

Innovation as a key renewal process

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Master's Thesis
Degree Programme in
Information Systems Management
2015



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Degree programme Information Systems Management, Master's degree	
Report/thesis title Innovation as a key renewal process	Number of pages and appendix pages 61 + 0
<p>The importance of innovation management has been growing, because of faster introduction of new technology, domestic and international competition, changing government regulations, and rapidly shifting market conditions change the way we do business.</p> <p>The purpose of this thesis is to discover how organisations can use innovations as their key renewal process. There is no simple answer how to do this and there is no out of the box solution that works for everyone. The objective is to generate a framework that can be applied to most of the organizations and to find out how software tools can support the innovation process.</p> <p>In this thesis a study on innovation management literature was used to create an innovation process framework with five sub-process. Also a case study on implementing innovation software in Company X was conducted to find out in what aspects can innovation software support the innovation process and the overall innovation maturity level of the organization.</p>	
Keywords Innovation process, Idea management, Project portfolio management	

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1 Introduction

In the 1930s Schumpeter started studying how the capitalist system was affected by market innovations. In his book "Capitalism, Socialism and Democracy" he described effects of human creativity, *"The opening up of new markets, foreign or domestic, and the organizational development illustrate the same process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one"*. Schumpeter called this process "creative destruction".

This "creative destruction" has become more and more effective on changing the business environments and according to Amabile (1988), *"Figuratively, it is impossible to escape the reality that corporations must be innovative in order to survive. Domestic and international competition, changing government regulations, and rapidly shifting market conditions demand constant and visionary innovation"*. Amabile (1998) also argued about elements of organizational innovation as following. *"Individual creativity is the most crucial element of organizational innovation, but it is not, by itself, sufficient"*

Tidd and Bessant (2013) promotes a process view to innovation and defines innovation as *"the process of turning ideas into reality and capturing value from them"* and emphasizes the role of innovation management as *"We are using the term 'manage' here not in the sense of designing and running a complex but predictable mechanism (like an elaborate clock) but rather that we are creating conditions within an organization under which a successful resolution of multiple challenges under high levels of uncertainty is make more likely."*

In order to organization keep on renewing and create sustainable growth they need to maintain a continuous innovation process to create new business while the old business starts to falter. If the solution is so simple why all organizations are not growing constantly?

The problem is that most of the times organizations are preoccupied with their existing business. Organizations need to focus on where they are currently but also to where they are heading. They often lack of ways to manage their innovations as the renewal process and only wait as the new waves of change will make their current business obsolete. In order to solve the problem, organizations should change the innovation as the key renewal processes. This requires that leaders at all levels need common ways to manage their innovation process.

1.1 Purpose

The purpose of this thesis work is to study the theoretical background of innovation management to develop a general innovation process model and conduct a case study on implementing Keto Innovation software tool for supporting Company X's innovation process.

1.2 Research Questions

- What are the key sub-processes of effective innovation process according to literature review?
- In witch aspects can a software tool support the organizations innovation process?

1.3 Objective

The objective of this research is to provide holistic view to innovation management and identifying the key processes that support innovation process. Objective is also to implement Keto Innovation software tool into Company X to support the innovation process.

1.4 Scope

The scope of the thesis was limited to the literature study on innovation management to provide the theoretical background to the innovation process framework and to the implementation phase of the Keto Innovation software tool into Company X. The identity of the case company is disclosed and the data and the structure of the innovation process based on example data and not actual business data. The scope of project management frameworks was limited to PMBOK (A Guide to the Project Management Body of Knowledge) by (Project Institute, 2013) and to PPM (Project Portfolio Management) by (Rajagopal, Mcguinn and Waller, 2007). Because the frameworks were limited the possibilities of agile project development as a source of innovation and the business impacts after a period of use in Company X were not measured. This creates a good opportunity for future study.

2 Theoretical framework

The purpose of this theoretical framework is to provide theoretical support for the innovation process and its sub-processes.

2.1 Research methodology and approach

Based on (Järvinen P, 2012)'s taxonomy of research methods this thesis uses design science research method with an innovation building approach to evaluate the use of information system to the innovation process model.

2.2 Three horizons of innovation

The problem is that most of the times organizations are preoccupied with their existing business. Organizations need to focus on where they are currently but also to where they are heading. They often lack of ways to manage their innovations as the renewal process and only wait as the new waves of change will make their current business obsolete.

“Our thinking about growth and decay is dominated by the image of a single lifespan, animal of vegetable. Seeding, full flower and death. “The flower that has once has bloomed forever dies.” But for an ever-renewing society the appropriate image is a total garden, a balanced aquarium or other ecological system. Some things are being born, other things are flourishing, still other things are dying – but the system lives on.” John Gardner

Baghai, Coley and White describes the “three horizons of growth” model as following:

