

LAPPEENRANTA UNIVERSITY OF TECHNOLOGY

Department of Industrial Management

**Innovation Benchmark Study:
Analysis of Innovation Processes in Finnish Companies**

The topic of this master's thesis was approved in the Industrial Management Department Council meeting on 24.9.2007.

Examiners: Professor Tuomo Kässi
Professor Markku Tuominen

Supervisor: M.Sc. (Econ.) Jokke Mäki

In Helsinki 18.10.2007

Jarno Huurinainen

Suvikuja 4 B 27

02120 Espoo

+358 50 3445232

jarno.huurinainen@lut.fi

ABSTRACT

Author: Jarno Huurinainen

Title: Innovation Benchmark Study: Analysis of Innovation Processes in Finnish Companies

Department: Industrial Management

Year: 2007

Place: Helsinki

Master's Thesis. Lappeenranta University of Technology

95 pages, 31 figures, 11 tables and 3 appendices.

Examiners: Professor Tuomo Kässi, Professor Markku Tuominen

Keywords: innovation management, innovation process, disruptive innovation, growth

Revenue growth is the primary driver of shareholder value and a major challenge for companies around the world. The objective of the study was to investigate the bias towards sustaining innovation. It uses a global benchmark-study to find out if Finnish companies are primarily focused on developing and funding sustaining innovation, thereby leaving growth opportunities and disruptive innovations on the table. In addition, it analyses the maturity of innovation processes using a self-assessment study.

The results of the study led to three conclusions. *Firstly*, this study proved that companies focus on sustaining innovation. Management procedures target demanding, high-end customers with improved performance. Corporations heed primarily to the voice of existing customers, have short time horizons during which new ideas can prove themselves, and set unrealistic revenue growth requirements for new projects while rejecting projects that do not match short-time evaluation criteria. *Secondly*, the study revealed that companies have alternative funding possibilities for innovation initiatives that do not meet the established financial criteria for innovation. More surprisingly, a majority of these alternative paths for innovation are informal “underground” processes that are not controlled. *Thirdly*, the study reported that in general, the innovation processes of Finnish organizations are immature. This means that the benefits of human resources inside and outside organizations are not fully utilized.

TIIVISTELMÄ

Tekijä: Jarno Huurinainen

Työn nimi: Vertaileva innovaatiotutkimus: analyysi suomalaisyritysten innovaatioprosesseista

Osasto: Tuotantotalous

Vuosi: 2007

Paikka: Helsinki

Diplomityö. Lappeenrannan teknillinen yliopisto.

95 sivua, 31 kuvaa, 11 taulukkoa ja 3 liitettä

Tarkastajat: Professori Tuomo Kässi, Professori Markku Tuominen

Hakusanat: innovaatiojohtaminen, innovaatioprosessi, radikaali innovaatio, kasvu

Liikevaihdon orgaaninen kasvu on ensisijainen tekijä ja haaste yritysjohdolle yrityksen omistaja-arvon kasvattamiseksi. Tutkimus tarkastelee suosivatko suomalaisyritykset pääasiallisesti olemassa olevaa liiketoimintaa palvelevia innovaatioita vai tukevatko nykyhetken toimintatavat myös uusia kasvua kiihdyttäviä radikaaleja innovaatioita. Lisäksi työ kartoitti suomalaisyritysten innovaatioprosessien kehitysalueita käyttäen itsearviointitutkimusta.

Tulokset johtivat kolmeen johtopäätökseen. Tutkimus osoitti, että vastaajayritykset ovat keskittyneet innovaatiotoiminnassaan vahvasti ydinliiketoimintaansa, jättäen potentiaaliset kasvumahdollisuudet huomioimatta. Yritykset tavoittelevat maksimaalisia tuottoja keskittymällä tuotteidensa korkeaan suorituskykyyn. Lyhyen aikavälin epärealistiset tuotto-odotukset sekä projekteille suunnatut arviointikriteerit rajoittavat liiketoimintaa mullistavien radikaalien innovaatioiden kehittymistä organisaatiossa. Toiseksi, tutkimus osoitti, että suuri osa yrityksistä käyttää perinteisen projektien arviointi- ja kehitysprosessin lisäksi vaihtoehtoisia ja huonosti kontrolloitavissa olevia kehitysprosesseja, mikäli projektille annetaan kielteinen rahoituspäätös standardin prosessin sisällä. Kolmanneksi, suomalaisyritysten innovaatioprosesseissa paljastui merkittäviä puutteita mitattavien elementtien suhteen.

TABLE OF CONTENTS

1	INTRODUCTION.....	4
1.1	Background and motivation.....	4
1.2	Defining innovation.....	5
1.3	Paradox of innovation.....	9
1.4	Research objectives	10
1.5	Research focus and restrictions.....	12
1.6	Approach and methodology.....	14
2	DISRUPTIVE INNOVATION: THE ENGINE OF GROWTH.....	17
2.1	Dynamics of innovation.....	18
2.2	A model of disruptive innovation.....	21
2.3	An open innovation approach to innovation management	25
2.3.1	Closed innovation paradigm.....	25
2.3.2	Open innovation -paradigm.....	26
2.3.3	Viability of the closed innovation paradigm	27
2.3.4	Balance between internal and external knowledge.....	29
2.4	Chapter summary: today's major challenges in innovation management.....	31
3	IMPORTANT PIECES OF A SUCCESSFUL INNOVATION.....	33
3.1	An integrated innovation strategy	33
3.2	Idea management for organizational innovation.....	36
3.3	Implementing a portfolio management approach to R&D	39
3.3.1	Main goals of portfolio management in the R&D process.....	40
3.3.2	Strategic buckets - resource allocation.....	41
3.3.3	Customized project evaluation and development system	43
3.4	Supporting technical systems for innovation management	48
3.5	Chapter summary: the six pieces of the innovation puzzle	49
3.5.1	Innovation strategy.....	50
3.5.2	Idea management	50
3.5.3	Evaluation gate-process	51
3.5.4	Portfolio management	51
3.5.5	Support systems and tools	51
3.5.6	Recognition and reward programs.....	51
4	INNOVATION BENCHMARK –STUDY.....	52
4.1	Project overview.....	52
4.2	The global benchmark-study.....	53
4.2.1	Innovation – A top priority.....	53
4.2.2	Existing business vs. new growth business.....	54
4.2.3	Investment criteria and logic	57
4.2.4	Sources of innovation.....	61
4.2.5	Alternative paths for funding.....	67
4.3	A self- assessment study of Finnish companies.....	70
4.3.1	Innovation strategy.....	70
4.3.2	Idea management	72
4.3.3	Evaluation process	73
4.3.4	Portfolio management	75

4.3.5	Systems and tools.....	76
4.3.6	Recognition and rewarding	78
5	CONCLUSIONS	80
5.1	Management challenges.....	80
5.2	Results from the benchmarking study	81
5.3	Results of the self-assessment study	83
5.4	Further development.....	85

REFERENCES

APPENDICES

LIST OF FIGURES

Figure 1: Questions that CEO's have to ask themselves	10
Figure 2: The focus of the study.....	13
Figure 3: The structure of this survey.....	16
Figure 4: The significance of disruptive and sustaining innovation.....	20
Figure 5: The disruptive innovation model.....	23
Figure 6: The closed innovation model.	26
Figure 7: The open innovation model.....	27
Figure 8: Four main factors eroding the viability of the closed innovation paradigm.....	28
Figure 9: Sources of technical knowledge	30
Figure 10: The strategic buckets -method for portfolio management	42
Figure 11: Spiral innovation process.	46
Figure 12: The six pieces of the innovation puzzle	50
Figure 13: Innovation – A top priority.....	53
Figure 14: Which markets are companies aiming for.....	54
Figure 15: Focus on sustaining innovation	55
Figure 16: Sustaining innovation is a dominating revenue driver.....	56
Figure 17: What is the investment logic and criteria for innovation	57
Figure 18: Majority of Finnish firms report payback periods less than 2 years....	58
Figure 19: Finnish firms do not expect high profit from innovation.....	59
Figure 20: Insufficient profitability is the greatest barrier to fund innovation	60
Figure 21: What are the different methods for gathering input for innovation....	61
Figure 22: Finnish firms have closer relations to universities and research organizations	62
Figure 23: US and Finland have a tendency to look for innovation externally	63
Figure 24: Team of researchers is the most common source of innovation	64
Figure 25: Customer has more influence in the US and Finland	65
Figure 26: Companies believe that customers are willing to pay for premium products.....	65
Figure 27: Alternative channels for funding exist.....	67
Figure 28: Informal innovation processes exists in Finland	68

Figure 29: Six elements for successful innovation process	70
Figure 30: Six important elements for well structured innovation process	81
Figure 31: A strategic bucket method.....	86

LIST OF TABLES

Table 1: Different definitions and classifications of innovation	6
Table 2: Number of participating companies per industry	15
Table 3: Number of participating companies per revenue.....	15
Table 4: Characteristics of sustaining and disruptive innovation.....	21
Table 5: Self-assessment – Innovation strategy	71
Table 6: Self-assessment – Idea Management	72
Table 7. Self-assessment – Evaluation process.....	74
Table 8: Self-assessment – Portfolio management.....	75
Table 9: Self-assessment – Systems and tools	77
Table 10: Self-assessment – Recognition and rewarding	79
Table 11: Major similarities and differences between different respondent groups	82

ABBREVIATIONS AND DEFINITIONS OF TERMS USED

CEO	Chief Executive Officer
CXO	Any C-level Officer
DD	Dominant Design
IP	Intellectual Property
NPD	New-Product Development
R&D	Research and Development
TD	Technology Development
US	The United States (of America)

1 INTRODUCTION

The study has been made as a Master's Thesis in major Finnish consulting company. At a general level, the objective of the study is to analyze how innovation is used as an engine for growth in Finnish companies. This survey will give instructions for senior management on how companies should develop their innovation process in order to be better prepared to meet today's managerial challenges in the field of innovation management. The research results should add value to the participating companies and inspire and spur a creative discussion to further development in the innovation curriculum. The study is made to serve CXO-level management in large Finnish companies.

1.1 Background and motivation

Today's business world is to a larger and larger extent characterized by increased requirements for flexibility, agility and innovation. Whilst the CEOs of today's successful companies acknowledge the strong link between innovations and driving shareholder value, they know that the biggest challenge lies in crossing the chasm between great ideas and new revenue. Delivering on the promise of innovation is further complicated by shareholders' need for predictable and sustainable growth. Generating sustainable long-term growth is the main challenge facing companies in the dynamic business environment. Despite the value many organizations place on innovation, most companies ignore the most valuable opportunities, and instead focus on short-term returns. Although many companies may harbor hopes of developing "the next big thing" in their respective industries, most product and service development efforts focus on incremental development. Only few in an organization will sacrifice short term profitability for any idea that may possibly bear fruit tomorrow.

Many companies have grown through acquisition whilst cutting costs in the false hope that this is the direct route to profitability on a sustainable basis. Companies

are still channeling significant management effort into achieving incremental cost savings rather than developing new revenue generating opportunities to gain competitive advantage. But it is hardly fair to even call this a way to growth; a better word would be agglomeration (Hamel & Getz, 2004). The most successful companies are those that have grown revenues continually through innovation by seizing on ideas to change customer expectations, the competitive landscape or industry economics as a whole. Simply put, innovation is the fuel of growth and when company runs out of innovation, it runs out of growth (Hamel & Getz, 2004).

1.2 Defining innovation

The first step in tackling the innovation imperative is to understand what innovation is. This study introduces some general definitions and classifications of innovation. Because the field of innovation research has become more complex and more difficult to understand, clear definitions of terms used in the study are necessary to avoid misunderstandings.

Innovation is more than new invention. The distinction between invention and innovation is that invention is the creation of a new idea or concept, and innovation is turning the new concept into commercial success or widespread use (Fagerberg et al, 2004, 4). According to this view, an innovation is not an innovation until someone successfully implements and makes money on the idea. There is naturally a wide range of approaches to conceptualizing innovation in the scholarly literature. However, a consistent theme may be identified: innovation is typically understood as the *introduction* of something *new* and *commercially useful*, for example introducing new methods, techniques, or practices, or new or altered products and services. Table 1 takes a look to different definitions and classifications of innovation.

Table 1: Different definitions and classifications of innovation

Author	Definition	Description
Kanter, 1997	Invention vs. Innovation	Innovation is the process of bringing new ideas into productive use. And, incidentally, the ideas do not necessarily have to originate with you. Innovation is not necessarily invention. If you are the one who gets an idea into the marketplace, the payoff can be tremendous. The secret is building that bridge between the idea and its commercial viability.
Christensen & Raynor, 1997, 2003	Sustaining vs. Disrupting	<i>Sustaining innovations</i> make a product or service work better in ways that mainstream customers already value. These innovations are most often developed and introduced by incumbents. <i>Disruptive innovation</i> creates entirely new markets by introducing new kind of products and services. Incumbents have a hard time introducing or coping with disruptive innovations.
Hamel, 2000, 13	Radical innovation	<i>Radical innovation</i> upends industry convention, significantly changes customer expectations in a new-positive way, dramatically altering the pricing or cost structure of the industry or changing the basis for competitive advantage within the industry.
Tidd et al, 2001, 6-8	Product vs. Process Incremental vs. Radical	Innovation means change and this change can take two forms: <ul style="list-style-type: none"> - Products and services, which organizations offer - Change in the ways these products and services are created, sold and delivered (processes). <p>The second dimension to change is the degree of novelty involved. There are different degrees of novelty, running from minor incremental improvements right through radical changes.</p>
Davila et al (2006, xvii)	Management process	Innovation, like many business functions, is a <i>management process</i> that requires specific tools, rules, and discipline
Linton, 2007	Continuous vs. Discontinuous	Continuous innovations require no change in user behavior. If the innovation requires more changes from the user, the innovation can be said to be more discontinuous. Continuous innovations tend to be adapted faster and more frequently, when discontinuous, radical, disruptive are often mistakenly linked because of the greater complexity of successful adoption.

Innovation terminology is confusing. It is quite usual that these different types of classifications and definitions are misunderstood. Recent definitions of innovation indicate that innovation must result in substantial new value for customers or the organization. Creating value implies that innovation is more than merely invention, but also includes the structured exploitation of invention for commercial gain. If a good invention never gets funded, tested and brought to market in a structured fashion, then its value is negligible. Furthermore, innovation can be radical (e.g. changing an entire business model) or substantial, but incremental changes to any business dimension are deemed to be productivity improvements rather than innovation.

This survey uses Clayton Christensen's classification of innovation. Christensen et al (2002) introduces two types of innovation and explains the differences between these innovation types. Innovations can be categorized into two groups. Evolutionary innovations (sustaining innovation) improve the performance of established products, services or business models, and are critical to sustaining and enhancing shares of mainstream markets. Revolutionary breakthroughs - or what are now more often termed disruptive innovations – however, are successfully exploited products, services or business models that significantly transform the demands and needs of a mainstream market, by providing something to the customer that was not available to them before and which they did not anticipate, and disrupts its former key players (Linton, 2007). In other words, companies have two options when they seek to build business opportunities. They can try to take over an existing market from an entrenched competitor developing sustaining innovations or they can try to beat competitors creating disruptive innovations that either create new markets or take root among an incumbent's worst customers (Christensen & Raynor, 2002).

The classification of innovation: (Christensen et al, 2002):

- Evolutionary: Sustaining innovation (developing existing business i.e. products, services, customers, markets and processes)
- Revolutionary: Disruptive innovation (incubating, growth and maximizing new business)

Christensen & Raynor (2003, 34-35) argue that *sustaining innovation* targets demanding, high-end customers with performance that is better than what was available before, speeding up the existing business. Most of these sustaining innovations are incremental year-by-year improvements (*incremental, continuous innovations*). Innovations that help incumbent companies earn higher margins by selling better products to best customers in established markets are sustaining innovation. They are used to serve demanding customers in the core business area. Sustaining innovations comprise both simple, incremental engineering improvements as well as breakthrough leaps up the trajectory of performance improvement (Christensen et al, 2002).

In contrast, *disruptive innovations* do not attempt to bring better products to established customers in an existing business area (Christensen et al, 2002). These innovations rather disrupt and redefine that technological trajectory by introducing products and services that are not as good as currently available products. However, disruptive innovations offer other benefits – typically they are simpler, more convenient and less expensive products that appeal to new or less-demanding customers. (Christensen & Raynor, 2003, 34-35). They are disruptive to consumers because they introduce products, services, radically new business models and value propositions that disturb prevailing consumer habits and behaviors in a major way (Markides, 2006). A disruptive innovation is often a revolutionary innovation that eventually overturns the existing dominant technology or status quo product in market while sustaining innovation tends to reinforce it. (Linton, 2007; Anderson & Tushman, 1990).

1.3 Paradox of innovation

A key problem experienced in many organizations is their partial approach to innovation (Leifer et al, 2001). Most organizations find that they have several good ideas but lack the strategy, frameworks, processes and funding required to convert the best ideas into new revenue (Anthony et al, 2006). Companies find it challenging to manage their innovation strategy and process. In addition, most companies' existing innovation processes are geared towards sustaining innovation, and almost never towards disruptive innovation. In other words, companies tend to do what the business schools preach as good practice – stay close to their existing customers and develop close interactive relationships with them to create new innovations (Tidd et al, 2001, 14). This works for sustaining today's business, but under certain circumstances, this may not be the best approach. Without established mechanisms to generate, identify, fund, and deliver disruptive innovations, organizations will inevitably miss expansion opportunities, be vulnerable to disruptions from competitive entrants, and over the long run, risk over reliance on ever smaller segments of highly profitable customers (Christensen & Raynor, 2003, 31-34). The innovator's dilemma is a hot discussion topic when globalization and sharpened competition are putting many companies under strain to increase their ability to generate both types of innovation. What are the challenges for successful innovations and why is persistent long-term growth so difficult to achieve?

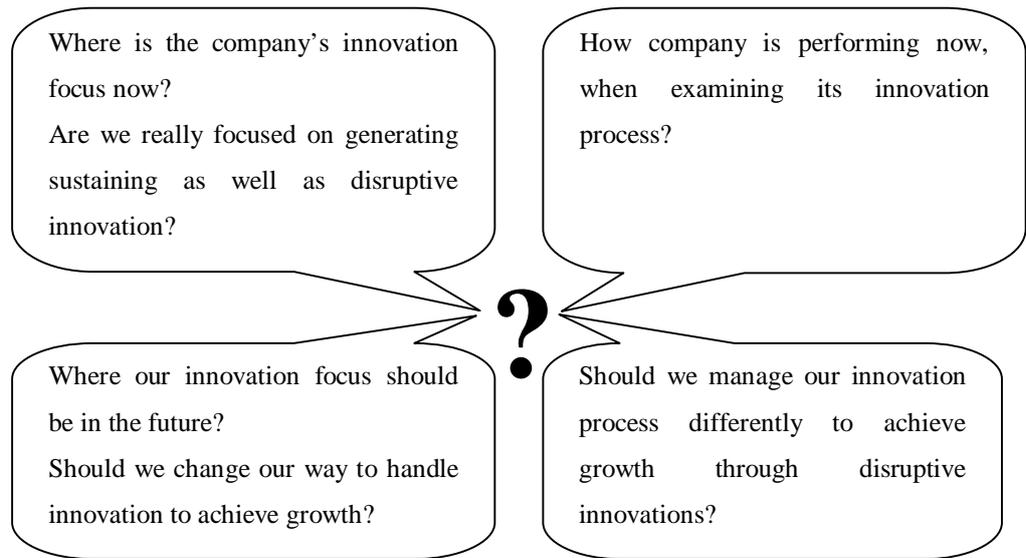


Figure 1: Questions that CEO's have to ask themselves

Figure 1 demonstrates some questions that senior managers have to solve to achieve sustainable growth through innovation. This survey is generated to help Finnish firms locate their current place on the map and to give useful instructions on developing innovation strategies and processes.

1.4 Research objectives

The theoretical part of this study examines the major challenges of innovation management. It also discusses the significance of a structured and customized innovation process for sustaining and disruptive innovation. The study answers five research questions:

"1. What kind of major challenges exist in innovation management in today's business environment and how should companies develop their innovation processes in order to be better prepared to meet these managerial challenges?"

The first part of the study examines the major challenges of innovation management that companies face in the dynamic business environment. The

survey takes a look at today's external-internal integration in R&D and managerial challenges between sustaining and disruptive innovation.

It also examines how companies should answer those managerial challenges that lie in the field of innovation management. The study investigates, why it is important that a company is able to manage different innovation types and why some common and accepted management procedures do not suit disruptive innovation. Finally, it will give useful instructions for senior management on further development.

"2. Which elements are necessary for a well-structured innovation process?"

What ever the type of innovation being dealt with, a structured innovation process is required. In order to be a successful innovative organization, there are several areas in which a company should be well-structured. One main task of the theoretical part of this study is to find these pieces of the innovation process. The study describes the key elements of innovation, which are later used to benchmark innovation processes in Finnish organizations.

"3. Are Finnish companies focused on generating, identifying, funding, and evaluating both innovation types and are there similarities or differences between Finnish and Non-Finnish companies?"

Question 3 examines the innovation imperative in Finland. It investigates where the strategic-level innovation focus in Finnish companies is and what differences and similarities can be found when comparing results to Non-Finnish companies. The final objective is to form a benchmark-analysis using a questionnaire and simple statistical analysis. The questionnaire will be assigned to CXO-management level.

"4. How does the innovation process work in Finnish companies and is it structured to deal with disruptive innovation?"

Question 4 analyzes how participating companies conduct and perform in relation to the defined key areas of the innovation process. The objective is to gather information from Finnish senior management using a self-assessment questionnaire. Crossing the chasm between great ideas and new business opportunities can only be achieved, if, firstly, the innovation imperative that is unique to every company is thoroughly understood, and secondly, a structured innovation process is implemented.

1.5 Research focus and restrictions

This survey sees disruptive innovation as an engine for growth. Although the study shows that the ability to develop sustaining innovation is vital to the capability to create disruptive opportunities, this study focuses on the innovation process from the point of view of disruptive innovation. It is not targeted to give answers on how companies should develop their R&D-practices and managerial procedures to speed up their existing core business. Of course, most instructions given for developing innovation efforts increase an organization's total innovation efficiency.

This survey does not criticize the significance of sustaining innovation to a company's success and growth. It highlights the balance between both innovation types. Sustaining innovation is essential to core business, but disruptive innovation is a vital way of building new business opportunities. Because academic research has focused more on sustaining innovation than disruptive innovation, this study is created to give some useful instructions on "innovating the innovation process" for disruptive innovation. According to many scholars (i.e. Cooper, 2006; Christensen & Raynor, 2002) companies should customize and separate some parts of the innovation process (i.e. project evaluation) for disruptive innovation. Cooper (2006) says that if uncertain high-risk (technology) projects are compared against sustaining innovations inside the same pipeline, disruptive innovations almost always lose because of greater uncertainty. He

argues that every company should see innovation as *its ability to improve and reinvent existing market offers, core processes and business model as well as its ability to create new ones*.

