning of UPM-Kymmene, but change in corporate management attitudes and new ways of thinking. In order to success, the IVC-unit has to be totally independent and have its own budget. Difficulties related corporate strategy won't probably emerge, because the ideas under review are non-core to begin with. Top managements support is however crucial, because without it there is no point to even try to implement the model at UPM-Kymmene corporation

9 Case studies

Purpose of these case studies is to validate the different ways to handle the incoming ideas. In this chapter, we review three cases; each represents a different path in the open IVC- model. The cases are: Oy Core Handlind ltd., Coloured Wood Products Oy (a.k.a. CWP) and wood-plastic composite (a.k.a WPC).

The Core handling case represents the path of an idea from the inside of the corporation straight to an entrepreneur. The CWP case represents the path from the inside of the corporation to an entrepreneur after reviewed and discarded by a decision making body of the corporation. Finally, the wood-plastic composite represent a potential new venture or new business unit after reviewed by the corporation's decision making body and financed by UPM-Kymmene corporation's subsidiary.

9.1 Oy Core Handling ltd.

Oy Core Handling Ltd. was established in the year 2005, but the

technology and the idea that it's based on has a longer history.

The development of the company began in 1998 when the production manager from Stora Enso`s cardboard factory at Inkeroinen contacted Pekka Ämtö. Mr. Ämtö owned a company called A.P.E. Trading Oy, which was involved in paper and board trade business. Stora Enso`s production manager wanted Mr. Ämtö to invent some kind of use to left over core cartons from sheeting process as well as for short pieces of core carton, that were left over when the actual paper roll cores were cut to their right measure.(Riikonen 2006)

After a few weeks of pondering, Mr. Ämtö had an idea to build a production line, which could join the unused pieces of cores together and thus be put straight to use in stead of reprocessing them. With the same line, it would be possible to recycle used cores instead of hauling them to a carton factory to be re-processed and this would save a lot of money to paper and board manufacturers. (Riikonen 2006)

Mr. Ämtö began to build a prototype in cooperation with Stora Enso, which however did not invest any money to the actual development and building of the production line. Stora Enso offered the materials and premises for the trial runs of the prototypes. The product line was developed over the years 1998-2000. (Riikonen 2006)

In 2001 A.P.E Trading made a contract with Stora Enso to handle their cores at Inkeroinen with the developed production line. In the same year, A.P.E Trading Oy began to market the production line to the other actors in the pulp and paper industry and managed to sell a few over next few years. However, A.P.E. Trading was a two man company and lacked credibility in the eyes of the big forest corporations. This lead to the establishment of Oy Core Handling Ltd. Mr. Ämtö contacted a few capital investors and sold all the IPRs to Core Handling. A.P.E Trading remained as one of the main owners of the newly established company. Thus, all the know-how, IPRs and funding was centralized to Oy Core Handling Ltd in

2005. (Riikonen 2006)

Oy Core Handling Ltd. employs four people and a number of sales agents around the world (www.corehandling.com). The company is expanding their sales to the fastest growing markets in Asia and South America. Core handling is also offering core renewal services at the first stage mainly in Europe. The only potential rival to the company is Swedish Core Link, which is however suspected of violating the Core Handling's patents. (Riikonen 2006)

9.2 Coloured Wood Products Oy

It was Riku Karri's interest in shooting which inspired him to think of through colouring of wood. The first successful application was a gunstock created in 1999. The same gunstock is shown in picture 1. (Kärri 2006)

Innovativeness lies with the colouring method. From 2001 to 2003 Lappeenranta University of Technology (LUT) had the method related 1,5 year research project, which was funded by TEKES. The project originated to Kärri's process invention. The main target of the project was to find the optimal parameters for successful through colouring treatment of birch veneer. The project studied possible product applications for the new colouring process. (Kärri 2006)