The results of this study are meant to energize the participating companies to create discussion around their innovation process. The study will not give a complete up-to-date model of the innovation process that could be implemented in several companies. It collects those key elements of the innovation process that are important from the point of view of disruptive innovation. The theoretical framework represents recent academic research results from the above-mentioned key areas of innovation management. The final conclusions will give useful instructions and viewpoints for senior management, if they are willing to renovate their current R&D procedures. It also gives benchmark-results to respondents to help them locate their current place on the innovation map. The focus of this study is described on Figure 2.

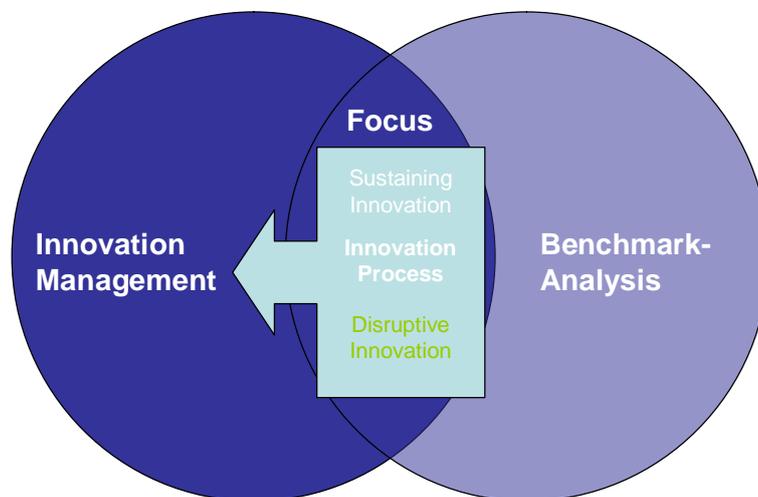


Figure 2: The focus of the study

1.6 Approach and methodology

This study is a part of broader Growth & Innovation project. The Innovation Benchmark Study has been made using a questionnaire, which is divided into three sections. The questionnaire and the theoretical framework were formed using previous academic research, company's research databases (Forrester research, Kennedy Information, Gartner and AMR) and collected in-house knowledge. Many recent sources were used, because the research area is very dynamic and old materials are not necessarily relevant anymore.

The structure of the questionnaire:

1. Company profile –section
 - Used to profile companies to different peer groups
2. The global benchmark study –section (US, Sweden, Finland)
 - Multiple-choice questions about the companies' innovation culture
 - Based on a global study in a major consulting company
3. Self-assessment –section (only in Finnish companies)
 - Multiple-choice questions about the companies' innovation processes
 - Divided to different parts using the defined key elements of innovation

The study selected companies from several different industries to investigate innovation climate in Finnish companies. These organizations operate both nationally and globally, and most of them play a significant role in the Finnish and global business environment. Some of the largest companies have limited their answers to just one specific business area or participated only with a strategic business unit. Most of the respondents were CXO-level managers in the Strategy & Development and Research & Development areas.

The Finnish study, which forms the basis for this study, was conducted on 17 major Finnish companies in 2007. The objective of the report is to analyze and

compare results between Finnish, Swedish and US companies. The study has collected extensive knowledge from internal databases and recent academic results to form a questionnaire for finding out how Finnish companies manage innovations. The study has also created useful instructions, which are based on literature, on how companies should manage innovation initiatives in the 21st century dynamic environment. Table 2 and Table 3 describe the respondents used in this study.

Table 2: Number of participating companies per industry

Industry	Number of participating companies		
	Finnish	Swedish	US
Agriculture and agribusiness	1	0	0
Automotive	0	2	7
Chemicals	1	1	5
Construction and real estate	0	3	3
Consumer goods	3	5	3
Energy and natural resources	0	6	12
Financial services	0	0	26
Healthcare, pharmaceuticals and biotechnology	0	2	8
IT and Technology	5	0	23
Manufacturing	4	9	17
Telecoms	3	1	12
Other	0	0	43
Total	17	29	159

The studied companies are categorized into five groups based on annual revenue in 2006.

Table 3: Number of participating companies per revenue

Company revenue 2006	Number of participating companies		
	Finnish	Swedish	US
\$500 million or less	9	3	54
\$500 million to \$1 billion	1	7	15
\$1 billion to \$5 billion	4	13	40
\$5 billion to \$10 billion	2	5	16
\$10 billion or more	1	1	34
Total	17	29	159

This survey is divided to five steps, which are illustrated on Figure 3. The study forms a theoretical framework for an empirical study, which examines the

innovation imperative and innovation processes in Finnish companies. The structure of this survey is illustrated below:

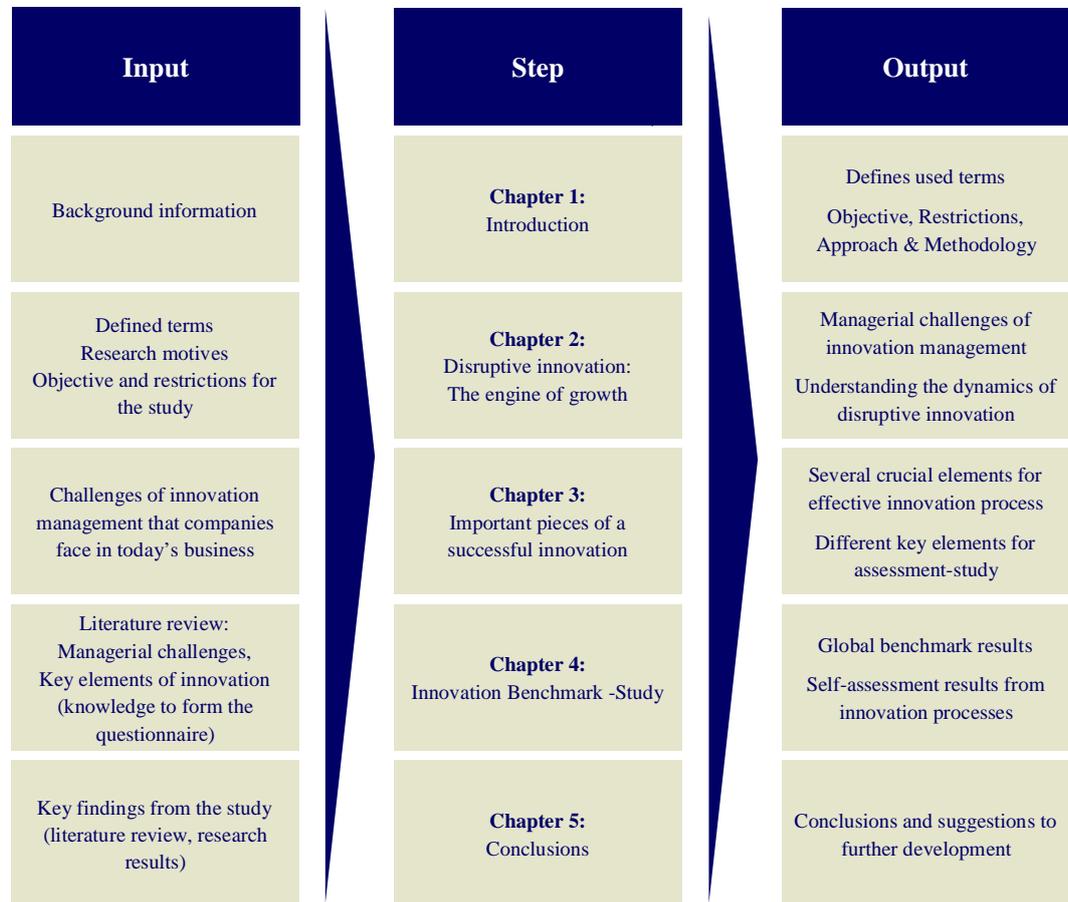


Figure 3: The structure of this survey

2 DISRUPTIVE INNOVATION: THE ENGINE OF GROWTH

Growth – real growth- depends on innovation (Hamel & Getz, 2004). Hamel argues that using innovation as an engine of growth demands a fundamentally new way of thinking about innovation productivity. Most managers understand that significant, new sustainable growth comes from creating new markets and new ways of competing (Christensen et al, 2002). But few of them make such investments. According to a research, assigned to 500 senior and middle-level managers in large US companies, the biggest barriers to innovation are “short-term focus” and “lack of time and resources”, when analyzing why companies are focused on existing business and incremental improvement to increase the performance of their current products (Hamel & Getz, 2004). From this point of view, innovation is highly dependent from investments towards new projects.

Innovation productivity is dependent from both innovation types. Organizations face the paradox of innovation management, that is, functioning efficiently today while innovating effectively for tomorrow and the day after tomorrow. According to Paap & Katz (2004), corporations, no matter how they are structured, must manage both sets of concern simultaneously. To be successful in this, companies have to understand and learn to manage the dynamics of innovation. This chapter captures general major challenges in innovation management. Although disruptive innovation is far from a new phenomenon, the awareness of the issue is starting to grow rapidly as more and more businesses recognize the threats and opportunities that disruptive strategies offer, especially as the pace of change in technologies and markets continues to grow (Anon, 2006). For successful disruptors, the internal-external integration of R&D plays a significant role in today’s business environment. After Henry Chesbrough (2003a) wrote his book about the open innovation paradigm, the discussion around classical R&D and open innovation - model has increased, and forced companies to renovate their processes to a more open direction. Although many scholars have studied same issues years before Chesbrough (2003a, 2006), the open innovation phenomenon has now become relevant for almost every company in dynamic industries. This chapter also

introduces Chesbrough's model and some erosion factors, which force companies to change their innovation procedures.

2.1 Dynamics of innovation

The need for organizations to engage periodically in the process of disruptive innovation for long-term competitiveness is now increasingly accepted, especially when the time is taken to look at recent industrial history and view the number of once leading businesses that have now disappeared because they failed to anticipate and embrace disruptive innovation (Anon, 2006). Nowadays companies understand quite well how to manage sustaining and incremental innovations that consume most R&D budgets and keep mid-to-large size companies moving forward. But the problem is that they do not really understand how to manage radical and disruptive innovations (Christensen, 2002). Whether new growth effort involves redirecting the entire firm or creating an offshoot from the core business of the company, it is not smart to replicate existing structures, however effective they may be, when reaching for disruptive innovations (Slywotzky & Wise, 2003). Inability to manage disruptive innovations creates large failures, cyclical company performance, stagnation and even erosion (Anthony & Christensen, 2005). Disruptors need different kinds of procedures and processes for this specific innovation type.

If we examine technological innovations in several industries and historical studies around them, we can say that that when patents are not significant factors, a technological discontinuity is generally followed by a single technological standard. Across diverse product classes, sales always peak after a new dominant design (DD) technology emerges. New dominant design means new technological era, created by major innovation (Tegarden et al, 1999). It is justified to say that disruptive new-market innovations create new dominant designs and cause instability in markets better than sustaining innovations (Anderson & Tushman, 1990). Focusing on a sustaining innovation strategy is not a viable way of building new growth businesses. Because if you create and attempt to sell better

products or services into established markets in order to capture an established competitors' best customers, the competitors will always be motivated to strike back rather than to flee and surrender (Christensen & Raynor, 2003, 40; Paap & Katz, 2004). In other words, companies which want to create new growth businesses should therefore seek new disruptive opportunities because industry leaders will not be motivated to pursue those (Christensen et al, 2002). Incumbent companies are focused on their existing businesses and are set up for sustaining innovations. They are not able to pick up or respond well to weak signal about disruptive change (Tidd et al, 2001, 14). Whereas the current leaders of the industry almost always win in battles of sustaining innovation, successful disruptions have been most often launched by entrant companies (Christensen & Raynor, 2003, 35).

Nevertheless, the role of sustaining innovation in generating growth is important. According to Christensen & Raynor (2003, 39-40) the importance of developing sustaining innovations is that it is critical to the successful exploitation of the disruptive opportunity. Often, the dilemma is that sustaining innovations are so important and more attractive in relation to disruptive innovations, because of better predictability and lower risks. The very best sustaining companies systematically ignore disruptive threats and opportunities until their game is finally over. So, there is a critical paradox at the heart of successful innovation: *"The best disruptors must also be best sustainers"* (Anthony & Christensen, 2005). Since achieving sustainable growth is one of the greatest challenges facing corporations today, the obvious question is how to reach expected growth levels. Growth expectations may differ between markets, industries and companies but the requirement for delivering growth is universal (Hamel & Getz, 2004). Based on several statements of different scholars, disruptive innovation is an engine for building new growth businesses, and sustaining innovations are needed to speed up this disruptive change (Christensen & Raynor, 2003; Tidd et al, 2001; Hamel & Getz, 2004). In order to reach growth levels, companies should focus on both sustaining and disruptive innovation. This minimizes the risk of new entrants stealing growth opportunities. In relation to growth and time horizons, many

companies are focused on the business of today and the business of tomorrow but not on the business of the day after tomorrow (Anthony & Christensen, 2005; Hamel & Getz, 2004; Christensen & Raynor, 2003) (Figure 4). Executives agree that innovation is the single most important factor contributing to growth. For those companies looking to differentiate themselves and achieve Super-Growth, managing incremental innovation to sustain the core business is not enough: they need to look for breakthrough and even disruptive opportunities to generate revenues and profits from currently non-existent sources.

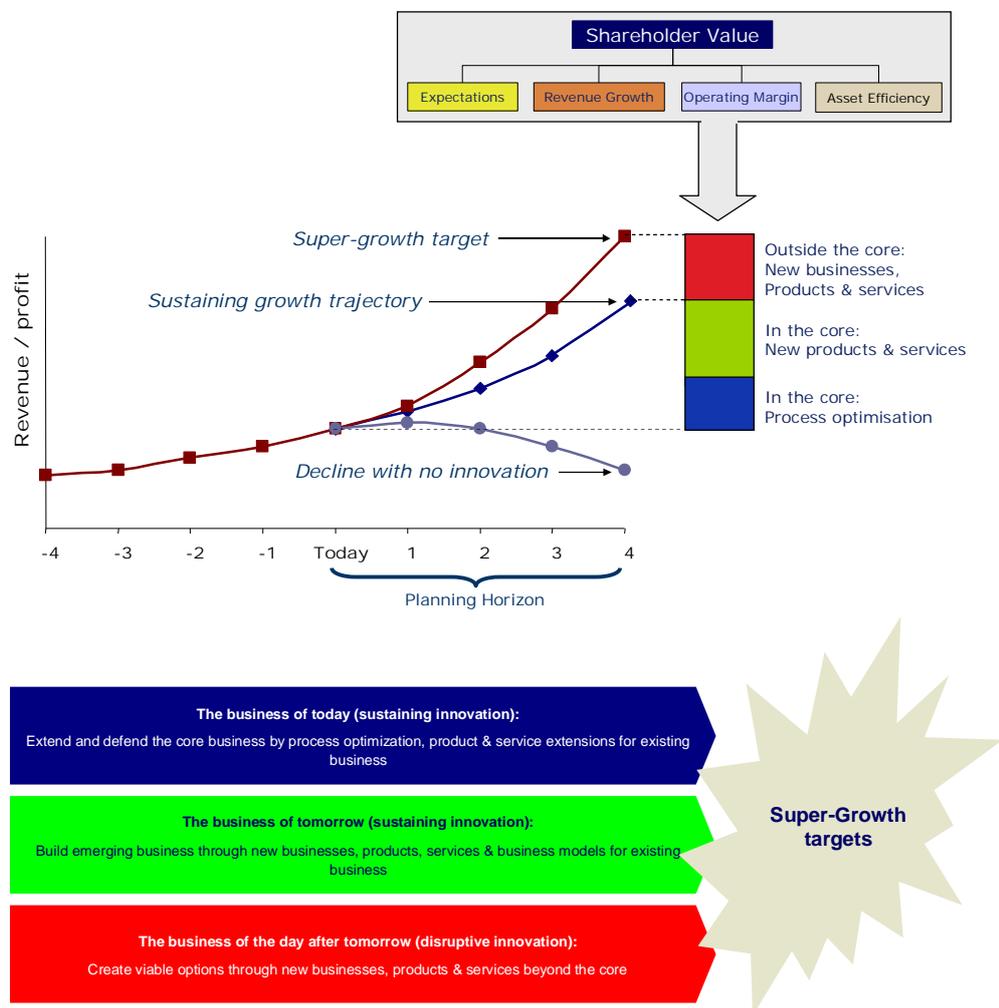


Figure 4: The significance of disruptive and sustaining innovation (based on Christensen & Raynor (2003) framework)

2.2 A model of disruptive innovation

Disruptive innovations “change the game”. Damanpour (1996) understands that disruptive innovations are those that produce fundamental changes in the activities of an organization and represent a large departure from existing practices. Assink (2006) sees it as *a successfully exploited radical new product, process or concept that significantly transforms the demand and needs of an existing market or industry, disrupts its former key players and creates completely new business practices or markets with significant societal impact.*

Table 4: Characteristics of sustaining and disruptive innovation (collected from Christensen & Raynor, 2003, 32-48)

Sustaining Innovation	Disruptive Innovation
Improving existing products Sold for more money Targeted at attractive customers Short time horizons	Low-end disruption Low-cost business models that target incumbents' least attractive customers at the low-end of the market Not new product, just lower priced Recognized as a threat to incumbents
	New-market disruption More affordable, simpler and more convenient products that allow a new population of costumers to buy and use the product Not perceived as a threat, initially doesn't pull away existing customers Over time it pulls away incumbents 'least desirable customers

Christensen & Raynor's (2003, 43-48) framework represents two types of disruptive innovation. Disruptive innovations can be divided into lower-end and new-market disruptive innovations (Table 4). *Low-end disruption* is aimed at offering products that are simpler, more convenient and less expensive to over-served customers found at the low end of the existing market. The other type of disruption is *new-market disruption* which appeals to entirely new and formerly non-consuming groups. New market disruptive products and services are so much more affordable to own and simpler to use that they enable a completely new population of people to own and use the product. Companies should go on the

offensive, seeking customers who are off the radar of their established businesses (Gilbert, 2003).

Figure 5 introduces Christensen & Raynor's (2003, 44-45) framework, which can be visualized by drawing three dimensions. The performance of the product or service is on the vertical axis and time is plotted on the horizontal dimension. The third axis represents new customers and new contexts for consumption and competition which create new value networks. *These constitute either new customers who previously lacked the money or skills to buy and use the product, or different situations in which a product can be used – enabled by improvements in simplicity, portability, and product cost* (Christensen & Raynor, 2003, 44-45). Considering every new value network, created by disruptive innovation, a vertical performance-axis can be drawn representing a product's performance as it is defined in that context. Axis is a different measure from what is valued in the original value network. In a nutshell, firms innovate faster than our lives can change to adopt those innovations, creating opportunities for disruptive innovations. Although sustaining innovations move firms along the traditional performance trajectory, disruptive innovations establish an entirely new performance trajectory.

A successful new product for established markets impacts original value network in one of two ways, either through low-end or high-end encroachment. Low-end disruptions attack the least-profitable and most over served customers at the low end of the original value network. (Schmidt, 2004; Christensen & Raynor, 2003, 44-45). The outcomes under low-end encroachment are similar to those described for disruptive innovations, while the outcomes under high-end encroachment have parallels with what is called for sustaining innovations (Schmidt, 2004).

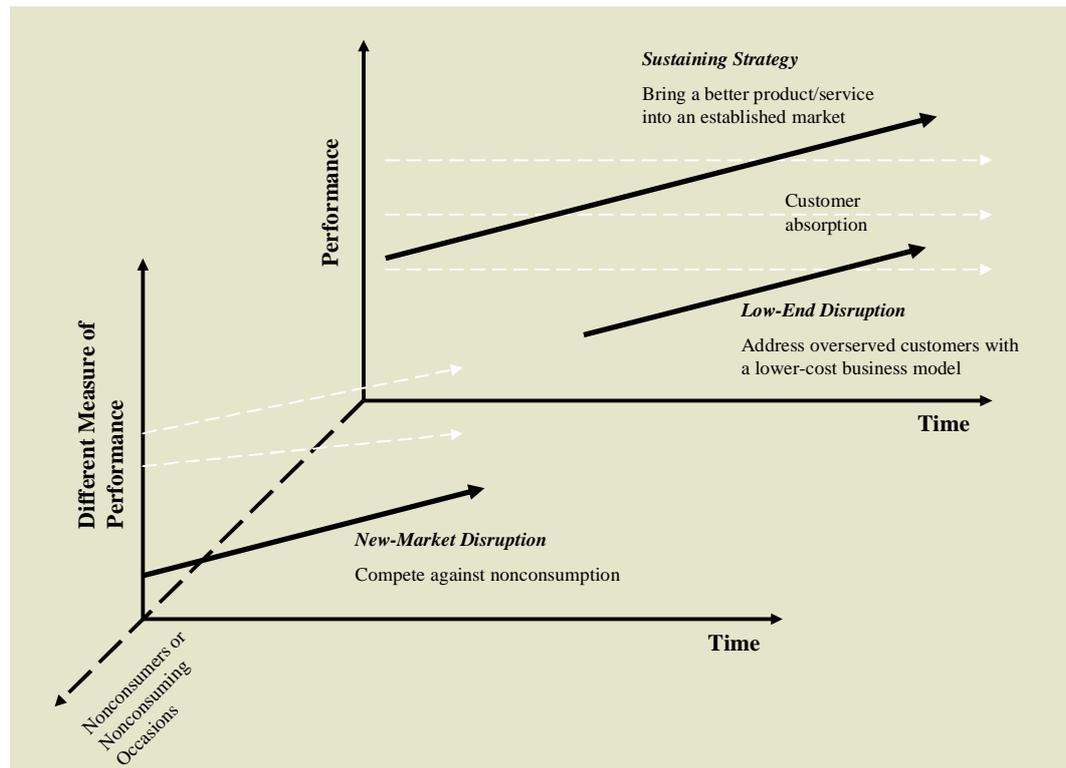


Figure 5: The disruptive innovation model (Christensen & Raynor, 2003, 44)

This model describes the competitive situation between incumbents and new entrants in relation to sustaining and disruptive innovation accurately. It is difficult for a new entrant to overcome an incumbent and win their high-end customers. Therefore incumbents raise the barrier to enter the market by focusing on sustaining innovation. Because of this up-market strive; new entrants are in course of time given the opportunity to target the low-end market which has been “forgotten” by the incumbents. Due to the fail of the low-end market potential incumbents are unable to respond effectively and thus lose this customer segment to new entrants. Once a new entrant is established the sustaining innovation cycle upwards begins, opening up for yet other new entrants. (Tidd et al, 2001, 14-15; Christensen & Raynor, 2003, 34-35)

Most organizations make products that are good, too expensive, and too inconvenient for many customers (Christensen et al, 2003). This happens for a good reason to many firms. Managers are trained to seek higher profits by bringing better product to the most demanding customers. But in the pursuit of

profits, companies overshoot less-demanding customers who are perfectly willing to take the basics at reasonable prices (Anthony et al, 2006). They also ignore nonconsumers who may need to get a job done but lack the skills, wealth, or ability to adopt existing solutions (Christensen, 2002). Problem is that managers are not willing to take the risks that disruptive innovations include.