Schauman Wood was one of the participants and in fact they set the goals of the project. Every goal was achieved, but Schauman Wood was not interested in commercialization of the innovation. They justified their lack of interest by saying that they did not have the market potential or commercial applications required to start the production. (Kärri 2006)

In 2003 Kärri was nominated as UPM-Kymmene Special Industries product manager. Base of nomination was made under the suspicion that the IPRs of the colouring method would be in utilised under UPM-

Kymmene’s Special industries division. Immaterial rights to the innovation were, in fact, at this point co-owned by LUT and Kärri. (Kärri 2006)

In May 2004 CWP, Coloured Wood Products Oy was established by Kärri and Jussi Helve. During that same year the company was successful in the Venture Cup competition, in which new enterprises compete with their business ideas. CWP won the provincial contest and was third in the nationwide final. In addition, the company was awarded for its creativeness in the Innosuomi and "Tuottava idea" contest and it was the winner of the provincial contest. At Baltic Sea Venture Cup CWP Coloured Wood Products Oy was awarded third best in international the cup finals in Copenhagen on 26.1.2006. This is a Final competition, where the best of the most promising companies of Baltic Sea countries compete. (Kärri 2006)

Newly established firm started negotiations of cooperation in commercializing the novelty process with all of the Finnish forest firms: Stora Enso, Finnforest, Koskisen, UPM-Kymmene and a few others potential partners. The value of royalties that licence holder would have had to pay for the use of the colouring process, was estimated in June 2004 by a consulting firm to be 5,2-10,4 million euros. After laying this to the negotiation table things went bad with all parties. They were unable to comprehend the value and the market potential of the process and personal relationships took over the negotiations, especially with UPM-Kymmene Wood division. As a result, commercialization plans in cooperation with big forest companies was buried at the time. Due to the conflicts in the negotiations with UPM-Kymmene Wood division Kärri was ultimately transferred to internal auditing of UPM-Kymmene corporation. This transfer required Kärri to resign from his position as the chairman of the board of Coloured Wood Products Oy and from all other operative relations to the company as well. (Kärri 2006)

Negotiations with the potential partners are still ongoing by CWP´s operational CEO. Lesson learned was that "father" of the innovation is not

the best negotiator when trying to licence the IPRs. After the negotiations failed, Kärri and Helve decided to matters in to their own hands. With the help from Technopolis Kareltek Oy`s incubation services and with the owner's capital and public funding, CWP was developed to a functioning company with huge anticipations of the future success. (Kärri 2006)

Today, Coloured Wood Products Oy is a fast growing firm and it is owned by Kärri and Helve (51 %), venture capital investors and SITRA. In the near future CWP`s business will be divided into three sectors, which are (www.cwp.fi):

- Hunting and Track,
- Construction and Interior Products and also
- Development and Licensing of Technology.

High volume product sector will be laminated preforms (www.cwp.fi) focusing especially on gun stock industry. In 2006 CWP entered international markets starting from Europe. One remarkable reference for the company is that they coloured the wood materials used in the floors of the Nokia`s flagship stores, except in Helsinki. The floors were made in cooperation with a Finnish floor materials manufacturer. (Kärri 2006)

Competitive edge of CWP Oy is based on the following characteristics achieved trough the innovative colouring process (www.cwp.fi):

- Fully homogenous colouring through wood resulting 100% the same colour as the colour used.
- Even penetration of colour up to 45mm depth.
- Precise colour control

Rival companies can achieve colour penetration at maximum of 0,6 mm and colours have not penetrated evenly throughout the dimension. In pictures 1-3 are shown examples of the CWP Oy`s products.

Picture 1. The first successful application: a gunstock, Hunting and track sector (www.cwp.fi).

Picture 2. Nokia`s flagship store, Construction and Interior sector (http://www.nokia.fi/lippulaivamyymala/).

Picture 3. Shoes that won the Manolo Blahnik Award in 2003, design by Julia Lundstèn the heel materials were made by CWP Oy (www.cwp.fi).