How should companies respond to the possible threats of disruption? Before deciding how to play the innovation game, companies have to decide where to play. There are some essential questions that help managers to pick their playing field (Anthony et al, 2006):

- What jobs cannot our existing customers get done?
- Who are the industry's worst customers?
- Where are the barriers that constrain consumption?

By answering the questions above, it is possible to create an individual game plan. Companies seeking to create new growth through disruptive innovation can develop their unique innovation strategies using three basic plays, each of which is suited to certain circumstances (Anthony et al, 2006):

- The Back-Scratcher: Scratch an unscratched itch
- The Extreme Makeover: Make an ugly business attractive
- The Bottleneck Buster: Democratize a limited market

The Back-Scratcher –strategy makes it easier and simpler for people to get an important job done by using disruptive products or services. It works when customers are frustrated by their inability to get a job done and competitors are either fragmented or have a disability that prevents them from responding. *The Extreme Makeover* –strategy tries to find a way to prosper at the low-end of established markets by giving people good enough solutions at low prices. It is an essential strategy when target customers do not need and do not value all the performance that can be packed into products and when existing competitors do not focus on low-end customers. *The Bottleneck Buster* –strategy expands a market by removing a consumption barrier. This strategy works when some

customers are locked out of a market because they lack skills, access or wealth. Competitors ignore initial developments because they take place in a seemingly unpromising market (Anthony et al, 2006)

2.3 An open innovation approach to innovation management

Today's business it is essential to focus on the challenge to manage disruptive innovation. Additionally, the world of innovation has become far broader than it had been, and internal-external integration in R&D has become also very important managerial challenge (Roberts, 2007). Innovation must be managed across organizations rather than just inside of them. 20th century innovation practices associated with either sustaining or disruptive innovation in vertically integrated or "closed innovation" environment are inadequate for the fast pace of 21st century global competition (Wolf, 2004). The objective of this part is to emphasize the 360-view on R&D process and discuss the sources of innovation.

2.3.1 Closed innovation paradigm

The closed innovation model (Figure 6) is a traditional, fundamentally inwardly focused innovation model. It assumes that ideas (invented inside) flow into the firm's research on the left and flow out to the market on the right. Projects are filtered during research and development processes, and survived ideas are transferred into development and then taken to the market (Chesbrough, 2003a, xxi). Firms that use the closed innovation model do not rely on external sources and channels of innovation. Everything is developed inside the corporate boundaries and innovations are protected by intellectual property (IP) rights.

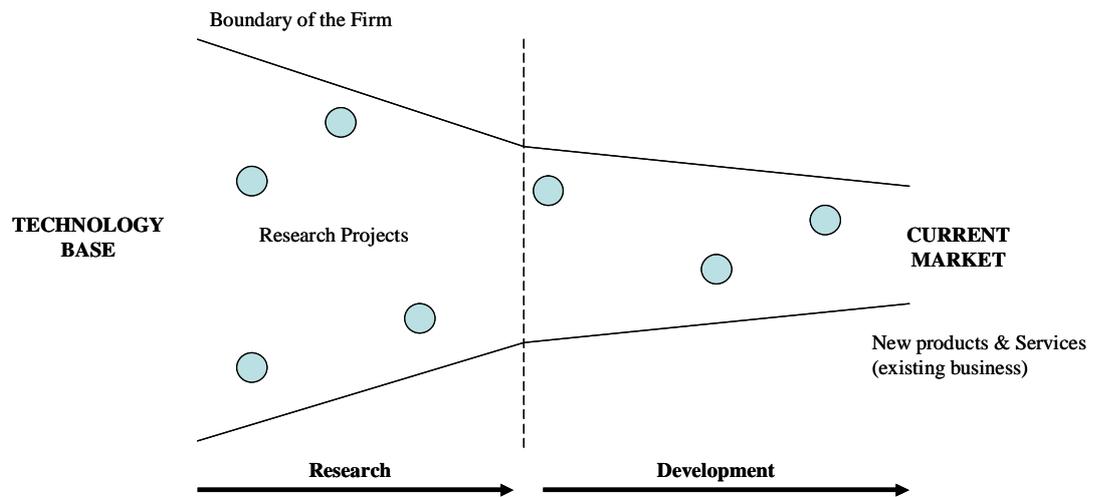


Figure 6: The closed innovation model. (Chesbrough, 2003a, xxii)

Chesbrough (2003a, 21) calls the “traditional” innovation model as a closed innovation model, because the whole innovation process from the basic research to the product implementation is classified information and it is protected from the business world outside a firm’s boundaries. The closed innovation approach worked well the past decades, but its viability has been threatened more and more. Several factors discussed in chapter 2.3.3 have forced industrial companies to change their innovation model. Besides these imperative forces, the one important reason to develop innovation model from closed to open one, is that old restricted “pipeline –model” makes innovations more incremental and do not offer viable options to create new business opportunities (Allio, 2005).

2.3.2 Open innovation -paradigm

Open innovation –model (Figure 7) encourages and explores systematically a wide range of internal and external sources for innovation opportunities, consciously integrating this exploration with the company’s capabilities and resources, and exploiting broadly these opportunities through multiple channels (Chesbrough, 2003b). Open innovation brings in external ideas, hands out internal ones and uses as well external business models. It opens new possibilities to the new markets.

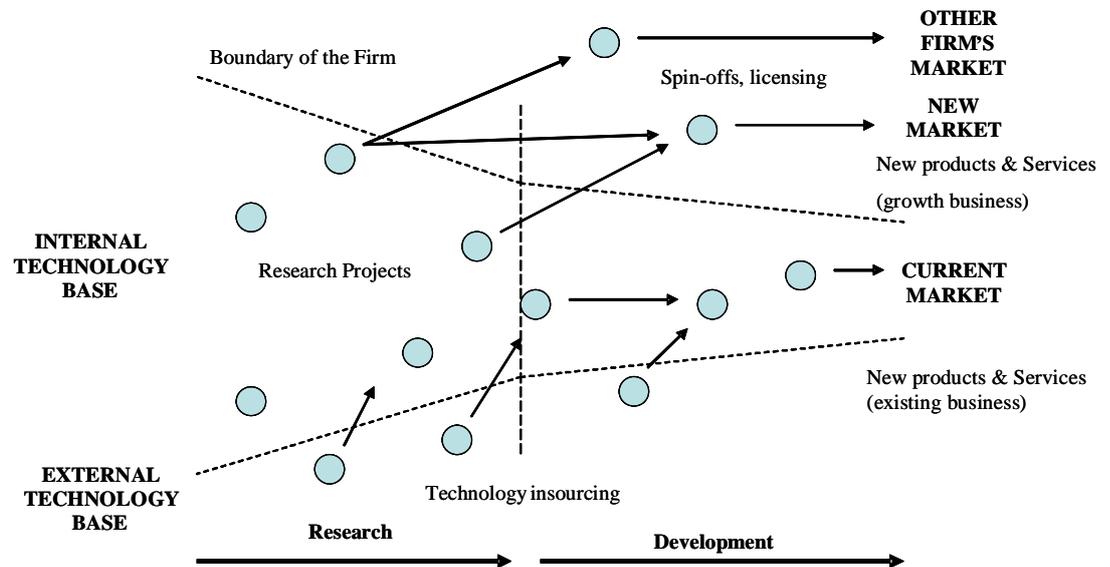


Figure 7: The open innovation model (Chesbrough, 2003a, xxv)

Figure 7 shows that ideas can still come from the company's research process but they can also come from outside the firm's boundaries (Chesbrough, 2006a, 2). In addition, projects can seep out of the firm, either in the research stage or later in the development stage. (Chesbrough, 2003a, xxiv). Once a new innovation has taken place a company can use several business models to bring it to the market. If a technology is not suitable for the current business model, it can be licensed or donated to other companies or a new spin-off can be created. (Chesbrough, 2003a, 52, 187-188).

2.3.3 Viability of the closed innovation paradigm

What differentiates the closed innovation paradigm from the open one is basically that companies implementing the latter interact with external entities in terms of the efficiency and effectiveness of their innovation process (Chesbrough, 2006a, 2-3). But because the environment is becoming more complex, the need to use external sources of innovation is increasing (Cohen & Levinthal, 1990). The open innovation paradigm emphasizes the balance between external and internal knowledge (West & Gallagher, 2006). The basic assumption of the model is that

the knowledge landscape has changed. Chesbrough (2003a, xii-xxiv, 34-41) mentions four erosion factors that compel companies to change their innovation strategy into a more flexible direction. Skilled workers' increasing availability and mobility as well as external suppliers increasing innovation capability have caused a shift in innovation paradigms. In addition, the external options available for unused ideas and the venture capital market have created new opportunities for companies (Cusumano, 2004). Several closely tied factors that erode the viability of the closed innovation paradigm are described in Figure 8.

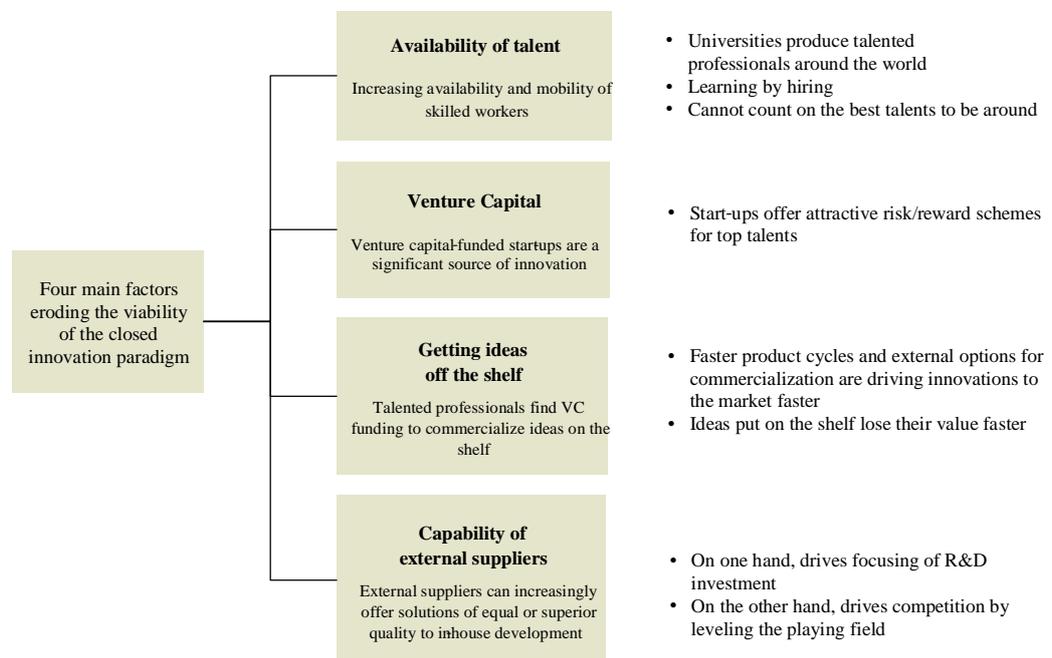


Figure 8: Four main factors eroding the viability of the closed innovation paradigm. (Chesbrough, 2003a, xii-xxiv, 34-41)

Open innovation is a phenomenon which has become worldwide. Shorter innovation cycles, industrial research and escalating costs of development, as well as the dearth of resources are motives that change companies' innovation strategy towards a more open direction (Gassman & Enkel, 2004). Only firms which wish to commercialize their own ideas as well as others' innovations, and find ways to bring their results of in-house innovation to the market by deploying outside processes, can start a new era of innovation management in their current businesses. (West & Gallagher, 2006).

2.3.4 Balance between internal and external knowledge

Open innovation is a new term, created by Chesbrough (2003a). Still, some scholars have written and highlighted same issues in their academic and empirical research. For example, Cohen & Levinthal (1990) argued that companies have to learn from the environment around them. For doing that, R&D resources should be allocated to develop organizations' absorptive capacity. Von Hippel (1994) suggested that companies should use external sources, customers, suppliers, universities and other companies, in their R&D efforts. March (1991) discussed the balance between exploration and exploitation in R&D.

The R&D process needs input from a wide range of sources to ensure the innovativeness of the firm. Critical knowledge can come from very different sources and key players. Cohen and Levinthal (1990) argue that the ability of a company to recognize the value of new, external knowledge, assimilate it, and apply it to commercial ends is critical to its innovative capabilities. They label this capability as a firm's absorptive capacity, and suggest that it is largely a function of the firm's level of prior related knowledge and diversity of background. According to Assink's (2006) research, disruptive innovation development requires a continuously developing absorptive capacity to improve the overall innovation capability.

March argues (1991) that it is important to achieve a balance between exploration and exploitation. Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, and execution. Companies that lean to exploration instead of exploitation are likely to suffer the costs of experimentation without gaining many of its benefits. March (1991) also stresses that firms which have adaptive processes, by refining exploitation more rapidly than exploration, are likely to become effective in the short run but self-destructive in the long term. According to these arguments, maintaining an appropriate balance between exploration and exploitation as well as developing in-house R&D-processes and

the company's absorptive capacity are critical functions for survival in a changing, uncertain environment.

The open innovation paradigm emphasizes the significance of balance between external and internal knowledge in R&D. Outside sources of knowledge are often critical for the innovation processes. The sources may be external (competitors, universities, etc.) or internal units outside the formal innovative unit (marketing, manufacturing, etc.). Cohen & Levinthal (1990) stress that companies, which conduct their own R&D are typically better in using the available external information. Figure 9 illustrates the linkages between absorptive capacity and the major sources of technological knowledge: own R&D, spillovers from competitors, and outside industry.

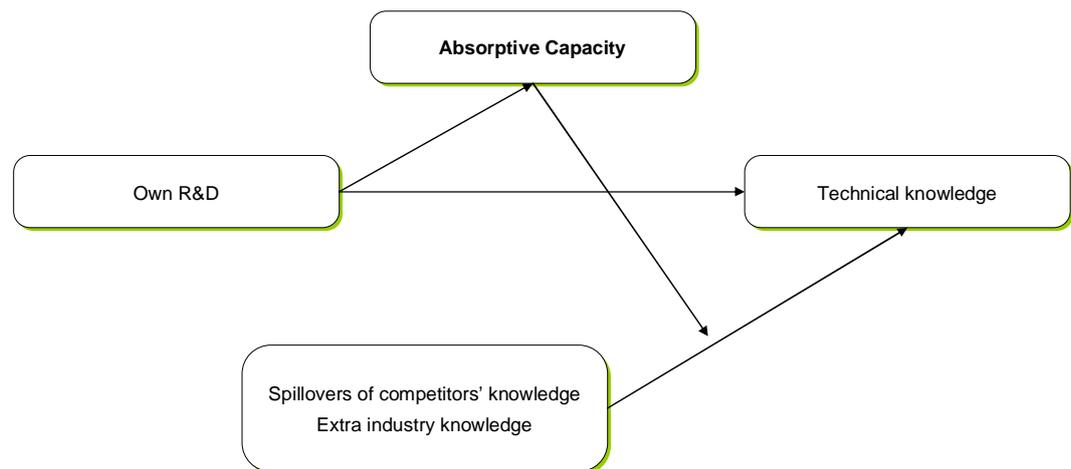


Figure 9: Sources of technical knowledge (Cohen & Levinthal, 1990)

In the model (Figure 9), the absorptive capacity determines the extent to which the extramural knowledge is utilized, and the absorptive capability itself depends on the company's own R&D capability (Cohen & Levinthal, 1990). Internal R&D activities are needed to connect valuable information together and to exploit the company's core capabilities when resolving complex interdependencies in nascent technologies to create architectures and to advance them later on (Chesbrough, 2003a, 177-178). The exploitation of competitors' research findings is realized through the interaction of the firm's adoptive capacity with rivals' spillovers.

Interaction signifies that a firm is unable to assimilate external information passively. Rather, to utilize the accessible R&D output of its competitors, the company invests its absorptive capacity by conducting R&D. (Cohen & Levinthal, 1990)

It has been argued by many scholars that a company's innovation process should support the open innovation paradigm (Assink, 2006; Chesbrough, 2003a; March, 1991; Von Hippel, 1994). If the smart workers inside the firm are connected to, and informed by the efforts of smart people outside the corporate boundaries, then the company's innovation process will reinvent fewer wheels, which can be understood as a transformation of "*not invented here*" syndrome. In the period of ascendancy on the closed innovation paradigm, the not invented here -syndrome meant a mindset that everything had to be developed inside the company. If a technology was not produced by their own R&D, the company could not be sure of the quality, performance and availability of the particular technology (not invented here). Today the problem is that you are not re-inventing the wheel. (Chesbrough, 2003a, 30, 49, 177)

2.4 Chapter summary: Today's major challenges in innovation management

There are some imperative elements, which can dramatically boost companies' innovation efficiency. This study tries to capture these imperative pieces of the innovation puzzle later in chapter 3. In this chapter, the survey took a look towards innovation focusing on 21st century management challenges in the field of innovation management. To succeed, there are two major challenges in the field of innovation management (Roberts, 2007):

1. Understanding the dynamics of disruptive innovation: Companies should focus more on the characteristic differences between sustaining and disruptive innovation and adapt their innovation process to support both innovation types simultaneously
2. Dynamic business environment demands internal-external integration in companies' R&D (open innovation)

The dynamics of the innovation field has changed the game in several areas. A good example of a disruptive innovation, which uses the open innovation principle is Linux. It is an open source-based operating system that is taking over market share from other operating systems such as UNIX and Windows. There are good examples of giant companies, which have changed their innovation efforts radically. IBM has moved more deeply to the software business using open source code. It has received attention by releasing hundreds of patents to its allies and rivals. Never before has a company that puts so much effort into its patents willingly released so many patents at one time. They now think that some parts of the portfolio are best served as open technology (Mamudi 2005). The biggest reason for a company to do this is that by opening up its IP vault the company hopes that its hardware and software brands will be used in the new commercial products developed by its partners. In the IT (Information Technology) and computing industry it is extremely important to get as many users of one's own technology as possible. At the same time, wireless and fixed-lines telephone companies are in danger to become vulnerable to new providers of internet telephony or VoIP (Voice over Internet Protocol), such as Skype and Vonage or networking companies like Cisco. The most recent example of successful disruptor is YouTube, a video-sharing website that became a household name in 2006. New disruptive technology solutions have changed the rules of the game and caused headache to its rivals. As history has shown, a lot of things that are complex today will get simpler in the coming years.

3 IMPORTANT PIECES OF A SUCCESSFUL INNOVATION

What is the solution to the paradoxical problem of innovation? In order to sustain competitiveness, companies must develop their innovation processes. According to Lamont (2004): *“Many other processes have been streamlined, but innovation poses special challenges because it is currently complex and low on repeatability, structure and predictable outcomes”*. This study has outlined main challenges of innovation management in chapter 2. Chapter 3 defines the key elements of successful innovation.

Whether dealing with sustaining or disruptive innovation, a structured innovation process is required for any organization. It has to support both innovation types, giving opportunities to manage them differently. In order to be a successful innovating organization, there are several areas in which the company should be well-structured. This study focuses on how the innovation process should be managed in these areas when the purpose is to give more support to disruptive innovation.

3.1 An integrated innovation strategy

The need to be innovative within a firm is as strong today as ever. Only the game has changed: classic R&D is just one of the levers within the company’s innovation machine. Acquisitions, licensing, joint ventures, and corporate venture capital investments also play an essential role in company’s R&D and innovation strategy (Holmes & Glass, 2004). The importance of a clear innovation strategy that is integrated into the company’s growth strategy cannot be underestimated. Equally important is that the innovation strategy embraces activities for sustaining innovation as well as activities for achieving disruptive innovation (Christensen, 2002). The innovation strategy defines how the company should manage its innovation process and its elements (Anthony et al, 2006).

This part examines the key elements of a successful innovation strategy. The best innovation strategy will vary across firms and industries. Common threads, however, within corporate innovation strategies include the following:

1. Organize for innovation

Innovation will not flourish within a firm without the correct organizational framework in place. Organizing for innovation involves at least three inter-related facets: incentives, structure, and culture. Disconnecting innovation efforts from the corporate bureaucracy allows for example empowered business units with autonomy and profit/loss responsibility to flourish and to adopt a more entrepreneurial spirit and reward structure. (Holmes & Glass, 2004). Organizations should separate their new, exploratory units from their traditional, exploitative ones, allowing them to have different processes, structures, and cultures. At the same time, they maintain tight links across units at the senior executive level. Such organizational parts allow executives to pioneer radical or disruptive innovations while also pursuing incremental gains (O'Reilly & Tushman, 2004).

2. Adopt a portfolio approach and processes

For a company's innovation process it is important that it puts focus on the right projects to be effective and efficient (Roussel et al, 1991). Furthermore, it is also essential to ensure that the set of active projects is continually updated and is in line with the intentions of the organization as new business opportunities arise. The process involves selecting the right projects for the portfolio and reviewing the portfolio of projects as a portfolio on a regular basis and not only as separate projects. This is what Cooper et al. (1998) refers to as portfolio management and they suggest this process to be of significant importance for the success of R&D operations. Organizations also recognize that portfolio management must be integrated into the gating process (evaluation process) in order to yield the right mix, balance and number of projects, and to deal with the challenge of

maximizing the value of the portfolio and ensuring that it reflects the company's innovation strategy (Cooper et al, 2002). A portfolio approach should have at least three dimensions: markets, time and source. Markets define the collection of customers that you wish to target. Time defines the horizon on which the innovation creation process must be completed. Source is the category of innovation in which resources are invested to add value to the market over the target time horizon (Holmes & Glass, 2004).

3. Break corporate boundaries and encourage collaboration

Globalization, workforce mobility and the need for interdisciplinary expertise require companies to seek input from outside sources for innovation (Holmes & Glass, 2004). In-house researchers must be encouraged to interact with other researchers, customers and cross-discipline experts to speed up applied research as well as disruptive opportunities (Von Hippel, 1994; Cohen & Levinthal, 1990). The voice of the customer as well as the opinion of many other constituents must be heard to make innovations successful (Holmes & Glass, 2004).

4. Strive for revolutionary (not just evolutionary) inventions

There is a critical paradox at the heart of successful innovation. Incumbents are aggressive in their activities to sustaining innovations, but the problem lies in their inability to develop breakthrough innovations (Christensen et al, 2002). Companies that were once good at finding new applications and markets, have later become unable to cope with new emerging innovations and technologies. A company's innovation strategy should support different management procedures between sustaining and disruptive innovation (Anthony et al, 2006).

5. Innovate business models as well as technology

Innovation must not occur on the technology front alone. New technologies often require creative business models to unlock their value to the firm. Firms should

encourage development teams to consider novel ways to unlock the value of innovation through internal brainstorming as well as external market assessments (Holmes & Glass, 2004). The business model has a central position in the open innovation model. (Chesbrough, 2003a, 52, 187-188).

6. Shift from the closed innovation paradigm to the open innovation paradigm

Henry Chesbrough has discussed the need for firms to transfer from closed innovation to open one (Chesbrough, 2003b). Today's firms must consider IP (Intellectual Property) as a currency and not just a fence (Mamudi, 2005). Internal R&D plays still a significant part in a company's innovation efforts, only its role has changed (Chesbrough, 2003b; Cohen & Levinthal, 1990; Holmes & Glass, 2004). Scholars state that companies should raise the ratio of externally sourced innovation to internally sourced innovation (Hamel & Getz, 2004; Chesbrough, 2003b)

7. Generate a new role: "CGO- chief growth officer"

To anticipate how would you lead and manage such a breakout into new growth territory at your organization you will need to create a new role – "chief growth officer" (Slywotzky & Wise, 2003). Delivering promises of innovation strategy and its targets has to be monitored by one responsible person, who is motivated to develop structured innovation processes to better meet strategic goals.

3.2 Idea management for organizational innovation

Idea management methods are needed to nurture and collect ideas from within the whole organization and its environment. However, the classical idea management system as described in many books on innovation is little more than a normal suggestion box (Gamlin et al, 2007). Research findings by Nilsson et al. (2002)

suggest that the idea management process can be used to introduce and strengthen the innovation capability of an organization. The premise behind idea management is that the innovation process is too important to be left to chance – it has to be managed well (Lamont, 2004). It is ideas that act as initiators of new product development projects. In literature, ideas for the development of new products are found to originate in different sources both external and internal to an organization (Nilsson et al, 2002).

For example, formalized old-fashioned NPD-processes use customer surveys and technology development in order to find ideas for new products while integration with a lot of other idea sources is less evident. Nilsson et al (2002) argues that some organizations have identified this weakness and created arenas where ideas can be discussed and exchanged between individuals. One option is idea management tools, which are formal ways of capturing, examining, nurturing, storing and developing ideas created in an organization. Processes can be used to introduce and strengthen the innovation capability of an organization. The key is to get the right ideas to the right people at the right time (Lamont, 2004).

The term “idea management process” is sometimes a bit confusing. Usually it refers to a software product, which provides a structured method and tool for initiating the collection of ideas, evaluating them and selecting a subset for execution (Lamont, 2004). These systems should enhance support to the purpose of idea management and emphasize the visibility of innovation in the whole organization. When examining idea management, some key elements of successful management procedures can be found:

1. Have a clear business purpose for the ideation
2. Understand the window of opportunity - Timeliness
3. Tap into the diverse pool of idea contributors - Look at challenges in a different way
4. Develop an idea through collaboration

The first element is having a clear business purpose for the ideation event that is presented in the form of an enticing challenge and ensures contributors that there is a clear business purpose and sponsor to identify the best ideas (Tucker 2003; Gamlin et al, 2007) *The second element* is timeliness, or understanding the window of opportunity for idea to be considered (Gamlin et al, 2007). *The third element* stresses the importance of a 360-degree cross-functional view on innovation. It is necessary that all departments and functions have committed themselves to using the idea management system (Tucker, 2002). This element should represent a broad range of experience and background – typically broader than what is intuitive (Gamlin et al 2007). Important is also that the process is not just for people labeled as creative. The process requires individuals who are original thinkers, but it also need sustainers, modifiers and those with other important skills. Not everyone is an inventor, but everyone can play a part in the innovation process (Lamont, 2004). The fourth element is collaborative development, which helps a “seed” idea to be developed further (Gamlin et al, 2007). Nowadays, everybody is impacted by innovation, inside and outside the company. The ability to share ideas can not only refine them but also lead to new disruptive innovations (Chesbrough, 2003b; Gamlin et al, 2007). Open source – communities in software development are good examples of such “open development and brainstorming”, which uses a give and take approach (West & Gallagher, 2006). For example, Nokia uses software communities and gatekeepers to create new products and give back contributions and improvement to feed the cycle of development (Correia, 2005).

What are the needs of idea management processes? Idea management systems help companies use their human resources better, ensuring that people from across the organizations are actively feeding the innovation pipeline (Lamont, 2004). Companies can get lucky for a year or two and innovate by accident, but eventually they will need a sustainable process or they will lag behind their rivals.

Nowadays companies have idea management systems and processes, which are used to gather ideas from different sources and develop them. Yet evolution goes

further and business environment demands more innovativeness. In the 21st century, almost every industrial key player uses some kind of idea collection or management system. But what makes these companies' idea management more successful? The following 10 general instructions are supposed to be a checklist to every company wanting to develop its idea management process to meet today's managerial challenges: (adapted from Gamlin et al, 2007)

1. In order to be innovative, you need to have a culture where ideas are exchanged freely and everyone feels they are a part of the process
2. Sponsorship and support from upper management will promote employee participation
3. Clearly define and focus the business need or problem for the ideation
4. Not everyone wants to be a part of the process – recognize those who do
5. Ideas need to be nurtured to turn into executable business strategies and products/services
6. Be creative and flexible, as you need to adapt the process to fit the need
7. Lay out a path for implementation – assign responsibility and work within the diversified team
8. Provide encouragement and feedback to idea submitters – communicate the top ideas and what happens to them
9. Build incentives – either financially or through symbolic rewards
10. Stay connected with the business goals

3.3 Implementing a portfolio management approach to R&D

Chapter 3.1 analyzed the meaning of a well-defined innovation strategy to a company's innovation efforts and mentioned the significance of the portfolio approach in innovation strategy. R&D portfolio management involves the selection and prioritization of R&D projects to assure an effective and efficient use of the company's resources (Kolisch et al, 2005). A structured innovation process with portfolio management -approach needs a structured R&D gating process and effective resource allocation method as well.

3.3.1 Main goals of portfolio management in the R&D process

Leading firms in several industries are integrating portfolio management to their R&D process. Portfolio management has four main goals in R&D (Cooper et al, 2002):

1. Selecting high value projects

Companies can use the scorecard method (gate scoring) to drive the high value projects to the top of the priority list (Cooper et al, 2002). It is important that there are different criteria to different kinds of projects (Anthony & Christensen, 2005; Cooper, 2006). Otherwise, R&D portfolio focuses too much on near-term earnings and closer-to-home projects.

2. Achieving the right balance of projects

Organizations should use a strategic buckets method to allocate resources to right projects (Cooper, 2006; Anthony & Christensen, 2005). Additionally, various charts, including bubble diagrams and pie carts are useful for displaying balance in the portfolio on any dimension relevant to management (Cooper, 2002). A balanced portfolio supports the company's growth strategy and long-term competitiveness.

3. Selecting the right number of projects

In effective portfolio reviews, all projects are up for auction. Projects are ranked using several criteria until one runs out of resources. Projects past this resource limit are either killed, moved outside corporate boundaries to find new ways to market or put on hold. Cooper et al (2002) argue that the first time a company undertakes such portfolio ranking, almost half of their projects are removed from the active portfolio. The end result is a significant reduction in time to market.

According to Cooper et al (2000), most companies have too many projects in the pipeline. As a result, resources are spread too thin over too many projects, and there is simply not enough time or capabilities to do many of these key project activities proficiently. Shortly, they are trying to do too many projects too quickly. The strategic bucket approach and criteria scorecards are effective methods to decrease the amount of projects. This study examines the stage-gate process more extensively in next part.

4. Strategic alignment

Portfolio management ensures that both the portfolio of projects and the allocation of resources mirror the strategic priorities of the business (Cooper et al, 2002). In all projects, it is crucial to include strategic objectives to scorecards, which evaluate R&D projects (Cooper, 2006).

3.3.2 Strategic buckets - resource allocation

Kolisch et al (2005) argue that implementing a structured portfolio management method can significantly increase a company's portfolio value and support both strategic and operational decision-making. According to Cooper et al (2004), most companies have a long way to go in implementing the best portfolio management practices to support different innovation types. Portfolio management is one way to improve disruptive and revolutionary development of different products. It is about resource allocation, more specifically about selecting the right set and number of development projects (Cooper, 2002). Because so much value lies in uncertain and high risk future projects, it is difficult to know when or whether they are going to pay off. This creates enormous stress on the resource allocation of most organizations (MacMillan & McGrath, 2002). To allocate resources considerably, companies should use the strategic buckets approach to allocate resources to evolutionary (sustaining) as well as revolutionary (disruptive) innovations. The idea is to make conscious decisions on what proportion of your resources will be devoted to different types of projects, platform developments,

new-product projects and to smaller projects like customer requests (Cooper, 2002). Using a method for resource allocation is important because the management in a number of companies have recognized that significant resources have shifted from venturesome projects to small lower-impact efforts. Strategic buckets is a portfolio management method that defines where management desires the development funding to go, broken down by the project type, market, geography, or product area. It is based on the notion that *strategy becomes real when you start spending money*. In other words, translating strategy from theory to reality is about making decisions on where the resources should be spent in R&D (Cooper, 2006)

The strategic buckets –method is implemented as a tool to ensure the right mix of projects from evolutionary to revolutionary innovations (Cooper, 2006). The idea of this method is described in Figure 10. According to Cooper et al (2004) only 27 % of companies are doing this well. His research shows that over 40% of the best performers of portfolio management use the strategic buckets approach.

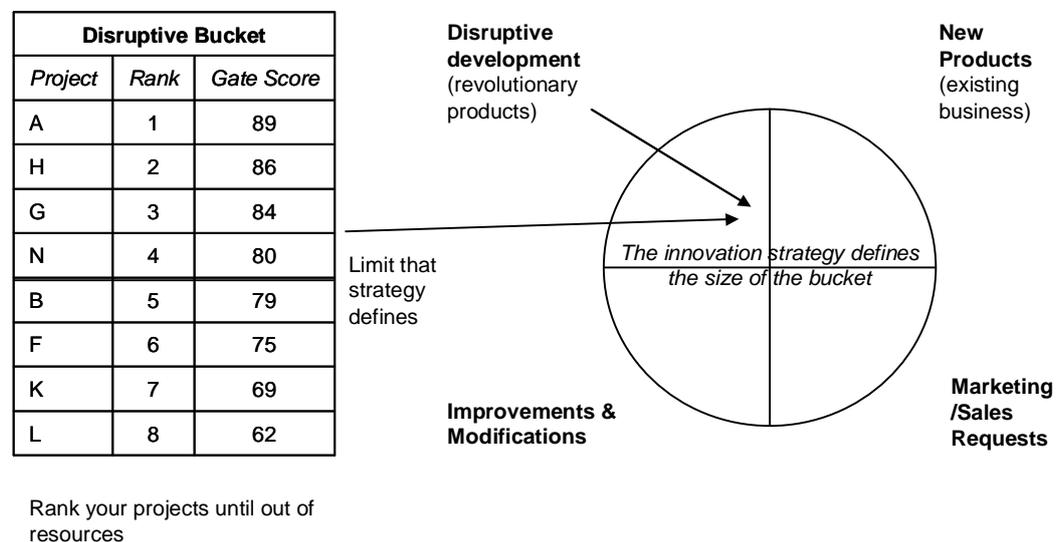


Figure 10: The strategic buckets -method for portfolio management (adapted from Cooper, 2006)

Figure 10 is based on Cooper's (2006) TD-bucket (Technology Development) model. Senior management begins with the innovation strategy and then makes

strategic choices about resources: how many percents of resources go to the disruptive bucket and how many of them to sustaining development (new products: existing business, improvements & modifications, marketing & sales requests). The disruptive bucket is created to serve uncertain and risky innovative projects. These projects need different evaluation methods than the other three buckets that are usually based on financial evaluation (Net Present Value, Return of Investment, Payback time etc.). Gates and decision steps in the disruptive bucket are customized to serve disruptive innovations. Projects in one bucket do not compete against those in another bucket (Cooper, 2006).

According to Anthony & Christensen (2005), the described method is the right way to manage the balance between sustaining and disruptive innovation in a better manner. If a disruptive innovation goes head-to-head against a sustaining innovation for funding, the latter almost always wins. Sustaining innovation tend to target existing, measurable markets, whereas disruptive projects, which often have markets that are unclear at the outset and have greater uncertainty in the short term (but oftentimes greater benefits in the long run), look too risky and are hence underfunded. By setting a pool of money for disruptive projects, companies create a hedge against their own conservative instincts.

3.3.3 Customized project evaluation and development system

Many companies recognize the benefits of developing new products through a project evaluation work-flow process (Cooper, 1998). The traditional process is based on gates, which filter possible innovations and stages, which develop and analyze projects for further development. According to recent surveys, over 75% of American companies use some form of the stage-gate process to support their innovation efforts. Best-performing companies have also combined it with idea management and portfolio optimization to achieve excellence in new product development (Anon, 2007). This chapter discusses the need for a customized project evaluation system for disruptive innovation.

Revolutionary innovations are vital to a company's long term growth (Hamel & Getz, 2004). Disruptive projects are a special breed, although they represent a small proportion of effort in a typical company development portfolio. Yet implementing such a specified process is a significant challenge, made complex by the dynamics of time, changing organizational structures, and the transition of key personnel (Cooper, 2006). Veryzer (1998) argues that most research on the new-product development (NPD) process focuses on the development of evolutionary products. For new-products professionals seeking insights into the means of achieving disruptive breakthrough innovations, a fundamental question remains unanswered: Does the NPD process for disruptive innovation differ from the process for incremental, or continuous, sustaining development when products are based on technology? In order to support both innovation types, companies should not manage uncertain high-risk projects (i.e. potential disruptive innovations) using traditional evaluation methods. According to Cooper (2006), disruptive projects are indeed a very different type of development projects. First, they are increasingly rare, because the average business's R&D portfolio has shifted dramatically to smaller, shorter-term projects such as product updates, modifications and fixes over the last 15 years. Secondly, these projects are often the foundation or platform for a new product line or an entirely new business. The final reason, why potential disruptive innovations should be managed differentially is that traditional new-product processes are designed for fairly well-defined and predictable projects. These are often high-risk projects by nature, with many unknowns and great technical uncertainties (Cooper, 2006; Veryzer, 1998).

Traditional "gating" processes are often linear pipeline-models (closed innovation –model). Miller (2006) argues that effective innovation management requires two different types of processes for sustaining and disruptive innovations: normal linear gate-model for sustaining innovations and spiral stage-gate process (Figure 11) for disruptive innovations. The new generation of innovation management begins by thinking about innovation in a scope much broader than products. The reason is that you cannot ask customers to tell what they want if they have not experienced it (Miller, 1995). Miller means that development is iterative and

project may have to return back several times on specific sub-stages until the scope is clear and the project is ready for a normal NPD-process or business model renewal. The spiral process for disruptive innovation has several sub-loops around the main loop, which identifies customer core problems and solutions. In this study, the model is not argued to be “the right option” for innovation process, but it indicates the nature of R&D in the 21st century project development appropriately. Today’s global competition presses companies to “turn their R&D upside down” to generate more emergent, market-based organizations designed specifically for innovation in a way that traditional R&D structures are not (Canner & Mass, 2005). Miller (2006) says that a spiral process enables new dominant designs by discovering and developing the underlying capabilities and architectures that define these dominant designs.

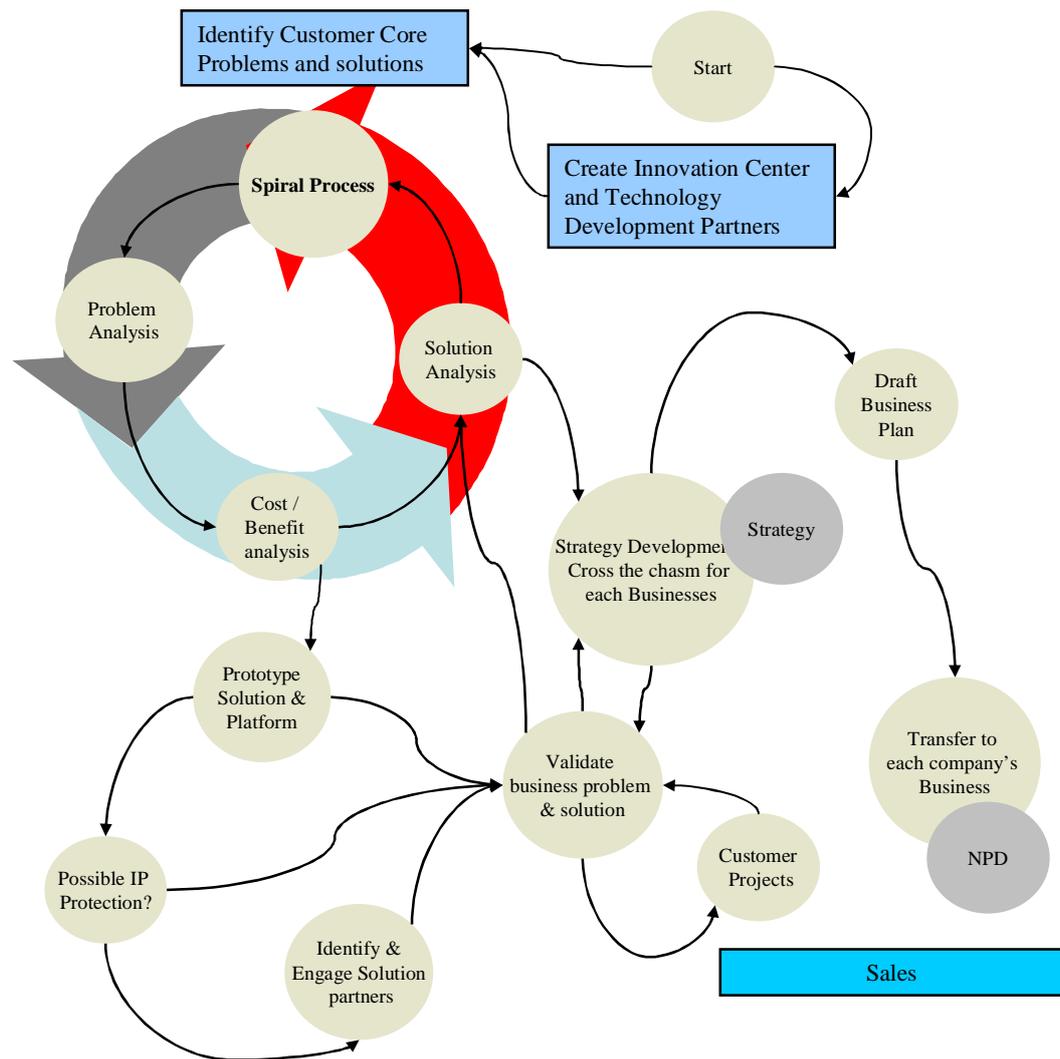


Figure 11: Spiral innovation process (adapted from Miller, 2006)

Companies have to choose the right process-model from the scale between traditional linear stage-gate-model and complex spiral model. Lots of companies still use linear gate-processes, but they have customized and developed them to serve disruptive innovation better. The key is that a company uses the right evaluation criteria for disruptive projects and does not compare disruptive innovations against sustaining innovation (Cooper, 2006). Every gate-process needs a systematic mechanism to kill projects after they are born (Cooper, 1998). It means serious Go/Kill decision points (gates) built into the process, which are based on criteria, established to make these important Go/Kill decisions. What is often missing is a customized “scorecard” with criteria or metrics for rating the “goodness” of projects and help managers to make objective prioritizing decisions

for uncertain (technology) projects. The scorecard approach should look at multiple facets of disruptive projects, from strategic to technical issues. The difference between two parallel evaluation processes is that disruptive innovation needs different evaluation criteria than sustaining innovation. If a company wants its innovation process to support disruptive and radical technological opportunities, traditional financial analysis is not useful. In high-risk technology projects, the level of uncertainty is so great that quantitative estimates of expected sales, costs, investments, and profits are likely to be highly inaccurate. Not surprisingly, executives' financial evaluation tools tend to favor predictable and close-to-home projects at the expense of radical and disruptive technology innovations (Cooper, 2006). There are lots of uncertainties, but one thing is certain: calculated numbers are always inexact, when examining disruptive innovation. Cooper et al. (2002) highlight the importance of clear and visible criteria in gate events. But most importantly, these criteria must be effective, which means that they have to be operational (easy to use), realistic (make use of available information) and at the same time discriminating (differentiate the good projects from the mediocre ones). Some examples of useful criteria for disruptive technology projects are shown in appendix 1, from which a scorecard can be developed and subsequently used to score projects right at the gate meeting (Cooper 2006).

It is also essential to understand that all kill-decisions do not have to mean the death of the project. It means that a project is removed from the active R&D portfolio. If companies are applying Chesbrough's (2003b) principles, there are other ways to fund projects outside corporate boundaries. For example, spin-off technologies often create venture-backed companies, which have different strategic purposes than the company, where the idea came from.

3.4 Supporting technical systems for innovation management

Many innovation projects have died on the wall as participants lose energy trying to figure out what to do with those pieces of paper fluttering to the floor. Having an effective technical system that captures ideas and engages people in developing, modifying, enlarging, and evaluating those ideas is just as critical to innovation as accounting systems are to the financial health of an organization (Wycoff, 2003). Without an efficient implemented process and robust infrastructure to effectively manage innovations and the people that contribute towards them, the innovation productivity can not increase (Cooper, 2002).

Many companies have implemented global, secure platforms for managing the entire innovation and growth process (Lamont, 2004). This study does not introduce any specific commercial innovation management system. This survey has collected important key elements from these different “innovation platforms”. These features support other important pieces of successful innovation (innovation strategy, idea management, evaluation, portfolio management, rewarding).

This survey represents relevant tasks for a technological innovation platform. It is based on a combination of cross-functional tools, which are used by several global key players in different industries. These systems are also linked outside corporate boundaries to gather crucial market knowledge and ideas from different interest groups. The following checklist is a usable tool for analyzing and renovating individual technical support systems for innovation management: (Flynn; 2003; Lamont, 2004; Wood; 2003; Gamlin et al; 2007; Cooper 2006;)

- Determine customized stage-gates for sustaining and disruptive innovation through which an idea / business concept will have to pass
- Develop a taxonomy that will enable the classification of ideas and business concepts in a manner that is meaningful to the organization. This is imperative to ensure knowledge sharing and the leveraging of cross-divisional synergies

- Harvest ideas from within the organization for rapid implementation, with the added ability to leverage synergies across the firm
- Harvest ideas external to the organization (“Market Insight Networks”)
- Effect a communication and mobilization exercise around the innovation strategy and processes
- Establish a recognition and reward program that supports innovative behavior and entrepreneurship that is aligned with existing compensation metrics
- Obtain strong support from senior management
- Actively build a community of innovators within the governance framework of the innovation process

Through the innovation platform, different elements of the innovation puzzle can be linked to the company’s growth strategy. The system allows better communication between different functions and stronger integration with external sources of innovation. It gives a management tool to link the corporation’s innovation strategy, idea management, evaluation process, portfolio management and rewarding together.