9.3 Wood-plastic composite by UPM Wood Oy

The development of wood-plastic composite, or WPC, at UPM Wood Oy in Lahti was launched in 2001, as VTT started a research program for research and develop WPCs. UPM Wood Oy joined the program regardless of the fact that WPC was not exactly its core business. The purpose of the research program was to examine the manufacturing processes of the WPC products out of dry and fresh saw dust. UPM Wood Oy went along with the program and provided the wood materials for the tests, knowing that the possible end products would be competitors for their products. A company called Conenor was also in the program as a technology developer.

Conenor had developed and patented technologies for plastics extrusion (http://www.conenor.com/tech.htm) and UPM Wood Oy started to test processes on their own with Conenor. During these tests occurred that

Conenor had tested WPC manufacturing processes with Raflatac, which is also a subsidiary if UPM-Kymmene corporation. These tests were about manufacturing WPC out of paper waste, which is coated with plastic. Because of certain components that the waste contains, it seemed that disposing of it would become a problem in the future. (Lehto 2006)

The research results of the VTT`s program were inconclusive and it seemed that it would be better if the research was conducted by UPM-Kymmene`s New Ventures organization in cooperation with Conenor. The idea of making WCP out of saw dust and plastic was discarded and the New Ventures lead project focused on the paper waste application. During The project a functional technology was found. New Ventures acquired test equipment from abroad and cooperation with Conenor ended. Test runs went well and a pilot plant was established in Lahti in 2005. Currently, UPM Wood Oy has two WPC-products: A patio lamp and base board. In other words the idea process for new products has just begun. (Lehto 2006)

According to Lehto (2006), the decision to build a pilot plant was a bit problematic to make, because of the fact that production, and especially marketing of WPC was not core business of UPM Wood Oy. Fortunately New Ventures project was a success and there enough justifications on behalf of the piloting. These justifications in essence were that Raflatac could dispose its paper waste and the competitors had similar kind of products. Advantage of the Wood-plastic composite products that they are more environmentally friendly and require less maintenance than the alternatives of solid wood treated with preservatives or solid wood of rot-resistant species.

Thus, UPM Wood Oy would have competed against WPC products in spite of the UPM-Kymmene`s decision regarding the pilot plant. Furthermore, Lehto (2006) said that the customer base is the same for wood and WPC products, which was another incentive to build the pilot plant.

9.4 Discussion about the cases

There are some similarities between the cases and the most important of which is that in every case the development from an idea to a product took about four years. In this respect, it didn't matter was the idea development done by an entrepreneur or a big corporation with almost unlimited resources.

Case Oy Core Handling ltd is a bit different form the others due to its origin. If the production manager at Stora Enso would have come up with the idea and concept, the role of A.P.E Trading would have been merely a technology supplier with no immaterial rights. Instead, Stora Enso was not even interested in buying the rights to the technology and they have to buy patented technology like everybody else. Thus, the situation is similar than with the paper machine suppliers, who commercialize the ideas they get, for example, from production engineers at forest corporations` paper mills. In the global market this is not the best way to do business, because the competitors benefit as well from these kinds of innovations. In this case, as simple idea as joining used cores together may be, the worldwide market is huge as new paper mills are being built in the developing countries and are utilizing the state of the art technologies. The same time European paper manufacturers are cutting costs. Core recycling is a simple and effective way to cut costs and no one else has the rights to the technology than Oy Core handling ltd.

If this kind of idea would have been presented to a team of business experts at an IVC-unit, it probably would have been developed to a new company or licensed the technology by it as well. Buying the immaterial rights right after the technology was developed would have been wise as well. According to Hokkanen (2006) immaterial rights carry no value before you have a value chain and customers. Furthermore, If Stora Enso would have developed the idea to a new company it would probably employ more than four people and a number of agents.

This case clearly shows, that in the current competitive environment of the pulp and paper industry, it is important to have some kind of system to rationally manage non-core ideas. It can be stated that the beneficiary of non-core ideas and potential innovations is not important. It however is important that somebody picks them up and starts to develop them to new products or services.