3.5 Chapter summary: The six pieces of the innovation puzzle

Using the theoretical part of this study, this study has described six pieces of the innovation puzzle to help the development of a well-structured and customized innovation process. The key areas of innovation, which are used to divide the self-assessment-study to different sections, are presented below (Figure 12):

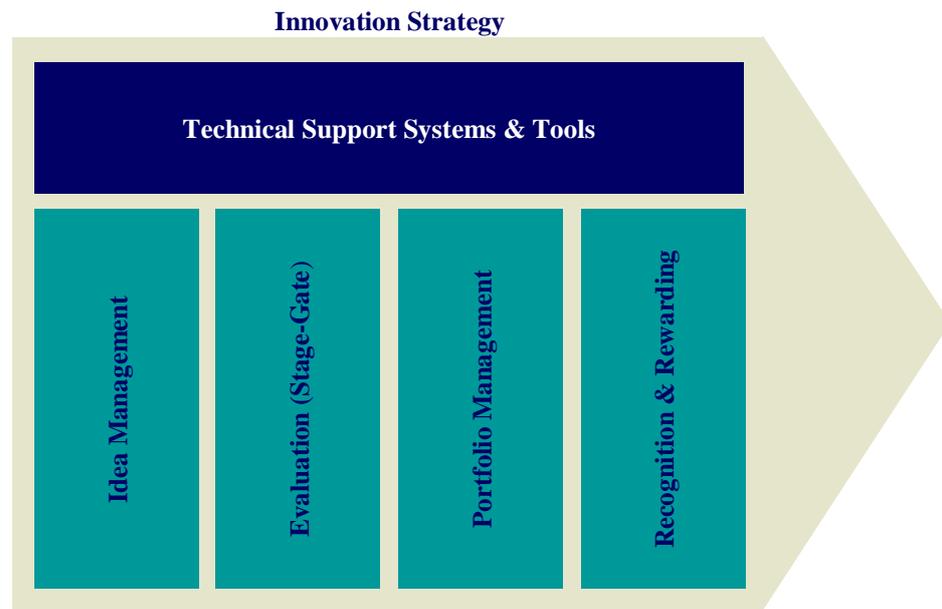


Figure 12: The six pieces of the innovation puzzle

3.5.1 Innovation strategy

The importance of a clear innovation strategy that is integrated in the company's growth strategy cannot be underestimated. Equally important is that the innovations strategy supports different innovation types.

3.5.2 Idea management

An idea management –process is needed to nurture and collect ideas from within the whole organization. It is also important that the process supports the absorption of outer knowledge. Its ability to identify and collect ideas from outside the organization is essential when internal-external integration plays a significant role in R&D.

3.5.3 Evaluation gate-process

The existence of a stringent and effective process and methodology for screening and stage-gating innovations is clear. This area still has development opportunities for many organizations. There are several different viewpoints to the evaluation process, but it is clear that an effective gate-process always needs right evaluation criteria and metrics for successful resource allocation.

3.5.4 Portfolio management

The existence of a company-wide innovation portfolio management solution, which is well communicated and not overly complex, helps firms to develop a balanced R&D portfolio mix. Portfolio management is a viable way to effective resource allocation in R&D.

3.5.5 Support systems and tools

Technical platforms of well-integrated and used support systems and applications for innovation management have increased in several industries. Companies use these software tools and systems to link different important elements of successful innovation to their strategic objectives. Systems help organizations to link better to the external environment to gather crucial knowledge for the innovation process.

3.5.6 Recognition and reward programs

The existence of a clear and well-communicated and understood recognition and reward program for innovation adds employee participation inside and outside the organization. Well-structured mechanisms encourage submitting ideas for idea evaluation and further development.

4 INNOVATION BENCHMARK –STUDY

Managers of today have a problem. They know their companies have to grow. But growth is hard, especially given today's economical environment where investment capital is difficult to come by and firms are reluctant to take risks. Executives know that innovation is the key to successful growth. When companies keep improving their existing products and services to meet their best customers' need, they eventually run into the "innovator's dilemma". By doing everything right, they create opportunities for new companies to take their markets away. It means that by focusing only on sustaining innovation, companies become vulnerable to disruptive innovations.

4.1 Project overview

How can managers increase the probability of their decisions leading to success? Today, they more than ever need robust theories – statements of what causes what, why, and in what situation - to guide their decision making around innovation. Maintaining an innovative climate, which supports sustaining and disruptive innovations, requires six elements of the innovation process to co-exist in corporations. Most companies appear to have some, but not all, thus missing out on the potential of truly structured innovation process. With these challenges in mind, this study investigates the urgency to innovate innovation processes in Finnish companies.

The study is divided into two parts. The first part is based on a recent global study which investigates the bias towards sustaining innovation. It includes statistical results from the United States, Sweden and Finland. The first section of the survey consisted of 23 multiple-choice questions originating from the global study. The second part consisted of 44 self-assessment questions regarding the six most important elements of the innovation process.

4.2 The global benchmark-study

Innovation is an imperative. It has emerged as one of the few means that CEO's have left of generating the growth that their shareholders demand. It is, therefore, all the more important that innovation is properly understood, that it is planned and delivered in a structured fashion and that executives understand where to look for innovative ideas and know how to exploit them. This chapter tackles these issues.

4.2.1 Innovation – A top priority

Innovation is the fuel for growth. This survey studies how Finnish companies rank innovation among their strategic priorities. The results show that innovation plays a vital role in corporate growth strategy now and for the upcoming years. In the Finnish study, 94 % (Figure 13) of respondents place innovation within their top three strategic priorities for the upcoming three years, including 18% who said that innovation is their highest strategic priority. Similar results were also reported in Sweden, where 93% respondents stated that innovation belongs to their top three strategic priorities. Results show the significance of innovation to organizational growth.

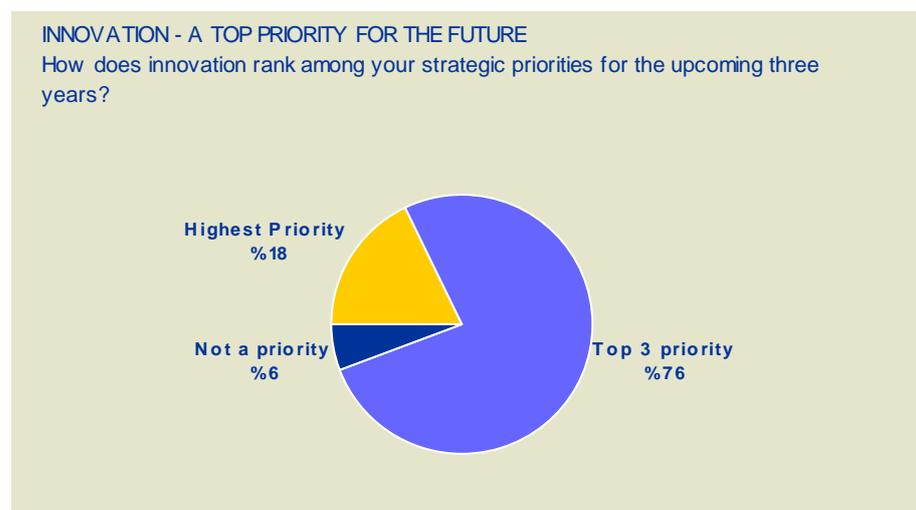


Figure 13: Innovation – A top priority

Innovation strategies and processes have become a hot discussion topic when globalization and sharpened competition are putting many companies under strain to increase their innovation capability. The dynamic business environment forces companies to be creative and innovative in NPD and also to renovate their historical business models, organizations and processes.

4.2.2 Existing business vs. new growth business

Innovation plays a vital role in every industry. Although companies act on different markets and have chosen different strategies and business models to serve customers, innovation remains an important strategic factor. In this part, the study examines which markets companies are aiming for and how it affects innovation. Figure 14 describes the logic behind the illustrated questions.

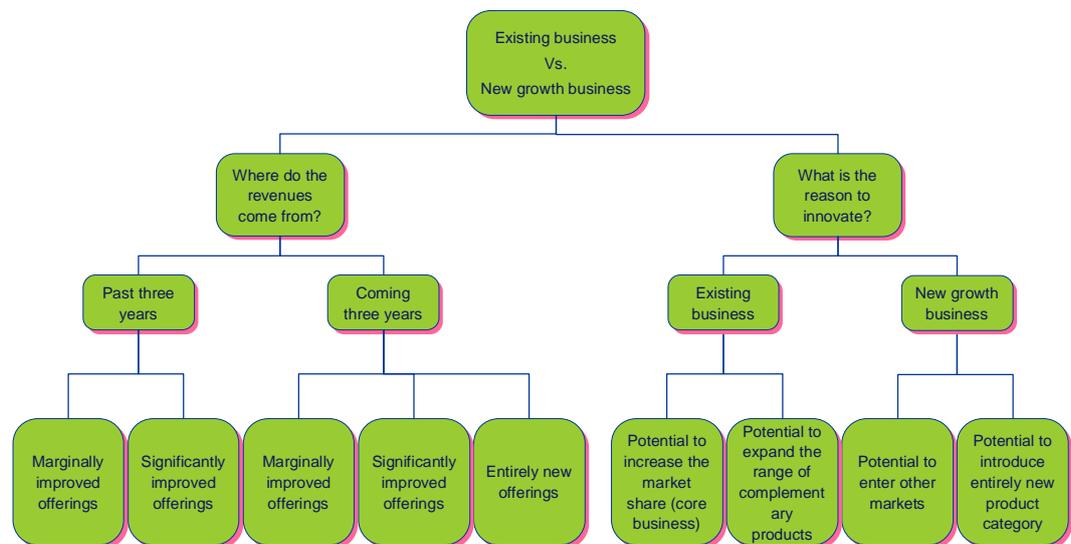


Figure 14: Which markets are companies aiming for?

However, quite often the turnover of the company comes from products that serve existing markets. Figure 15 demonstrates the differences between different respondent groups, when examining companies' total sales.

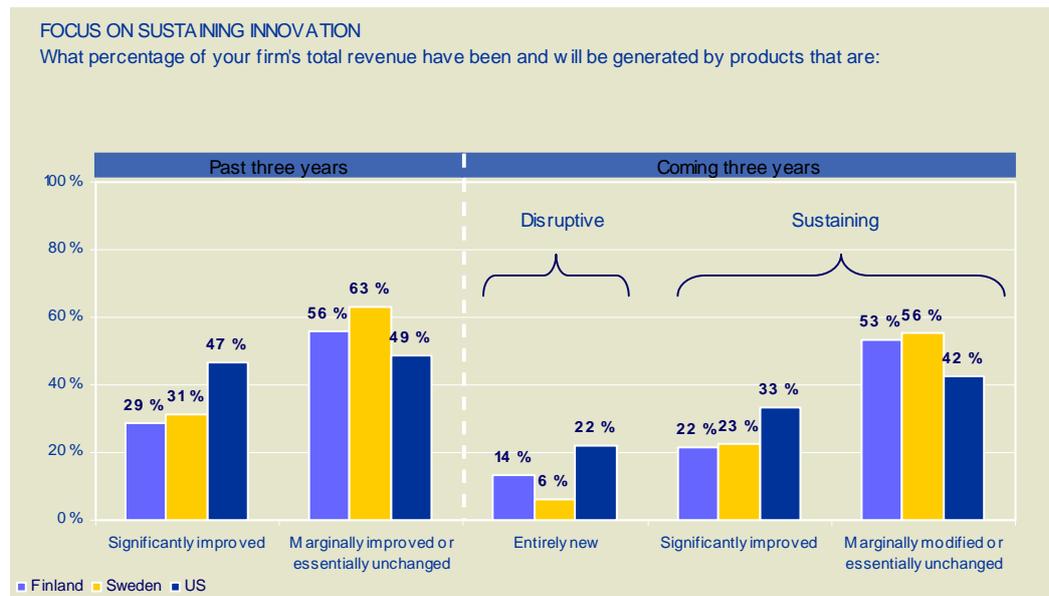


Figure 15: Focus on sustaining innovation

The results show that Non-Finnish companies have received more revenue from recently introduced and significantly improved products and services than Finnish companies. American companies earn almost half (47%) of their revenues from products that have changed essentially during the past three years. In Finland, the corresponding rate is only 29%, when Sweden is doing a little bit more nicely on its 31%.

If we examine the three upcoming years, 22% of US revenue streams will probably come from entirely new products and services. The corresponding percentage in Finland was 14% and in Sweden only 6%. As the results show, there is a real gap between global respondents and Nordic respondents. In Sweden, many respondents claimed to act in mature industries where the market does not demand new products or services. In the Finnish study, a majority of the respondents came from technology intensive and dynamic industries, where products and services have shorter time horizons and life cycles. Therefore, the maturity of the industry cannot be the only explanation for the lack of entirely new products and services. It is difficult to reach growth if companies cannot offer new product portfolios for new markets. Organizations might operate on markets where competition is low and barriers to enter the market are high. But as history

has shown in several cases, these barriers tend to diminish all the time, offering new entrants possibilities to steal existing customers from industry leaders. The innovator's dilemma describes the paradoxical challenge of finding a way to enable disruptive innovation without neglecting sustaining innovation.

Figure 16 examines different revenue drivers for innovation projects. The potential to increase the share of existing markets interests 76% of Finnish respondents when 65% of US respondents and 69% of Swedish respondents also regarded this as the most important reason to innovate. At the same time, 63% of the Finnish firms see innovation as a possibility to enter other markets, while only 31% believe in this statement in Sweden. These drivers tell how sustaining innovation plays a dominating role in innovation investments. On the other hand, it also suggests that those Finnish firms are more willing to seek disruptive opportunities.

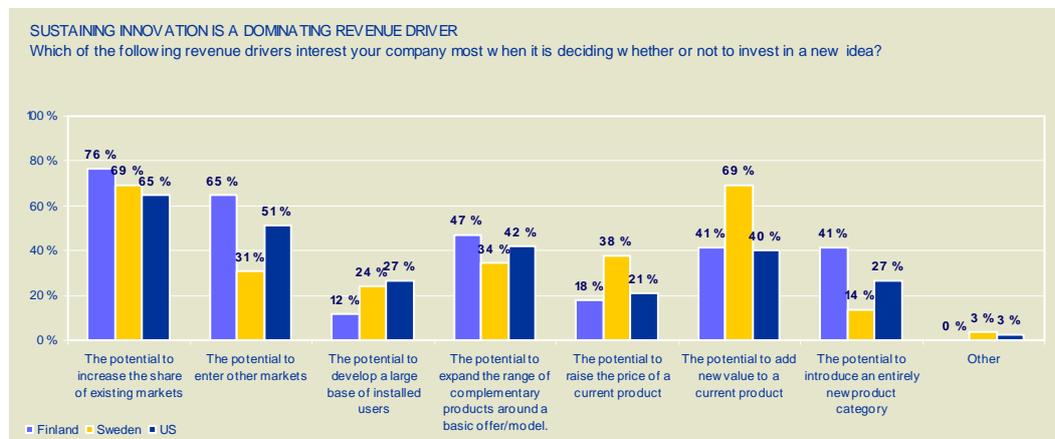


Figure 16: Sustaining innovation is a dominating revenue driver

4.2.3 Investment criteria and logic

This part of the benchmark-study investigates the investment logic and criteria for innovation. Figure 17 describes how revenue expectations, rejection criteria, time periods and investment volume affects in outcome of innovation process.

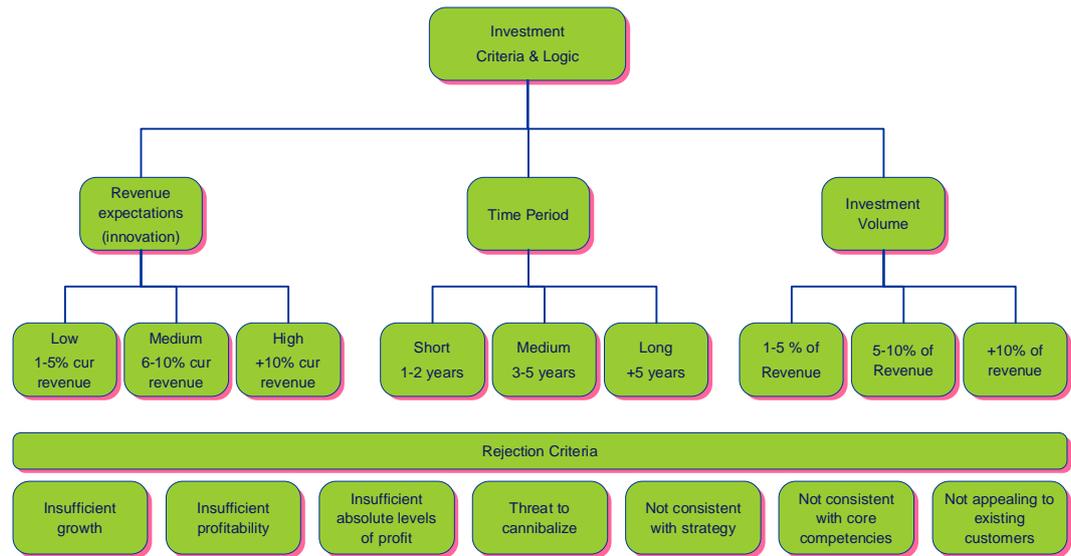


Figure 17: What is the investment logic and criteria for innovation?

This study illustrates some important factors that explain why Finnish companies are unable to create entirely new business opportunities. First of all, Finnish firms do not invest in innovation as much as US recipients, as appendix 2 shows. Over 75 % of the Finnish respondents state that their investments of innovation are only 1-5% of their current revenue, while 74% of US firms spend more than 6% investment to R&D. In Sweden, the phenomenon is similar to Finland. Most executives understand that new sustainable growth comes from creating new markets and ways of competing, but only few of them make such investments. One explanation to lower investment volume is that when times are good and core business is growing robustly, starting new a generation of growth ventures seems unnecessary. And when times are bad and mature businesses are under attack, investments to create new growth businesses cannot send enough profit to the bottom line quickly enough to satisfy investor pressure for fast turnaround. And

when companies' budgets are tight, their R&D procedures too often focus only on serving the existing markets.

A high investment volume for innovation does not mean high innovation capability by itself. Management's ability to transform innovative ideas into new revenue is the major reason for stagnation. Disruptive innovations demand a fundamentally new way of thinking about innovation productivity. Traditional R&D processes do not feed disruptive innovations.

Innovation is highly dependent from investment criteria which are made towards new projects. Figure 18 describes the time periods within which innovations are expected to be cash flow positive. Almost all of the Finnish respondents (95%) claim that innovation must pay itself off within the next three years. 71% of them argue that payback-time should be less than two years, which is a radically larger percentage than in the US (44%) and Sweden (36%). These rates tell the brutal truth: in Finland, innovations are targeted to existing, well-known markets. There is no space or time for disruptive innovations. These time periods only make sense when firms feel that they have a good understanding of the markets they are targeting and of the potential impact of the innovations they are commercializing.

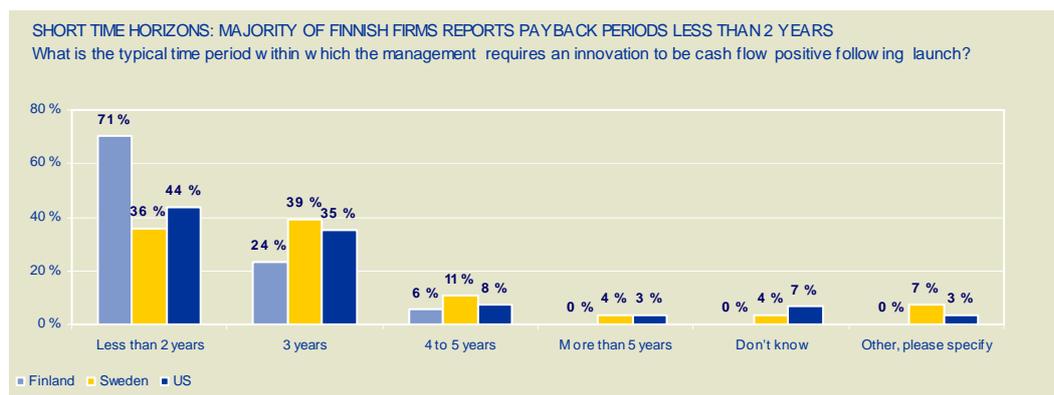


Figure 18: Majority of Finnish firms report payback periods less than 2 years

It is argued that short-term focus supports sustaining innovation efforts and does not leave opportunities for disruptive innovation. If companies compare sustaining innovations against disruptive innovation using traditional financial methods,

sustaining innovations always wins because of lower uncertainty. These actions tell that management is unwilling to sacrifice short-term profits for long-term opportunities, thus missing out potential growth opportunities. The biggest reason for short-term perspective is short-term demand from shareholders and investors. Under high pressure, senior executives often have a tendency to focus on financial measurement methods, which have short time horizons (0-3 years). Sustaining projects tend to target existing, measurable markets. Disruptive projects, which often have markets that are unclear at the outset and have greater uncertainty in the short term (but oftentimes greater benefits in the long run), look too risky and are hence underfunded. Sustaining innovation projects should typically be linked to traditional financial tools as ROI (Return of Investment), payback-time etc, while disruptive innovation should have criteria based on long-term evaluation measurements. In high-risk technology projects, the level of uncertainty is so great that quantitative estimates of expected sales, costs, investments, and profits are always likely to be highly inaccurate. Not surprisingly, executive's financial evaluation tools tends to favor predictable and close-to-home projects at the expense of radical and disruptive innovations. Even though capital markets are crucial for investment, the short-term expectations are the greatest barriers toward successful disruptive innovation.

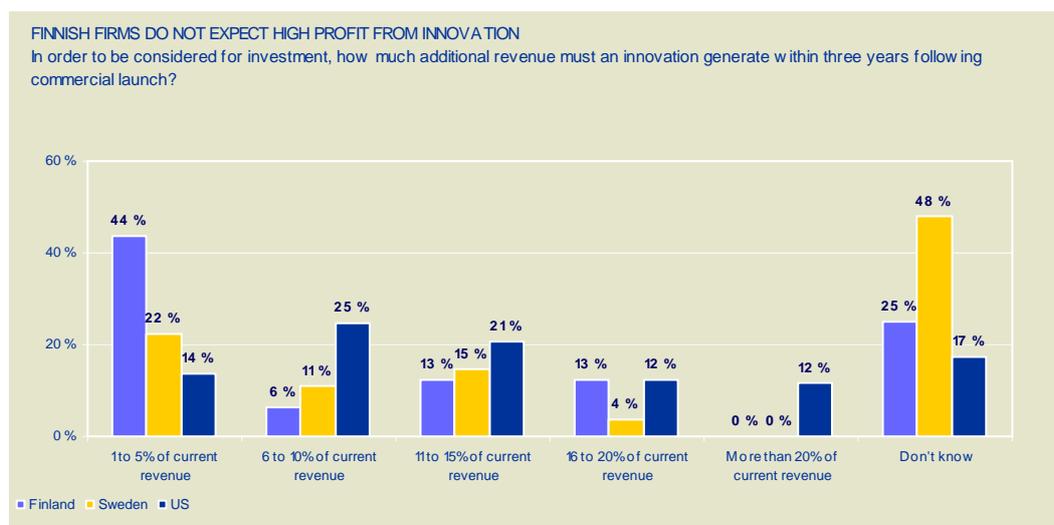


Figure 19: Finnish firms do not expect high profit from innovation

Figure 19 supports this conclusion. Innovations are targeted to be incremental improvements for existing markets with low and secure profit expectations. Almost half of the Finnish firms (44%), expect that innovation projects generate only 1 - 5% profit. In the US, profit expectations are much higher, when 12 % of respondents expect more than 20% profit from innovative projects. Surprisingly, many of the respondents do not know how much additional revenue an innovation must generally generate in their company.

It is essential to examine the barriers to innovation funding. Figure 20 show that insufficient profitability is naturally the greatest barrier from the financial point of view. 47% of Finnish companies, 55% of US companies and 72% of Swedish companies argue that potential profitability is the most important factor when companies are building financial models around innovation projects. More interestingly, 47% of Finnish recipients report that “not being consistent with existing core competencies” is another major reason for denying funding. In Sweden, only 14% of respondents have chosen this statement. It shows that Swedish companies think a lack of competence is not an obstacle for funding and development. They are more willing to think “out-of-the-box” than Finnish respondents.

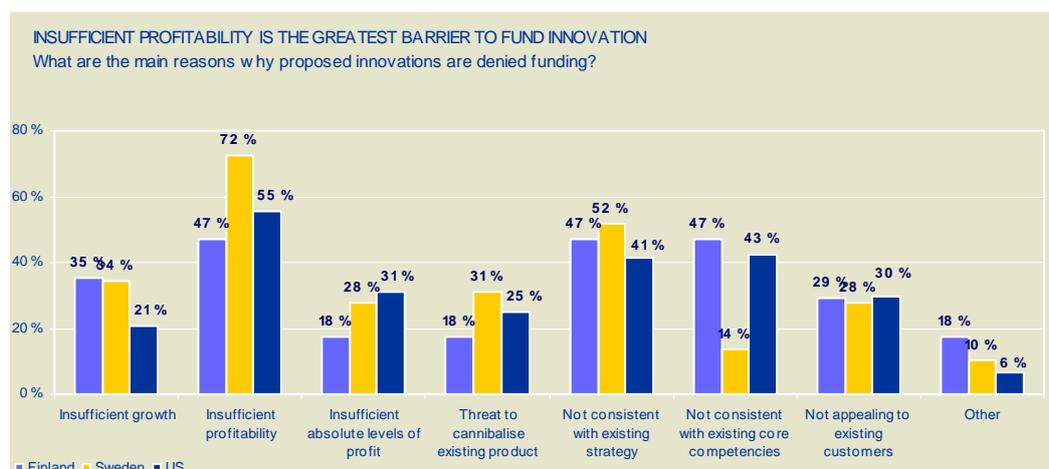


Figure 20: Insufficient profitability is the greatest barrier to fund innovation

4.2.4 Sources of innovation

Companies have two options to seek sources for new innovation. They can gather input for new breakthrough innovations from internal and external sources. Figure 21 demonstrates the logic behind different questions.

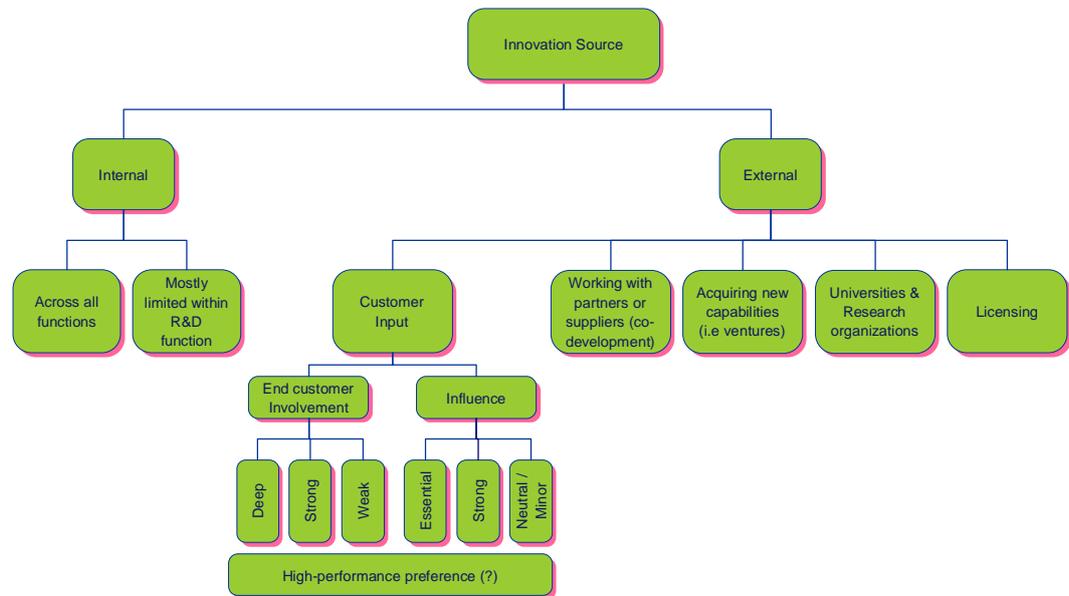


Figure 21: What are the different methods for gathering input for innovation?

Figure 22 illustrates the methods, which are used most for innovating and producing new products and services. It shows how in-house development plays a significant role in the companies' R&D. About 70% of all respondents claim that innovating predominantly in-house serves their purposes in R&D, despite the industry where the company acts. The second most popular method is using partners and strategic alliances for innovating. The most significant difference between different countries is sponsorships with universities and research organizations. Almost half of the respondents in Finland (47%) state that they sponsor university research to create new business opportunities, whereas only 14% of US companies invest in academic research. The comparative number from the Swedish study was 31%. Instead of co-operating with research organizations and universities, the US study shows that American companies are more likely to use partnerships and acquisitions to share knowledge and exploit it on their own R&D.

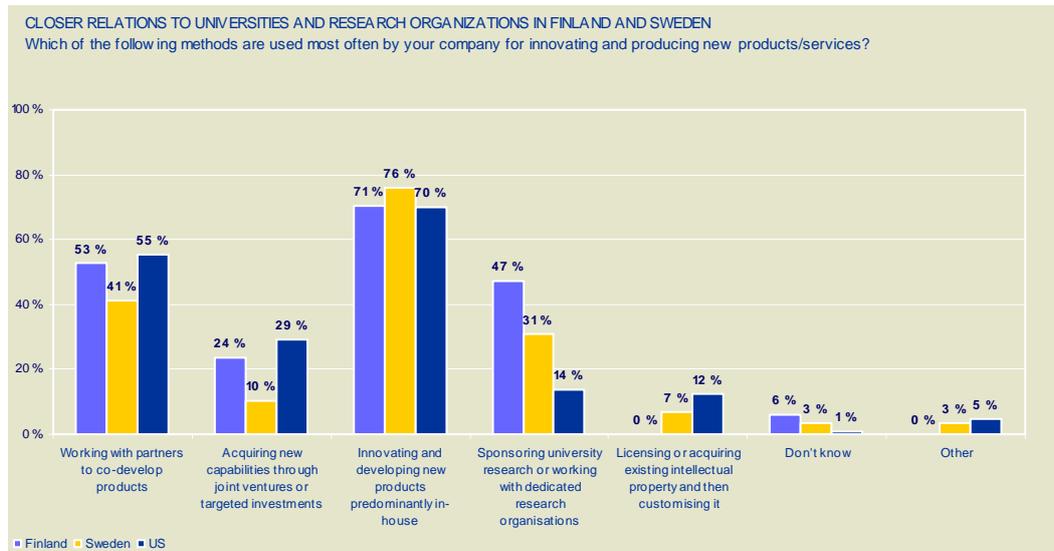


Figure 22: Finnish firms have closer relations to universities and research organizations

Today, innovation must be managed across organizations rather than just inside them. Innovation practices associated with either sustaining or disruptive innovation in vertically integrated or “closed innovation” environment are inadequate for the fast pace of 21st century global competition. This study does not criticize the significance of in-house development in R&D; it only stresses that the role of internal R&D is different than 10 or 20 years ago.

Keeping innovation locked inside the walls of the company may still be a commonly used method but it is not the most optimal one. If a company uses a functional system for gathering new ideas and then develops these ideas in-house it may work well. But if it only centers its innovation process on a limited numbers of functions it might be a risky venture, because there are “too many eggs in one basket”. Figure 23 examines how organizations see external options for innovation.

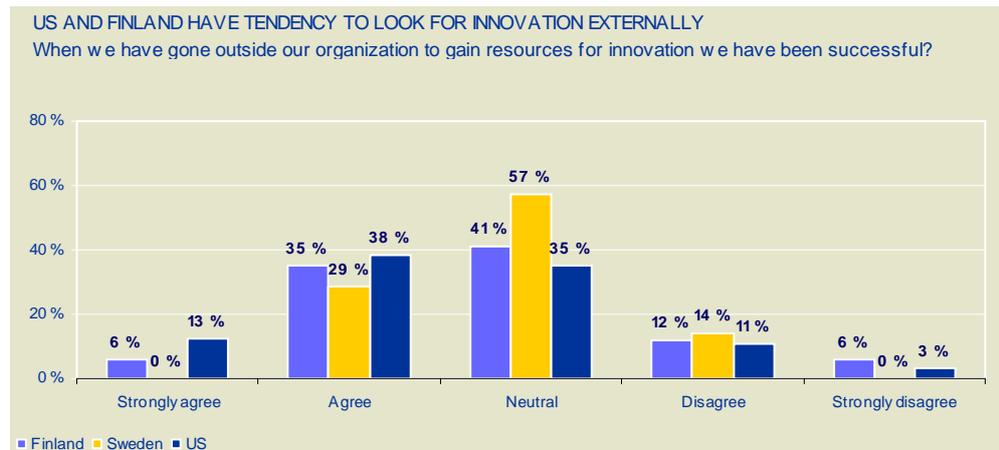


Figure 23: US and Finland have a tendency to look for innovation externally

Over 50% of US respondents agree or strongly agree that they have been successful outside organizational boundaries, while in Finland the percentage is 41%. Swedish organizations do not believe as strongly in external resources of innovation; only 29% stated external options successful. Moreover, only 18% of Finnish firms, 14% of Swedish firms and 14% of US respondents reported that they have not got positive experiences, when they have gone outside corporate boundaries (the sum of ‘disagree’ and ‘strongly disagree’).

Focusing on existing business, where company’s core competencies have a strong position may quite often be a strategic choice. In this case, it is not surprising that the preferred method of innovation is in-house related since own people would know the products and markets best. Furthermore, quite often the source of a firm’s most successful innovation is still a team of researchers, which is established to work on a particular new product, service or process that senior management has targeted (Figure 24).

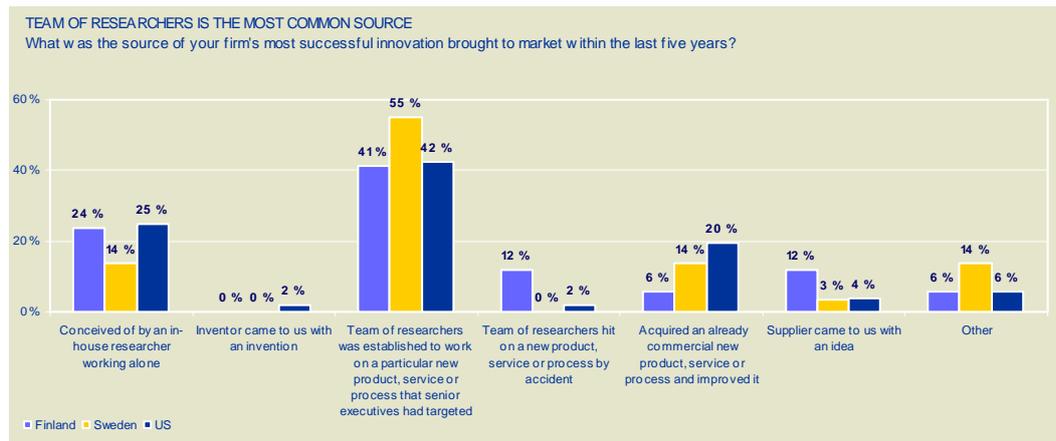


Figure 24: Team of researchers is the most common source of innovation

On the other hand, focusing on sustaining innovation may be a by-product of closing organizational boundaries for innovation and focusing strongly on internal R&D. Companies with in-house focus most likely have the necessary skills, technology, knowledge and market information suited for improving their current product portfolio, thus creating high-performance products for their best customers. The question is, then, which segment of the market are organizations aiming for? And do their current actions really generate opportunities for growth?

Today customers play a significant role in R&D. Organizations tend to nurture the input from current customers and exploit the knowledge on their business. Figure 25 demonstrates that 70% of Finnish firms agree that the customers have an essential or strong role in NPD, while the US study revealed that 80% of organizations reported from strong or essential customer influence. The corresponding rate in Sweden was only 62%. Comparing these results to each other shows there are tendencies towards deeper customer collaboration in the US and Finland. No doubt, customer involvement is essential for both sustaining and disruptive innovation. Companies believe that existing customers prefer premium products, while production costs for manufacturers are most often kept at a constant level, resulting in higher profit margin.

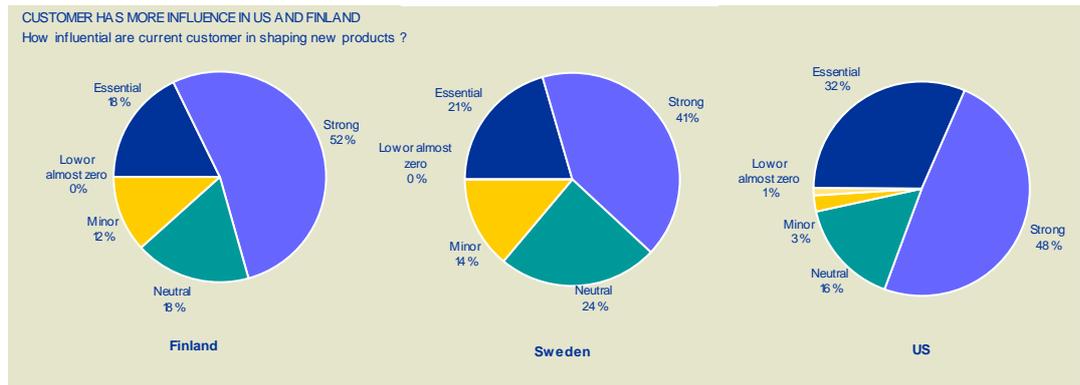


Figure 25: Customer has more influence in the US and Finland

Figure 26 shows to what extent companies believe that high-performance products will create value to customer. 71% of Finnish companies and 80% of US companies agree or strongly agree that the customers’ willingness to pay for premium motivate them to speed up the R&D around existing business. In Sweden, only 29% agreed that customers prefer these products.

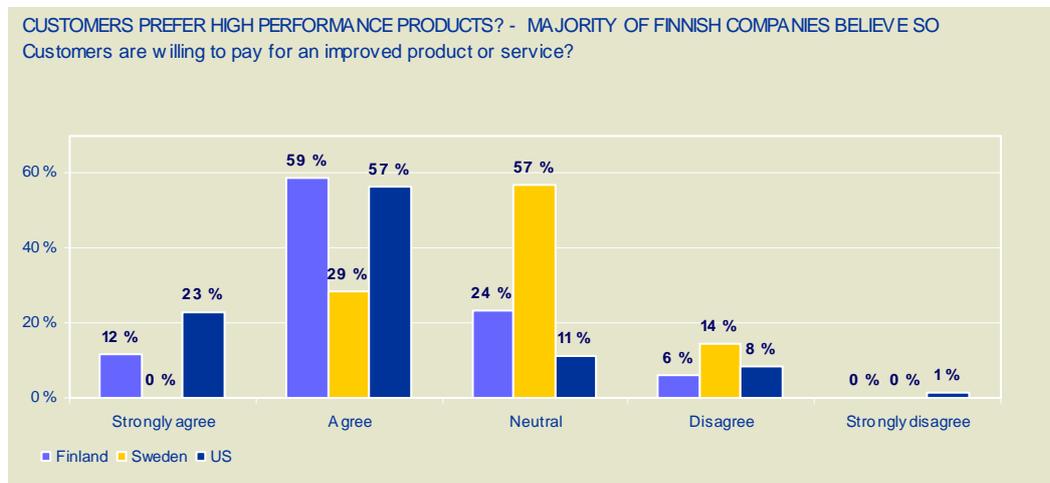


Figure 26: Companies believe that customers are willing to pay for premium products

By focusing on sustaining innovation, companies ensure short-term revenue streams from existing customers and markets, keeping marketing costs at low levels and building on deeper customer relations in existing markets. One major

risk is that if focusing on the premium products, companies may forget their low-end customers, which open channels for new entrants.

Findings have shown that customers have a strong influence in R&D. But how deep is this relationship? What are the R&D stages where the customers have an influence? Results also reported that US and Finnish companies have the deepest customer relationships. 24% of Finnish firms and 27% of US firms use customers at every R&D stage. In Sweden, only 10% of respondents collaborate with customers at all stages. Collaboration with current customers indicates that companies want to serve existing customers as good as possible. However, customer collaboration should also include deep relationships with potential customers outside the core business area. The reason is to find and concept their latent needs and create possibilities for new business.

Results suggest that US and Finnish companies are more focused on fine-tuning market offerings, delivering precisely what the market asks for. The degree of collaboration indicates the risk that companies are willing to take offering products and services to existing business. Deeper involvement should lead to lower financial risk in NPD. The success of a product should be more predictable with wide-range customer collaboration. Appendix 3 shows detailed information about the benefits of collaboration. A better understanding of market demand (94%) and a lower market risk (59%) are the most important reasons for Finnish organizations to collaborate with customers. Organizations tend to do what business schools preach as a good practice - stay close to their existing customers and develop close interactive relationships with them to create premium products and spreading them to a larger market.

4.2.5 Alternative paths for funding

In this study, many facts have illustrated how companies are focused to generate and fund sustaining innovation. However, this study will show how companies give possibilities for disruptive projects to reach the organization’s growth targets. At the end of section two in the questionnaire, the survey asked if these companies have alternative funding possibilities for projects that do not meet their financial criteria.

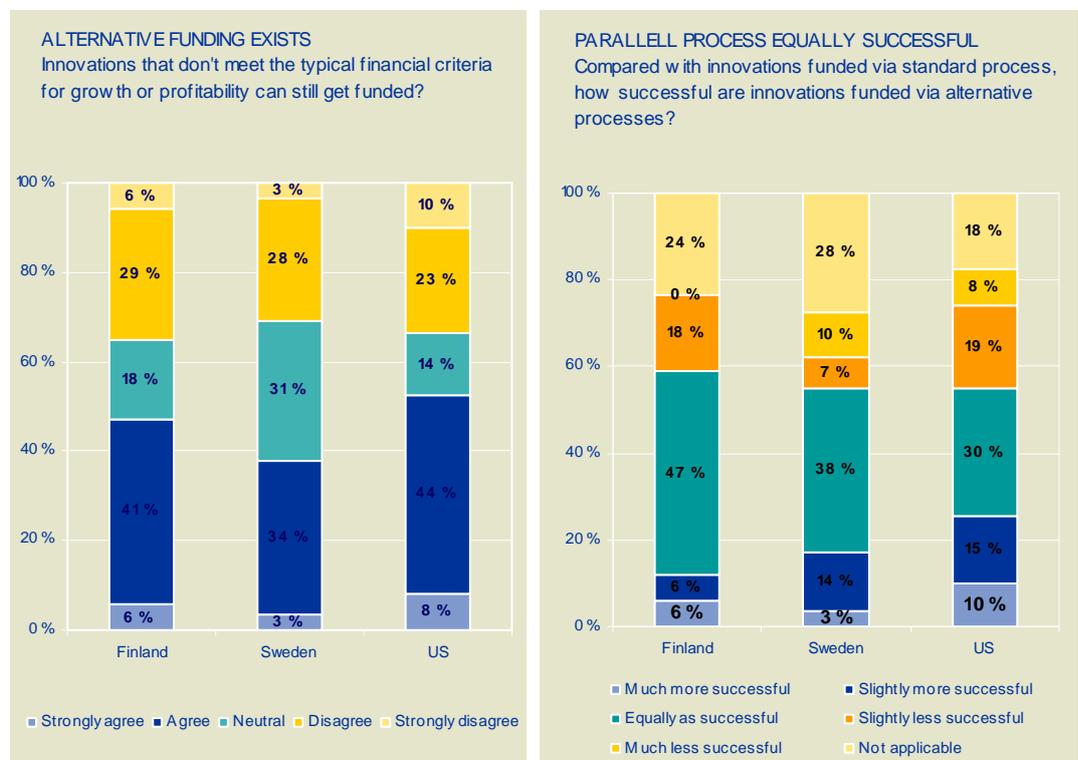


Figure 27: Alternative channels for funding exist

Figure 27 examines alternative funding possibilities for innovation. Surprisingly, 47% of Finnish respondents either agree or strongly agree that business case requirements for profitability and growth can be circumvented. It means those innovations that have been rejected by company’s financial models, can still obtain alternative funding. The comparative numbers for US companies were 52% and for Swedish companies 37%.

The success of innovations funded via alternative channels seems to be similar in other studies. In Finland, half of the respondents (47%) regard alternative funding as successful as the standard process. Similarly to the other two recipient countries, about 60% of Finnish respondents reported that alternative funding is an equally or more successful method for funding innovation. Two different conclusions can be made based on this fact. First of all, processes are created only to support sustaining innovation and the only way to fund a disruptive project is to circumvent the formal process completely. The results may also suggest that the standard process might be so poorly designed that funding is not approved for potential sustaining initiative. Whatever the reason is, one thing is clear: the results tell harsh truths of the unreliability and immaturity of established innovation processes.

A majority of the companies have parallel processes for funding innovation. Surprisingly, a large portion of respondents stated that informal processes for alternative funding exist, which originates from “underground” processes for innovation (Figure 28).