Case Coloured Wood products Oy is also very interesting case and a very good example of the consequences of poor personal relationships. The setting as a whole was quite unusual in Finland.

If you look at this case objectively, it easy to see that mistakes were done on both sides of the table. Firstly, the people who made decisions at UPM-Kymmene let personal feelings effect their decisions. Kärri made a mistake when he asked a large sum of money of the immaterial rights if the colouring process before a value chain and a stable customer base existed. This didn’t make the difficult situation any easier between him and UPM-Kymmene.

If this kind invention would have gone to an IVC-unit, the story would most likely have been a whole lot different. If you think what kind wood products are made, you don’t have to be a rocket scientist to think of for example ten applications where through coloured wood can be used especially when you have seen the pictures of their products. If Kärri would offer the license today to UPM-Kymmene corporation, the price he asked in 2004 for would probably be moderate to say the least. It would not be surprising if CWP announced that it has made a big licensing agreement with some big player in the wood products business as they have succeeded and have some good references for their products. It however is easy to predict that the partner won`t probably be UPM-Kymmene corporation. In the open IVC-model the invention would have been refined possibly to a new business unit of the corporation.

This case emphasizes the need of an independent unit with a capability to

break a non-core idea to numbers and do the marketing and business plans is evident.

The Wood plastic Composite- case differs from the rest, because it is the only one that is in development phase inside UPM-Kymmene corporation. This means that the idea to make WPC products has undergone severe dissection within the corporation. The route ,or the detour to be exact, that the idea went through is quite interesting.

According to Lehto (2006), without the New Ventures project, the idea would have been killed and Raflatac should have found another way to dispose their paper waste. This shows how important it is to have an organization that is willing to take on projects like this, even if it doesn't fit the company strategy. In this case however, the manufacturing of WPC products fits the strategy, because the customer base is the same with the wood and the WPC products. Thus, it seems that the directors who decided that it would be reasonable to build a pilot plant saw that it is better to compete with both products than with only the wood products. Lehto (2006) made a good point as he said that the WPC products` marketing should be separated from wood products, because WPC products will be left aside if wood products` marketing took care of both. This may be wise, because competition between the product types will be imminent.

The project to develop WPC products went well, but could it have gone even better. The answer is most likely to be yes. If the corporation would have had a certain model or a system to handle this types of ideas in the corporation, the development of the WPC products would have begun earlier and without the VTT`s research program. The route that the development of WPC products took carries a signal that more effective system to share information between subsidiaries is needed. Also, a single organization that has the ability to review and propose idea based plans straight to a decision making body and the same organization could gather a project organization to execute the plans.

These cases clearly show that a model for handling non-care ideas and potential innovations is needed at UPM-Kymmene corporation. Especially the case of Coloured Wood Products Oy shows how important it is to see the potential of an invention objectively instead of who made it. For the open IVC model these cases didn't bring anything new, but they proved that the open IVC model might have been the right tool for handling them.

In the beginning of this chapter the similarity in terms of development time between these cases was mentioned. The other similarity between the Core handling and CWP cases is apparent. Namely, both ideas were discarded by the corporations` managements without deeper insight of their potential.

10 Conclusions and visions

The most important feature of the open IVC model is the outflows of discarded ideas to these kinds of interest parties. Imagine what it would do to the current image of UPM-Kymmene corporation if they announced that they are creating new businesses and jobs in Finland, instead of the news about lay-offs and shutdowns like in the near past. Furthermore, they would benefit from the best ideas themselves in form of new business units. Downside of the model is that it requires totally new ways of thinking and profound changes to the forest industry's culture.