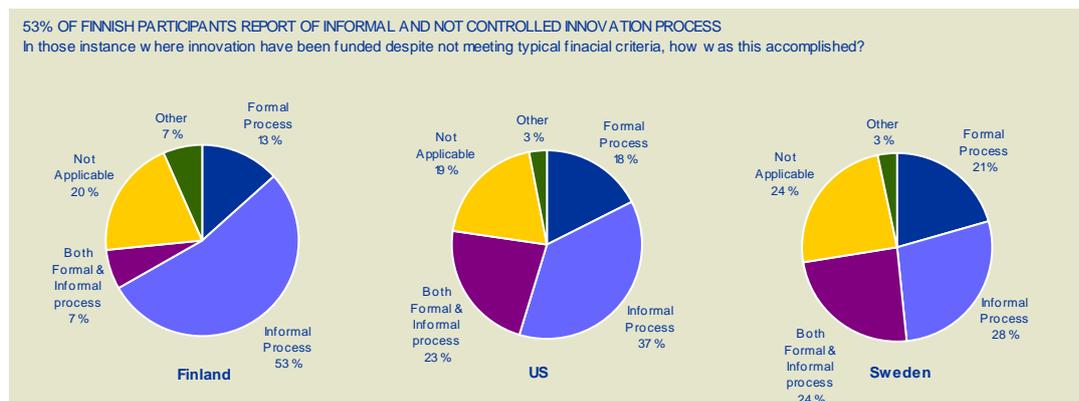


Figure 28: Informal innovation processes exists in Finland

53% of Finnish respondents reported from parallel informal processes. As stated before, one explanation for this might be that the standard process is designed and adjusted to serve sustaining innovation and does not leave room for disruptive innovation. Only 7% of Finnish firms claimed to have both a formal and informal

parallel process for funding, while corresponding rates were 24% in Sweden and 23% in the US. This indicates that formal processes do not have enough support within the organization especially in Finland. Innovators are forced to circumvent the formal process, by another formal or informal process. Innovation will not flourish within a firm without the correct organizational structure in place.

Only 13 % of Finnish firms reported that they have alternative formal parallel processes for screening and evaluating different projects. In terms of sustaining and disruptive innovation, two formal processes should co-exist. There are some explanations for these results. One reason for immature evaluation processes is the wrong evaluation criteria used for innovative projects. As argued before, disruptive innovation needs different evaluation criteria for funding decisions.

Having parallel processes is essential for evaluating different types of innovation. These two types are so different in nature that they need to be evaluated separately. However, it is interesting to investigate the reasons for informal processes. The existence of informal processes results in an unpredictability which does not correlate well with the corporation's ultimate desire of maximizing shareholder value. Thus, formal processes, even for disruptive innovation, should over time create predictability in regard to future earnings. It is a fact that senior management, shareholders and employees would need to feed growth through innovation.

4.3 A self- assessment study of Finnish companies

This study has emphasized a 360-degree-view of innovation and innovation processes. It means that companies must have a broad focus on their innovative actions (i.e. including processes, technologies and business models). From the point of view of innovation management, there should be a structure in place, aimed at dealing with all aspects of the innovation puzzle. This section of the study examines how Finnish companies perform related to six important key elements of innovation (Figure 29)

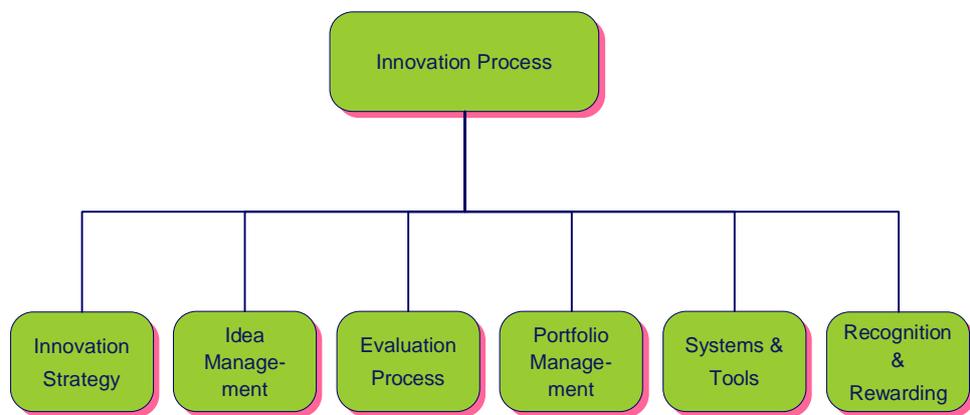


Figure 29: Six elements for successful innovation process

4.3.1 Innovation strategy

In order to consistently develop new sources of corporate growth, an organization needs a novel strategy for seeking out unexplored growth possibilities and a set of management practices to identify, shape, and nurture new-growth initiatives. A firm's ability to establish an integrated innovation strategy for managing multiple sources of innovation (i.e. internal R&D, joint ventures, licensing etc.) is a major key factor for successful growth.

Table 5 shows that there is a strong link between innovation and company's growth strategy. Results from the self-assessment study show that innovation strategy is well aligned to the company's growth strategy (3.6). It also indicate how Finnish companies place innovation in their top three strategic priorities.

Table 5 illustrates also how respondents understand the significance of innovation in relation to the company's growth, but they are not able to build a 360-view on innovation inside their corporation. In this study, Finnish firms seem to have neither a cross-functional nor cross-departmental view on innovation (2.6). Findings show that companies center their innovation process only on a limited number of functions. In general, an innovation initiative starts in one department or function and travels through the organization (sometimes even outside firm boundaries), where each department contributes with their perspective. A company's innovation efforts should be well communicated within the organization to gather different viewpoints to innovation.

Table 5: Self-assessment – Innovation strategy
(Scale: 1 = strongly disagree, 5 = strongly agree)

Question / Statement	Average (Scale 1 - 5)	Top 5	Bottom 5
We have a well defined innovation strategy	3,4	4	2,2
Innovation strategy is aligned with our firm's growth strategy	3,6	4,8	2,4
Innovation strategy is clearly articulated as a mean to generate growth throughout our organization	3,1	4,6	1,8
Well defined action plan to execute and implement our innovation strategy	3,1	4,2	1,8
Organization has a 360 degree cross-functional view on innovation	2,6	3,8	2,0
Organization has a 360 degree cross-departmental view on innovation	2,6	3,6	1,8
One person is dedicated and held responsible for the innovation process	2,5	4,2	1,4
Innovation strategy is clearly communicated within the company	2,8	4,2	1,8
Innovation strategy rating	3,2	4,4	1,8
Innovation strategy overall	3,0	4,2	1,9

Commitment to innovation is vital for corporate growth. Although companies claim that innovation is one of the major priorities, many companies do not have one dedicated person responsible for the innovation process (2.5). This is one example of the disparity between organizations' outspoken commitment to innovation and the actual situation. To anticipate how companies would lead and manage breakthrough opportunities into new growth territory, there would be

room for one dedicated senior executive, who is committed to the innovation process.

4.3.2 Idea management

Over recent years, significant research has focused on the issues of managing the process of developing ideas towards eventual organizational innovations. However, the process by which these ideas are generated and effectively managed is one which currently operates in an “ad hoc” fashion.

Table 6: Self-assessment – Idea Management
(Scale: 1 = strongly disagree, 5 = strongly agree)

Question / Statement	Average (Scale 1 - 5)	Top 5	Bottom 5
Process for collecting ideas from inside our organization	4,0	5	2,6
Process for collecting ideas from outside our organization	3,1	4,6	1,8
Idea management process is well communicated and understood throughout our organization	3,0	4,2	2,0
Idea management process is uniform throughout the organization	2,7	4,2	1,6
Well defined process for screening and evaluating ideas	3,0	4,0	1,8
Well defined process for informing submitters of ideas of the results/actions/status of the submitted idea	3,0	4,4	1,6
Idea-generating process is strongly supported by senior management	3,6	4,8	2,4
Idea-capture-and-evaluation tools allow users to enter ideas and interact with them	2,5	3,8	1,6
Idea management rating	2,9	4,2	1,8
Idea management overall	3,1	4,4	1,9

This part presents a structured approach for managing idea generation. Table 6 reveals that a majority of Finnish firms have processes for collecting ideas from inside corporate boundaries (4.0). This specific question received the highest score of all in the survey and reports that organizations have developed their processes to pick up ideas throughout their organization. But this is not enough for 21st century innovation management. When external sources of innovation

increase their role in R&D, companies should be able to build structured systems to collect and evaluate ideas from outside the corporate boundaries.

Although companies claim that they co-operate with customers and other important interest groups in their R&D, only few organizations have a structured way of collecting ideas from outside organization (3.0 / large standard deviation!). Instead of taking advantage of influences such as suppliers, customers or partners, companies tend to have an introvert view on their idea management process, so they rely on their own competencies. Some research results have even claimed that about 90% of breakthrough ideas are collected and further developed outside corporate boundaries.

Although Finnish firms have quite strong support from senior executives to idea management (3.6), this study reveals that processes are not uniform throughout the organization and parts of the organization are unaware of the existing idea collection (2.7). Table 7 also reveals that Finnish companies do not have well-structured idea management systems, which would allow people to enter ideas and co-develop them together. This in itself suggests that the companies do not have a well-functioning process for idea collection at all. Idea management systems help organizations use their human resources more effectively, ensuring that people across the organization and outside its boundaries are actively feeding the “innovation pipeline” together.

4.3.3 Evaluation process

Most companies’ development portfolios suffer from “the rush in the innovation pipeline”. Implemented gating-processes, complete with tough Go/Kill-decision points are necessary for effective resource allocation. Companies should build tough gates into the evaluation process, using scorecard methods at gates to rate and prioritize projects.

Table 7 reports that a majority of the Finnish companies seem to have a systematic stage-gate process for screening and evaluating innovative projects (3.6). The stage-gate system provides structure to the innovation process, allowing management to kill projects at the right time and focus on right projects. Respondents also claim that there are quite clear roles and responsibilities in the project evaluation system (3.2).

Table 7. Self-assessment – Evaluation process

(Scale: 1 = strongly disagree, 5 = strongly agree)

Question / Statement	Average (Scale 1 - 5)	Top 5	Bottom 5
Screening and evaluation framework is uniform throughout the organization	2,9	4,2	1,6
Screening and evaluation framework is communicated throughout the organization	2,7	3,4	1,8
Screening and evaluation framework is used to make clear go/kill –decisions	3,6	4,6	2,2
Clear roles and responsibilities ensuring that no submitted ideas are "forgotten"	3,2	4,4	2,0
We use business cases/prototypes to evaluate ideas/projects	3,1	4,2	2,0
We perceive our evaluation process as effective method for project selection and prioritization	2,7	3,8	1,6
Evaluation process rating	3,1	4,0	2,2
Evaluation process overall	3,1	4,1	1,9

However, although respondents stated that their evaluation process is used to make clear go/kill –decisions, there is not very much trust on their evaluation system as a whole. Evaluation processes are not experienced to be effective enough (2.7). One major reason for inefficiency might be wrong evaluation criteria used to prioritize different projects. The importance of clear and visible criteria for evaluating high-risk projects is necessary for different types of innovation. But especially for disruptive innovation, these criteria must be effective, which means that they have to be operational (easy to use), realistic (make use of available information) and at the same time discriminating (differentiate the good projects from the mediocre ones), not traditional financial evaluating methods. This study has earlier demonstrated how Finnish companies use parallel ways to fund innovative projects. First, there is one formal and

standard process for sustaining innovation. Second, there are parallel formal and informal paths to fund projects that do not meet traditional financial criteria (i.e. potential disruptive innovations). This often happens as a result of a poorly designed stage-gate process.

4.3.4 Portfolio management

For a company's success, it is important that it puts focus on the right projects to be effective and efficient. Furthermore, it is also essential to ensure that the set of active projects are continually updated and are in line with the business and growth strategy. Portfolio management consists of selecting the right projects for the portfolio and reviewing the portfolio of projects on a regular basis as a portfolio and not only as separate projects.

Table 8: Self-assessment – Portfolio management
(Scale: 1 = strongly disagree, 5 = strongly agree)

Question / Statement	Average (Scale 1 - 5)	Top 5	Bottom 5
Company wide portfolio approach to decide which ideas to pursue	3,3	4,4	1,8
A link between our project portfolio and our organization's strategy	3,8	4,8	2,4
Portfolio management method is well integrated to our idea management and project evaluation -processes	3,1	4,0	1,8
Established formal method for R&D portfolio management	3,4	4,2	2,2
Balanced portfolio of projects	2,8	3,8	1,8
We treat all R&D projects as a portfolio	2,9	4,0	1,8
Portfolio management method is well understood by senior management and it fits to our management style	3,3	4,0	2,4
We perceive our R&D portfolio management method effective	3,2	4,0	2,0
Portfolio management rating	3,4	4,0	2,4
Portfolio Management overall	3,2	4,3	2,1

Table 8 shows that a majority of the Finnish companies use portfolio approach to R&D (3.3), using an established formal method (3.4). Respondents also reported

that through portfolio management, companies can link their product portfolio to the organization's growth strategy more efficiently (3.8). If the company uses an integrated system for portfolio management, which is well-linked to idea management, it is able to steer idea generation through rewards and incentives thus connecting the idea to the portfolio and the portfolio to the corporate strategy.

Portfolio management addresses such questions as: "Which new product or development projects should we undertake? What is the right balance and mix of projects (high-risk vs. low-risk, long-term vs. short-term etc.)? How should we allocate our resources across various development projects?" Portfolio management must be integrated into the gating process in order to yield the right mix, balance and number of projects, and to deal with the challenge of maximizing the value of the portfolio and ensuring that it reflects their innovation strategy.

However, some development areas can be seen. Respondents do not see their offerings as a balanced product or service portfolio (2.8). One major reason for this may be the difficulty of developing high-risk and long-term projects, because gating system criteria supports short-term and close-to-home projects. From an innovation perspective, the results show that a systematic portfolio management approach does not exist.

4.3.5 Systems and tools

A key element for successful innovation in large organizations is well-functioning technical system for administrating innovation. These technical systems and tools enable companies to achieve their aggressive growth targets by providing the ability to manage innovation via a disciplined and repeatable process that effectively harvests ideas and opportunities, and converts them into business cases for executive approval, funding and implementation. Without an implemented process and robust infrastructure to effectively manage innovations and the people that contribute towards them, companies cannot ensure systematic and uniform

treatment to all innovative projects. In today's business world, many companies are forced to implement global, secure platforms for managing the entire innovation and growth process.

Table 9 reveals that Finnish companies have poor technical systems for innovation management (1.8). Respondents reported that companies might have some sort of systems for processing incoming ideas, but they do not have an automated approach for screening and evaluating different innovation initiatives. Furthermore, the process is quite often manual with varying degrees of interference from people involved in the innovation management process. This indicates that companies are either unaware of the possibilities that come with the use of such platforms, or that they have alternative methods for administrating their innovation process. Technical systems are also less dependent on individuals and manual input, which secures objectivity and reduces the risk of losing intellectual property along employees leaving the organization.

Table 9: Self-assessment – Systems and tools
(Scale: 1 = strongly disagree, 5 = strongly agree)

Question / Statement	Average (Scale 1 - 5)	Top 5	Bottom 5
Having an integrated platform to process incoming ideas, evaluating and screening of those ideas, is a top priority in our organization	2,6	3,8	1,8
We have a technical platform to process incoming ideas	2,8	4,2	1,6
We have a automated approach for screening and evaluating ideas	1,8	2,4	1,0
We have a built-in function for creating business cases	2,2	3,4	1,0
Current platform allows us to integrate systems for product development, idea management and portfolio management	2,2	3,8	1,0
Systems & tools rating	2,3	3,4	1,6
Systems & tools overall	2,3	3,5	1,7

Finnish respondents stated that the current platform does not allow them to integrate systems for product development, idea management and portfolio management (2.2). A well-functioning system requires a distinct gate process to manage the idea-to-commercialization process. It should also be able to connect

ideas to the portfolio and strategy and should provide management with information on both detailed and aggregate levels, enabling them to evaluate current portfolios and steer innovative initiatives in the desired direction.

Surprisingly, innovations are seldom the result of great single “brainstorming” moments, when talented isolated inventors suddenly come up with a great invention. Instead, innovations are more often the result of connected teams simultaneously thinking in multiple boxes. Innovators often link well-known ideas from diverse settings to create groundbreaking thinking that can, in turn, evolve into innovations. Innovation is critical to organizational success, and deploying a well- functioning system for administering innovation needs to be a cornerstone of corporate strategy. Today, ideas alone are not differentiators. It is rather the effective implementation of these ideas that drives predictable super-growth. Organizations therefore need to implement a process that stimulates a culture of innovation, provides resources and a mechanism for processing ideas, and have appropriate funding to invest in innovation.

As the previous chapter has shown, companies use parallel processes for innovation funding: one formal process for sustaining innovation and several other informal and formal paths for disruptive innovation. This is applicable to the technical platform as well, because the platform can include two parallel development pipelines with individual established criteria. The only difference is that both processes are formal, well-structured objective paths for sustaining and disruptive innovation.

4.3.6 Recognition and rewarding

The last assessment area, recognition and rewarding, ranked the highest total average (3.3). First of all, study revealed (Table 10) that a majority of the Finnish firms have some kind of incentive program in relation to ideas and innovation (3.4). It indicates that Finnish firms believe in incentives and rewarding in their

innovation activities. Respondents believe that an incentives program adds value to their business and that receiving recognition will encourage being creative.

Table 10: Self-assessment – Recognition and rewarding
(Scale: 1 = Strongly disagree, 5 = Strongly agree)

Question / Statement	Average (Scale 1 - 5)	Top 5	Bottom 5
We have an incentive program in relation to ideas and innovation	3,4	4,6	1,8
Our innovation incentive program adds value to the business	3,4	4,6	1,8
There is a clear linkage between generating innovative ideas and receiving recognition	3,2	4,6	1,8
Recognition & reward rating	3,1	4,4	1,4
Recognition & reward overall	3,3	4,6	1,7

Interestingly, the correlation between statements “incentive programs adds value” and “a clear linkage between ideas and recognition” is very strong, indicating that if management feels that an incentive program adds value, submitting innovative ideas is rewarded and recognized accordingly. If companies want that people think “out-of-the-box” and are creative, incentive programs are essential for disruptive innovations. These programs motivate people from outside R&D to participate in creating ideas. To get employees truly dedicated to the innovation process and to foster creative and innovative climate, recognition is one important element which needs to be addressed.

5 CONCLUSIONS

The initial objective of this study was to test a hypothesis which proposed that companies are structurally focused to identify, fund, and deliver sustaining innovations. Furthermore, it was interesting to examine how innovation processes work in Finnish companies and how these companies perform in relation to important elements of the innovation process.

5.1 Management challenges

The first task was to investigate a major challenge in innovation management. The theoretical framework of this study defined two important challenges for companies that act in a dynamic business environment:

- Understanding the dynamics of disruptive innovation: Companies should focus more on the characteristic differences between sustaining and disruptive innovation and adapt their innovation process to support both innovation types simultaneously
- Innovation must be managed across organizations rather than just inside them

This study has shown that characteristic differences exist between sustaining and disruptive innovation. To manage disruptive innovations, companies need different management procedures and processes, which are targeted to serve uncertain and more risky long-term projects. They must also be able to manage their R&D across organization boundaries. An important reason to developing the innovation process from a closed process to an open one, is that the traditional restricted innovation pipeline makes innovations more incremental and does not offer viable options to creating new business opportunities. Without established mechanisms to generate, identify, fund and deliver disruptive innovations, companies will lose growth opportunities and be vulnerable to disruptions from competitive entrants. The findings of this study have suggested that having an

innovation process is not enough for successful innovation. All six important key elements of the innovation process must be managed and understood well. Since it has been argued that organizations should have a broad focus on their innovation, this study examined, which key elements are necessary for successful innovation process. The findings revealed that organizations clearly have a process in place, but that some important areas (Figure 30) are not well covered and handled. Without this, full benefit of a well- structured innovation process does not exist.

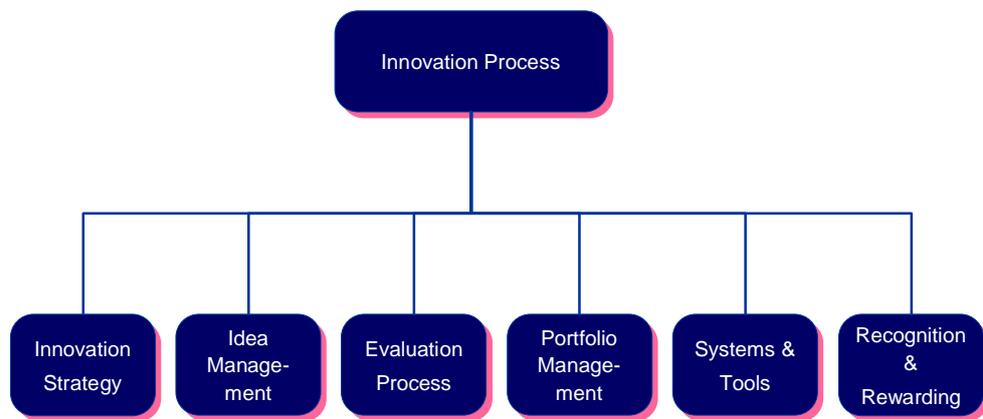


Figure 30: Six important elements for well structured innovation process

5.2 Results from the benchmarking study

This study has argued that disruptive innovations can herald the rapid downfall of well-established and successful businesses. This is because most organizations are designed to grow through sustaining innovations, which do no more than improve existing products for existing markets. With these challenges in mind, the empirical part of this study revealed that most organizations, both on the Finnish and an international level, have built processes that force new ideas onto a sustaining path. However, the study reported that there are some differences between different countries in how companies handle their innovation efforts (Table 11).

Table 11: Major similarities and differences between different respondent groups

DIFFERENCES	SIMILARITIES
<ul style="list-style-type: none"> • Non-Finnish companies (US, Sweden) are more focused to develop entirely new offerings to their customers than Finnish firms • Finnish firms (as well as Swedish) do not invest on R&D as much as US companies • Finnish and Swedish companies have much closer relationships to universities and research organizations, whereas US companies rather acquire new capabilities through joint ventures or targeted investments • Finnish companies do not have customer collaboration at early stages of development. US and Sweden have deeper customer relationships. • Majority of Finnish firms (71%) reports that innovation payback period should be less than two years (!), when 95% report it to be less than 3 years. (Only 44 % of US and 36% of Swedish respondents stated that management requires less than two years payback-time) • Finnish firms expect lower profits from innovations than US companies • The potential to enter other markets is an important revenue driver for innovation funding in Finland • More than half (53%) of the Finnish respondents reported that they use <u>informal</u> parallel process for innovations 	<ul style="list-style-type: none"> • Almost all respondents place innovation within their top three strategic priorities • The potential to increase the share of an existing market is the most important reason to innovate • Majority of companies agree that they have been successful, when they have gone outside their organization to gain resources for innovation • Respondents state that customers are willing to pay for an improved product or service (motivates them to speed up R&D around existing products and services) • Better understanding of market need is the most important reason to collaborate with customers • Insufficient profitability is the greatest barrier for innovation • When disruptive projects are denied funding based on traditional financial criteria, the process can be circumvented using alternative, not well controlled channels. • Respondents stated that alternative funding possibilities are equally or more successful than formal standard processes

The drive towards sustaining innovation necessarily blinds organizations to the most valuable growth opportunities, which invariably lie in disruptive commercialization strategies. All this has led to several informal and formal parallel processes for funding sustaining and disruptive innovations. Too extensive focus on sustaining innovation could lead to:

- Lost growth opportunities in low-end markets
- Lost customers in low-end markets (low barriers to new entrants)
- Informal parallel innovation processes for primarily disruptive innovation (processes that are not structured and well controlled)

5.3 Results of the self-assessment study

Although the significance of innovation for organizational growth is well understood and linked to company's growth strategy, the findings of the self-assessment study still tell that there is a huge gap between the companies' outspoken commitment to innovation and the actual situation. This section in our questionnaire revealed that companies have immature management procedures for administrating the innovation process.

The results of this study show that companies have implemented idea management processes to collect information from R&D function, thus lacking the 360-degree cross-functional or departmental view on innovation. Moreover, a majority of the Finnish companies do not have well-structured processes for collecting ideas from outside the organization. This question also produced the highest standard deviation among the respondents. It indicates that some of the respondents have implemented processes to collect ideas from different interest groups, while others trust only their own innovation capability. Furthermore, respondents reported that although innovation is one of the major strategic priorities, they do not have one dedicated person held responsible for the innovation process.

According to the respondents of this study, Finnish companies use some sort of stage-gate-processes to evaluate incoming innovation initiatives. However, they feel that these processes are not effective enough and have caused “rush in the innovation pipeline”. According to recent surveys, over 75% of American companies use some form of a stage-gate process to support their innovation efforts. Best-performing companies have also combined it with idea management and portfolio optimization to achieve excellence in NPD. The process-model for stage-gating can be unique in every company, but the evaluation process needs parallel evaluation criteria for sustaining and disruptive innovation in order to be effective. A majority of the respondents claim that they use a company-wide portfolio approach to manage the set of innovative projects. Still, companies stated that they do not have a balanced project portfolio. The results demonstrate the immaturity of the evaluation and the portfolio management processes.

The systems and tools –element received the lowest average score of all elements. It shows that Finnish organizations have poor technical systems for innovation management. Moreover, the process is stated to be manual with varying degrees of interference from people involved in the management process. When a majority of these organizations claim that innovation is their top priority, why is it that an unpredictable and uncontrollable innovation process exists? It is not possible to predict future growth on formal processes that are not followed and alternative processes that are not controlled. When examining recognition and rewarding, a majority of the Finnish firms reported having used incentive programs. Respondents stated that incentives programs add value to their business and receiving recognition will encourage being creative. Interestingly, the findings indicated that if management feels that an incentive program adds value, submitting innovative ideas is rewarded and recognized accordingly.

A focus on sustaining innovation seems to dominate Finnish companies. The formal processes in place are aimed at administrating such initiatives. Since a majority of the Finnish respondents stated that parallel formal and informal innovation processes exist, disruptive innovation seems to be addressed outside

the formal innovation process. If companies cannot handle all six important areas of the innovation process, an incomplete innovation process may lead to:

- A weak link between innovation and growth strategy
- Potential ideas neglected too often (inside & outside organization)
- Inability to focus on the right projects and allocate resources effectively
- An incomplete R&D portfolio (excludes disruptive projects)
- Inaccurate estimates of financial tools such as ROI and payback time for the company's innovation efforts
- Difficulties for senior management to administrate innovation initiative

5.4 Further development

The field of innovation management is complex and dynamics of innovation difficult to understand. Based on the results of the benchmark analysis, this study has formed some important instructions for senior management for further development of innovation processes.

Create awareness of the current barriers to disruptive innovation

It is essential that executives understand the dynamics of innovation. A great challenge for top management lies in creating an awareness of the fact that short-term measurements do not support the companies' growth initiatives. Management procedures target demanding, high-end customers with improved performance. Corporations heed primarily to the voice of existing customers, have short time horizons during which new ideas can prove themselves, and set unrealistic revenue growth requirements for new projects while rejecting projects that do not match short-time evaluation criteria. Companies need to close the gap between outspoken strategic focus and factual strategic actions.

Implement strategic bucket method for resource allocation and use at least two parallel formal processes for innovation

Recent academic studies and the empirical results of this study have shown that a majority of companies use traditional financial criteria to evaluate all R&D projects. This is not the best possible approach if companies want to give opportunities for disruptive projects. Disruptive innovations need own their stage-gate processes with specific evaluation criteria.

Companies can encourage disruptive innovation in their resource allocation procedures. Nowadays notably many companies put potential disruptive innovation projects head-to-head in comparison against a sustaining project, so that the result is always the same: the sustaining innovation project wins because of better predictability. Figure 31 simplifies how companies should change their management procedures to feed disruptive innovation.

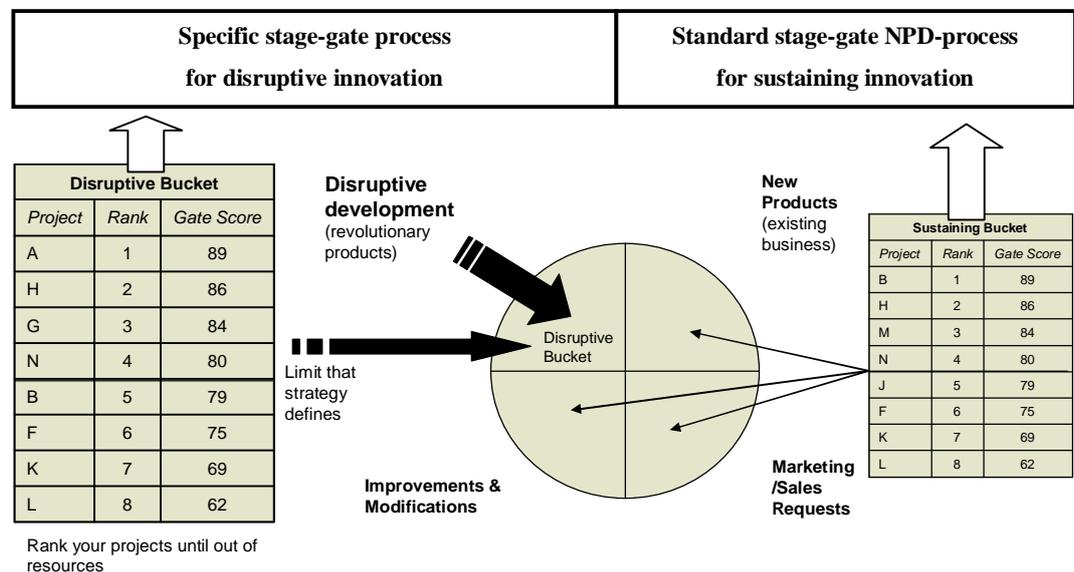


Figure 31: A strategic bucket method

One solution to this problem is to isolate a “disruptive bucket” from R&D budget for disruptive projects and compare disruptive projects against each other using a specific criteria inside the bucket. By setting a pool of money for disruptive

projects, companies create a possibility for long-term projects. Growth demands two parallel and formal processes for different innovation types.

Evaluation processes for different types of innovation initiatives should be separated to several parallel processes, with specific evaluation criteria and design of stage-gate process. However, gathering all development pipelines under one common structure enables top management to get a full portfolio view of all innovation initiatives within the company. Moreover, disconnecting innovation efforts from the corporate bureaucracy allows empowered business units with autonomy and profit/loss responsibility to flourish and to adopt a more entrepreneurial spirit and reward structure.

Expand your innovation focus

Industrial innovation is becoming more open, which requires changes in how companies manage innovation. External sources of knowledge become more prominent, while external channels to markets also offer greater promises. Companies can be very innovative, achieving their innovative success with the research discoveries of others and using that knowledge on their own business.

The expanded focus should be applied to all departments and functions of the organization as well as outside the corporate boundaries. In addition, executives have to understand that trusting only in internal sources of innovation may lead to focusing on sustaining innovation. Today, the major sources for breakthrough innovations come from outside the corporate boundaries. Innovation in areas not related to traditional NPD may in turn lead to completely new breakthrough innovations. Current processes, technology and business models also need to be refined and sometimes fully renewed.

Develop one centralized structure

Innovation should remain a top three strategic factor also for the upcoming years. Companies should clearly appoint a dedicated “innovation director” to secure the enlarged innovation focus beyond R&D department. The function should be sanctioned from the highest level of the organization and the innovation director should either be a member of the executive management team or report directly to the CEO.

Ensure strong technical system support for innovation

A partial explanation for poor innovation capability might also be the limitations in regard to systems and tools for controlling, evaluating, and administrating innovative projects. Having an effective technical system that captures ideas and engages people in developing, modifying, enlarging, and evaluating those ideas is just as critical to innovation as accounting systems are to the financial health of an organization. Without an efficient implemented process and robust infrastructure to effectively manage innovations and the people that contribute towards them, innovators prefer to use alternative methods for funding. A firmly established system support would secure the use of formal processes and it would prevent and discourage the use of uncontrollable informal innovation processes.

REFERENCES

- Allio, R. 2005. Interview with Henry Chesrough: Innovating Innovation. *Strategy & Leadership*. Volume 33. Issue 1. pp 19-25
- Anderson, P & Thusman, M. 1990. Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change. *Administrative Science Quarterly*. Volume 35. Issue 4. pp 604-633
- Anonymous. 2007. New Product Development & Portfolio Management Software; Innovation Framework Technologies suite certified Stage-Gate(R) Ready. *PR Newswire*.
- Anonymous. 2006. Becoming part of the new innovation paradigm. *Strategic Direction*. Volume. 22. Issue. 4. pp 30-32
- Amabile, T. Conti, R. Coon, H. 1996. Assessing the work environment for creativity. *Academy of Management Journal*. Volume 39. Issue 5. pp 1154-1184.
- Anthony, S. Eyring, M. Gibson, L. 2006. Mapping your Innovation Strategy. *Harvard Business Review*. Volume 84. Issue 5. pp 104-113
- Anthony, S & Christensen, C. 2005. Can you Disrupt and Sustain at the Same Time. *Harvard Management Update*. Volume 10. Issue 2. pp 3-4
- Assink, M. 2006. Inhibitors of Disruptive Innovation Capability: A Conceptual Model. *European Journal of Innovation Management*. Volume 9. Issue 2.
- Canner, N & Mass, N. 2005. Turn R&D Upside Down. *Research Technology Management*. Volume 48. Issue 2.

Chesbrough, H. 2003a. *Open Innovation: The new imperative for creating and profiting from technology*. Boston, Harvard Business School Press. 225 p. ISBN 1-57851-837-7

Chesbrough, H. 2003b. The Era of Open Innovation. *MIT Sloan Management Review*. Volume 44. Issue 3. pp 35-41

Chesbrough, H. 2006a. Open Innovation: A New Paradigm for Understanding Industrial Innovation. In Chesbrough, H., Vanhaverbeke, W. & West, J. (eds). *Open Innovation: Researching a New Paradigm*. Oxford, Oxford University Press. 400 p. ISBN 0-19-929072-5

Chesbrough, H. 2006b. *Open Business Models: How to Thrive in the New Innovation Landscape*. Boston, Harvard Business School Press. Boston. 256p.

Christensen, C & Raynor, M. 2003. *The Innovator's Solution: Creating and Sustaining succesful growth*. Boston, Harvard Business School Press. 304p.

Christensen, C. Johnson, M. Rigby, D. 2002. Foundations for Growth: How to Identify and Build Disruptive New Businesses. *MIT Sloan Management Review*. Volume 43. Issue 3.

Christensen, C. Raynor, M & Anthony, S. 2003. Six Keys to Creating New-Growth Businesses: How better decision making can help address the innovator's dilemma. *Harvard Management Update*. Volume 8. Issue 1.

Cohen, W & Levinthal, D. 1990. Absorptive capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*. Volume 35. Issue 1. pp 128-152

Cooper, R. Edgett, S. Kleinschmidt, E. 2004. Benchmarking best NPD Practices - II. *Research Technology Management*. Volume 47. Issue 3. pp 50-59

Cooper, R. Edgett, S. Kleinschmidt, E. 2002. Optimizing the Stage-Gate Process: What Best-Practice Companies Do –II. *Research Technology Management*. Volume 45. Issue 6.

Cooper, R. Edgett, S. Kleinschmidt, E. 2000. New Problems, New Solutions: Making Portfolio Management More Effective. *Research Technology Management*, Volume 45. Issue 6.

Cooper, R. Edgett, S. Kleinschmidt, E. 1998. Best practices for managing R&D portfolios. *Research Technology Management*. Volume 41. Issue 4.

Correia, E. 2005. Nokia Goes on Open Source Safari. *Software Development Times*, Volume 129.

Cusumano, M . 2004. Reflections on Free and Open Software. *Communications of the ACM*. Volume 47. Issue 10. pp 25-27

Damanpour, F. 1996. Organizational complexity and innovation: developing and testing multiple contingency models. *Management Science*. Volume 42. Issue 5. pp 693-716.

Davila, T. Epstein, M. Shelton, R. 2006. *Making Innovation Work: How to Manage It, Measure It, and Profit from It*. Upper Saddle River, Wharton School Publishing. ISBN 0-13-149786-3.

Fagerberg, J. Mowery, D. Nelson, R. 2004. *Innovation: A Guide to the Literature: The Oxford Handbook of Innovations*. Oxford, Oxford University Press. 26p. ISBN 0-19-926455-4.

Flynn, M. Dooley, L. O’Sullivan, D. Cormican, K. 2003. Idea Management for Organizational Innovation. *International Journal of Innovation Management*. Volume 7. Issue 4. pp 417-442.

Gamlin, J. Yourd, R. Patrick, V. 2007. Unlock creativity with “active” idea management. *Research Technology Management*. Volume 50. Issue 1.

Gassmann, O & Enkel, E. 2004. Towards a Theory of Open Innovation: Three core process archetypes.

Gilbert, C. 2003. The Disruption Opportunity. *MIT Sloan Management Review*. Volume 44. Issue 4, pp 27-32

Hamel, G. 2000. *Leading the revolution*. Boston, Harvard Business School Press. 332p. ISBN 1-57851-189-5.

Hamel, G & Getz, G. 2004. Funding Growth in an Age of Austerity. *Harvard Business Review*. Volume 82. Issue 7/8. pp 76-84.

Holmes, J & Glass, J. 2004. Internal R&D – Vital but only one piece of the Innovation Puzzle. *Research Technology Management*. Volume 47. Issue 5. pp 7-10.

Kanter, J. 1997. *Frontiers of Management*. Boston, Harvard Business School Press. 320 p.

Kolisch, R. Konrad, M. Roland, M. 2005. Maximizing R&D Portfolio value. *Research Technology Management*. Volume 48. Issue 3.

Lamont, J. 2004. Idea Management: Everyone’s an innovator. *KM World*. Volume 13. Issue 10.

Leifer, R. O’Connor, G. Rice, M. 2001. Implementing radical innovation in mature firms: The role of hubs. *Academy of Management executive*. Volume 15. Issue 3.

Linton, J. 2007. What in innovation, Anyway? *Circuits Assembly*. Volume 18. Issue 4.

Luecke, R & Katz, R. 2003. *Managing Creativity and Innovation*. Boston, Harvard Business School Press. ISBN 1-59139-112-1.

MacMillan, I & McGrath, R. 2002. Crafting R&D Portfolios. *Research Technology Management*. Volume 45. Issue 5.

Mamudi, S. 2005. IBM Redraws the patent map. *Managing Intellectual Property*. Volume 150.

March, J. 1991. Exploration and Exploitation in Organizational Learning, *Organization Science*. Volume 2. Issue 1. pp 71-87

Markides, C. 2006. Disruptive Innovation: In Need of Better Theory. *Journal of Product Innovation Management*. Volume 23. Issue 1. pp 19-25

Miller, W. 2006. Innovation rules! *Research Technology Management*. Volume. 49. Issue 2.

Miller, W. 1995. A Broader Mission for R&D. *Research Technology Management*. Volume 38. Issue 6. pp 21-36.

Nilsson, L. Elg M. Bergman, B. 2002. Managing ideas for the development of new products. *International Journal of Technology Management*. Volume 24. Issue 5/6.

O'Reilly, C & Tusman, M. 2004. The Ambidextrous Organization. *Harvard Business Review*. Volume 82. Issue 4. pp 74-81

Paap, J & Katz, R. 2004. Predicting the “Unpredictable”: Anticipating Disruptive Innovation. *Research Technology Management*.

Roberts, E. 2007. Managing Invention and Innovation. *Research Technology Management*. Volume 50. Issue 1.

Roussel, P. Saad, K.N. Erickson, T.J. 1991. *Third Generation R&D, Managing the link to Corporate Strategy*. Boston, Harvard Business School Press and Arthur Little Inc. 192p.

Slywotzky, A & Wise, R. 2003. Three keys to groundbraking growth: a demand innovation strategy, nurturing practices, and chief growth officer. *Strategy & Leadership*. Volume 31. Issue 5. pp 12-19

Tegarden, L. Hatfield, D. Echols, A.1999. Doomed from the start: what is the value of selecting a future dominant design? *Strategic Management Journal*. Volume 20. Issue 6. pp 495-518

Tidd, J. Bessant, J. Pavitt, K. 2001. *Managing Innovation: Integrating Technological, Market and Organizational Change*. Second Edition. UK, John Wiley & Sons, Ltd. 381 p. ISBN 0-471-49615-4.

Tucker, R B. 2002. Sparking Growth. *Executive Excellence*. Volume 19. Issue 11.

Tucker, R B. 2003. 7 Strategies for Generating Ideas. *The Futurist*. Volume 37. Issue 2.

Tushman, M & O'Reilly, C. 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*. Volume 38. Issue 4. pp 8-29.

Veryzer, R W Jr. 1998. Discontinuous Innovation and the New Product Development Process. *Journal of Product Innovation Management*. Volume 15. Issue 4. pp. 304-321.

West, J. & Gallagher, S. 2006. Challenges of open innovation: the paradox of firm investment in open-source software. *R&D Management*. Volume. 36. Issue 3, pp 319-331.

Wolf, M. 2004. Accelerate Radical Innovation - Now. *Research Technology Management*, Volume 47. Issue 5, pp 2-3.

Wood, A. 2003. Managing Employees' Ideas From Where do Ideas Come? *Journal for Quality & Participation*. Volume 26. Issue 2. pp 22-26.

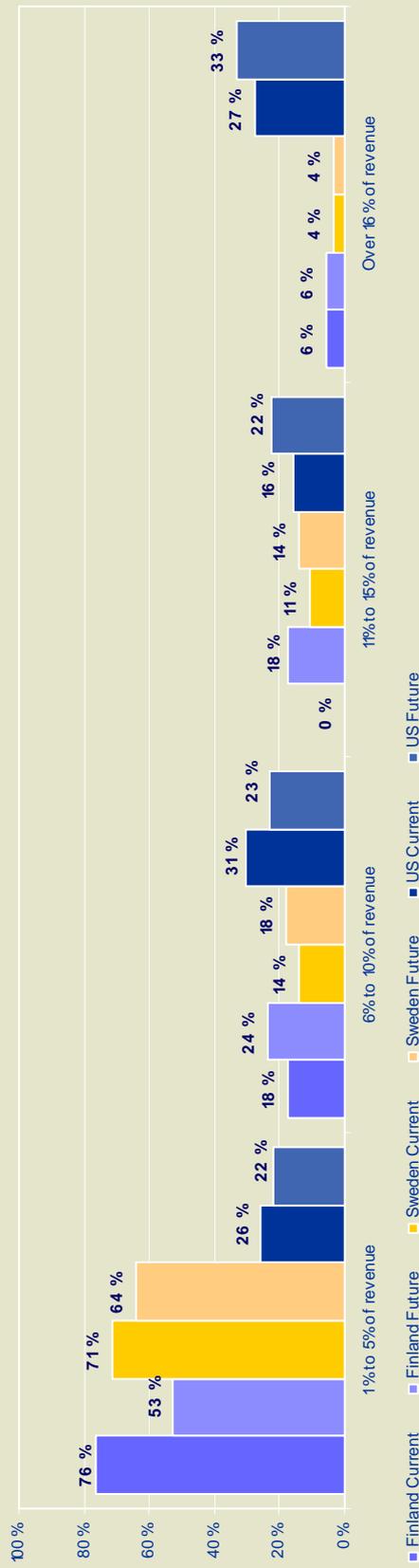
Wycoff, J. 2003. The "big 10" innovation killers: How to keep your innovation system alive and well. *The Journal for Quality and Participation*. Volume 26. Issue 2.

APPENDICES

There are lists of proven criteria for a gate meeting. Many have been shown to correlate strongly with the success of the new product. This list can be used as a base for a unique scorecard for technology development projects. (Cooper, 2006)

Criteria	Score = Zero	Score Ten out of Ten
1. Business Strategy Fit		
•Congruence	•Only peripheral fit with our business's strategy	•Strong fit with the several key elements of strategy
•Impact	•Minimal impact, no noticeable harm if project is dropped	•The business's future depends on this project
2. Strategic Leverage		
•Proprietary position	•Easily copied; no protection	•Position protected through patents, trade secrets, raw material access etc
•Platform for growth	•Dead end: one-of-a-kind; one-off	•Opens up many new product possibilities
•Durability	•No distinctive advantage: quickly leapfrogged by others	•Long life cycle with opportunity for incremental spin-offs
•Platform for growth	•Limited to a single business unit	•Could be applied widely across the corporation
3. Probability of technical success		
•Technical gap	•Large gap between solution and current practice, must invent new science	•Incremental improvement; easy to do; existing science
•Project complexity	•Difficult to envision the solution: many hurdles along the way	•Can already see the solution: straightforward to do
•Technology skill base	•Technology new to company: almost no skills internally	•Technology widely practiced within the company
•Availability of people and facilities	•Must hire and build	•People and facilities immediately available
4. Probability of Commercial Success		
•Market need	•Extensive market development required; no apparent market exists at present	•Product immediately responsive to a customer need: large market exists
•Maturity	•Declining markets	•Rapid-growth markets
•Competitive intensity	•High: many tough competitors in this field	•Low: few competitors; weak competition
•Commercial applications development skills	•New to company; we have no few commercial applications skills here: must develop	•Commercial applications skills and people already in place in the company
•Commercial assumptions	•Low probability of occurring: very speculative assumptions	•Highly predictable assumptions: high probability of occurring
•Regulatory and political impact	•Negative	•Positive impact on a high-profile issue
4. Reward		
•Contribution to profitability	•Rough estimate: less than \$10M cumulative over 5 years	•Rough estimate: more than \$250M
•Payback period	•Rough estimate: greater than 10 years	•Rough estimate: less than 3 years
•Time to commercial start-up	•Greater than 7 year	•Less than 1 year

LOWER INVESTMENTS IN INNOVATION IN FINNISH AND SWEDISH COMPANIES
 What is the current and anticipated future level of investment in innovation?



IN FINNISH COMPANIES CUSTOMER COLLABORATION DECREASES THE MARKET RISK AND HELPS TO UNDERSTAND MARKET NEEDS
 What are the three benefits derived from collaborating with customers to develop new products?