In reality, this kind of radical change in the culture demands a huge amount of work and confrontations with current management before the model has a chance get utilized. In an industry that has always done things the same way, as discussed in the forest industry-chapter, this kind of change can be made only if it's backed up by the corporation's top management. On the other hand, the Finnish forest industry is indicating that attitudes towards innovativeness are changing to more positive direction and the need to develop new products is recognized. For example UPM-Kymmene corporation's announcement about investing in biofuels was this kind of indication. Another very strong indication to this direction was when M-Real`s innovation director Lars Gädda (2006) said in the interview that their goal is to double their research funding by the year 2020.

As discussed in chapter 2, the only way to keep the Finnish forest cluster competitive is that the companies invest in people and know-how, which leads to new innovative products and processes. This includes joining forces at European level to strengthen the innovation system and promoting knowledge and technology transfer in order to transform the R&D investments into to competitive edge for the cluster. Cross-sector cooperation is a crucial factor on the road to better performance, because it creates a breading ground for new business opportunities (Saarnivaara 2006). The successful utilization of the open IVC-model will provide all this

as the whole cluster benefits in form of inflow of ideas, which can be refined to new companies in the Finnish forest cluster.

Intermediating organizations will probably have a big role in finding the external entrepreneurs as well as in developing the new start-up companies. As mentioned previously, the problems related to the Finnish forest industry are market failure related. In this light the solution to the problems related to the development of discarded ideas are intermediating organizations. Their role becomes vital if the interest party is not found by the IVC-unit. At the same time, an intermediating organization can help the interest parties to develop the idea to a functioning company through the incubation and other services as shown in figure 8. On the other hand the IVC-unit is itself one kind of intermediating organization, because its function are similar to the services provided by a commercial intermediating organization like Technopolis ventures for example.

The matter of intermediating organizations is really an interesting one. This is, because the IVC-unit itself has same kind role than external intermediators:

- Develop innovations
- Develop and uphold cooperation between companies, universities and other instances
- Develop innovation environment and its structures
- Offer expert services to different stages of the innovation process

From this point of view, the question is that would it be possible to outsource selection and evaluation phases to external intermediating organization like Lappeenranta Innovation or Technopolis Kareltek in Lappeenranta. This would naturally require tight cooperation and as tight trust between the parties. If you look at this objectively, the ideas that would seem feasible for UPM-Kymmene to implement itself are probably recognized in a very early stage and the rest are discarded. Furthermore, the ideas that go in the open IVC-model are the ones that are left when

UPM-Kymmene corporation`s R&D- and New Ventures unit have taken the ones they are interested in.

The situation can be reversed as well meaning that what if UPM-Kymmene began act as an intermediating organization and provide services for the external entrepreneurs developing the discarded ideas. In this situation the selection, evaluation, partial financing and supporting the entrepreneurs in the development of new businesses could be fused to the New Ventures-unit and IVC-unit would only make the proposals for the IVC advisory council. The public funding system in Finland is so advanced that the financing needs in seed and start-up phases of the new businesses would be fairly small as well as the risks to the New Ventures- unit. This arrangement would of course jeopardize the model to risks involved in traditional venturing.

Thus, Intermediating organizations offer an interesting research issue. It has to be determined that is feasible to fuse some of the IVC-unit`s functions with the corporation`s New Ventures-unit and support the entrepreneurs like a commercial intermediator. This would also mean that UPM-Kymmene corporation should take more risks and invest more money, but accessibility to a developed technology for example would remain at arms lenght. This might also encourage UPM-Kymmenes employees to bring their ideas out and become entrepreneurs knowing that they would not have worry about never getting their old job back. This would benefit the corporation as well, because they would have a known partner to do business with. In practise, the final form and functions of the IVC-unit will settle after the IVC-unit has been operating for a while, but it is quite possible that it is something between the intermediator and an business expert body.

The cases reviewed in this thesis and expert interviews as well indicate that the development from an idea to a functioning company takes about four years. This means that in some cases the IVC-projects may become a part the corporations core business as the market environment changes

during those years.

The utilization of the open IVC model requires further research as this thesis provides only a mechanism and some details and challenges. All the other details like how big a budget should the IVC unit need or how many and what kind of people would be suitable to work in the IVC unit.

The open IVC-model will, if utilized, offer a tool for UPM-Kymmene corporation to capitalize the innovativeness of the whole organization. There are in every large company a number of ideas on shelves and drawers that are never developed due to their lack of fit in the company strategy. It will be interesting to see what the future holds for the Finnish forest industry. Will the industry shift from Finland to the developing markets or will Finland become a cradle for new innovative technologies and wood and fiber products. This remains to be seen, but the utilization of the open IVC-model would an indication to the latter.

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Riku Kärri, Internal Auditor, UPM-Kymmene, co-founder and co-owner of Coloured Wood Products Oy. Interview in Lappeenranta, 1.9.2006

Markku Hokkanen, CEO and Business Development Advisor, Technopolis Ventures Kareltek Oy. Interview in Lappeenranta, 13.9.2006

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Jaakko Lehto, System Manager: R&D Innovation Management Operating System, UPM Wood Products Oy. Interview in Lahti, 12.10.2006.

APPENDIX 1 (1/3): Example of business plan contents

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   - History and most significant achievements
   - Business idea – why and how this venture will be a success

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     - Market size
     - Market segments
       - Geographical
       - Product
       - Special focus or niche attacked
     - Market growth prospects
     - New trends and technologies
     - Barriers to entry

5. Product and service
   - Product / service / technology description
     - Innovativeness, relevance, defendability
     - Ongoing R&D efforts and their impact on product
   - Intellectual property
     - Patents
     - Licensing agreements
     - Technology partnerships
     - What limits imitation possibilities
   - Threat of emerging technologies
   - Production
     - Equipments
     - Suppliers
     - Costs

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   - Competition

APPENDIX 1 (2/3): Example of business plan contents

        - Main rivals and their strategies
        - Level of concentration
        - Substitutes – existing and potential
        - Competitive advantage
    - Customers
        - Current satisfaction of demand
        - (existing) and potential customers
        - Required behavioral changes
    - Sales and distribution channels
    - Branding strategy
    - Strategic alliances
    - Targeted growth / market share / geographical focus

7. Establishment of Organization
    - Organization structure
    - Management team
        - Biographies – experience and track record
        - Role in the venture – strength brought
        - Motivation
    - Other
        - Advisors
        - Partners
    - Plan to complete core team
    - Governance structure

8. Summary of UPM-Kymmene relationship
    - What value UPM-Kymmene can bring to venture
        - Resources, knowledge, reputation,…
    - What (indirect) value venture creates for UPM-Kymmene Core business growth, strengthening of value chain,…

9. Financials
    - Forward-looking projections
        - 3-year profit & loss statement (income statement)
        - 3-year balance sheet
        - 3-year cash flow statement
    - Cash flow projections on quarterly basis
    - Clearly stated underlying (key) assumptions and basis for selections made
        - E.g market share, production, distribution, sales & marketing costs by major components, cost inflation,…

APPENDIX 1 (3/3): Example of business plan contents

- Sensitivity analysis
    - Best case, base case, worst case, break-even analysis
- Valuation

10. Sources of Funding and uses of Proceeds
    - Sources
        - Equity investors – future needs for capital injections
        - Debt financing
        - Cash flow from operations
    - Uses of proceeds
        - Production
        - Sales & marketing
        - Recruitment
        - Legal and accounting
        - Capital expenditures (equipment, offices,…)

11. Schedule
    - Milestones within next two years
    - Personnel requirements
    - Capital needs
    - New product launches
    - New market approaches
    - R&D
    - Business concept development
    - Permissions required

12. Exit strategy

13. Conclusions
    - SWOT – analysis
    - Risk analysis with back-up plans
    - How will competitive edge be achieved and how will it be made sustainable?

Source: Ruuska, Karjalainen & Johnsson 1996