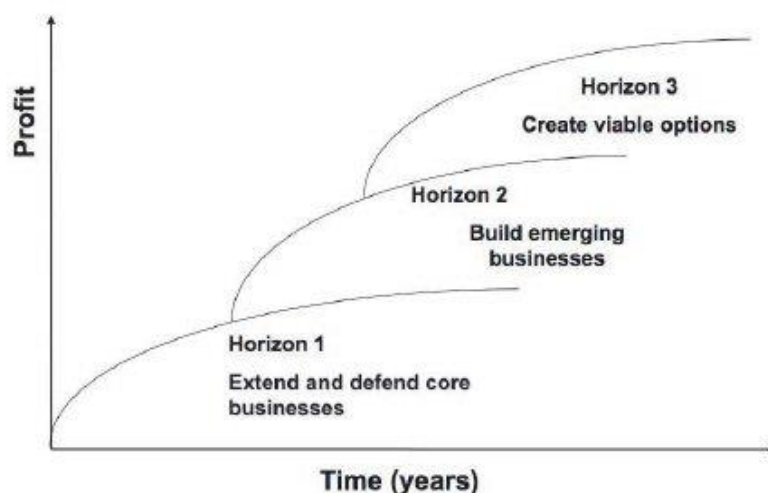


Figure 1, three horizons of growth (Baghai, Coley and White, 2000, page 5)

“In successful companies the horizon 1 is the core business of a company that usually account for the major share of the organizations profits and cash flow.”, “They usually have some growth potential left but usually flatten out and decline.”, “The management’s primary challenge in horizon 1 is to shore up competitive positions and capture what is remaining of the growth potential.”“(Baghai, Coley and White, 2000, pages 4-5)”

“Horizon 2 comprises businesses on the rise: fast moving, entrepreneurial ventures in which a concept is taking root or growth is accelerated”, “Though substantial profits may be four or five years away, they have customers and revenue, and may generate some profits. More important, they are expected to become as or more profitable as horizon 1 business in time.” “They need continuous investments to finance rollouts or otherwise accelerate the expansion of the business.”, “Horizon 2 is about building new streams of revenue. That takes time and demands new. Without horizon 2 businesses, a company’s growth will slow and eventually stall.”“(Baghai, Coley and White, 2000, pages 5-6)”

“Horizon 3 has the seeds of tomorrow’s business – options on future opportunities. Although embryonic, horizon 3 options are more than ideas; they are real activities and investments, however small. They are research projects, test market-pilots, alliances or minority stakes, and memoranda of understanding that mark the first steps towards actual businesses, even if they don’t produce actual profits for a long time or never. Should they prove successful, they will be expected to reach horizon 1 level of profitability.”, “Building successful business means seeding numerous options of future business. Some of them fail for internal reasons; others will fall victim to shifting industry winds.” “A company goal should be to keep the option to play without committing too much capital or other resources. The challenge is to nurture promising options while ruthlessly excising those with diminishing potential.”“(Baghai, Coley and White, 2000, pages 6-7)”

The Mehrdad Baghai’s description of the three horizons of growth makes distinct difference on how to manage your current, developing and future business. Every horizon requires a different mindset for the management.

“When you’re targeting your technology to your current business, it’s like a chess game. You know the pieces, you know what they can and cannot do. You know what your competition is going to do, and you know what your customer needs from you in order to win the game. You can think out many moves in advance, and in fact, you have to, if you’re going to win. In a new market, you have to plan your technology entirely differently. You’re not playing chess anymore; now you’re playing poker. You don’t know all the information in advance. Instead, you have to decide whether to spend additional money to stay

in the game to see the next card.” (Jim MCGroddy, the former head of IBM's TJ Watson Research Center)

This difference between playing chess game or poker should be visible in the innovation process as decisive investments in innovation programs (playing poker) in Chapter 3.2 or investments to develop your current business (playing chess) in Chapter 3.4.

2.3 Creativity

John Cleese in his talk in the 2009 Creativity World Forum in Germany describes the 5 factors that make that enable individual to be creative. In this 5 factor model, individual has two modes of operating. In open mode we allow our mind to ponder over multiple possible solutions to the problem and in a closed mode where we take the familiar proven solution that solves the problem effectively. John Cleese says that in order us to creative we need to change to open mode and describe 5 factors that enable us to do so.

The five factor to make your life more creative by John Cleese are following:

Space (“You can’t become playful, and therefore creative, if you’re under your usual pressures.”)

Time (“It’s not enough to create space; you have to create your space for a specific period of time.”)

Time (“Giving your mind as long as possible to come up with something original,” and learning to tolerate the discomfort of pondering time and indecision.)

Confidence (“Nothing will stop you being creative so effectively as the fear of making a mistake.”)

Humor (“The main evolutionary significance of humor is that it gets us from the closed mode to the open mode quicker than anything else.”)

“We get our ideas from what I’m going to call for a moment our unconscious — the part of our mind that goes on working, for example, when we’re asleep. So what I’m saying is that if you get into the right mood, then your mode of thinking will become much more creative. But if you’re racing around all day, ticking things off a list, looking at your watch, making phone calls and generally just keeping all the balls in the air, you are not going to have any creative ideas.” (Cleese, 2009)

According to (Dyer, Gregersen and Christensen, 2011, page 3) creativity is not merely a cognitive skill.

“A critical insight from our research is that one’s ability to generate innovative ideas is not merely a function of the mind, but also a function of behaviors. This is good news for us all because it means that if we change our behaviors, we can improve our creative impact.

(Dyer, Gregersen and Christensen, 2011) argues that the key skill for generating ideas is the cognitive skill of associational thinking. However, he states that this skill is not enough to generate good ideas. More critical reason for the success of innovators is that they more frequently engage in the behavioral skills of questioning, observing, networking and experimenting. For to be able to practice these behavioral skills innovators need to be able to challenge the status quo and not to be afraid of taking risks on when experimenting new things.

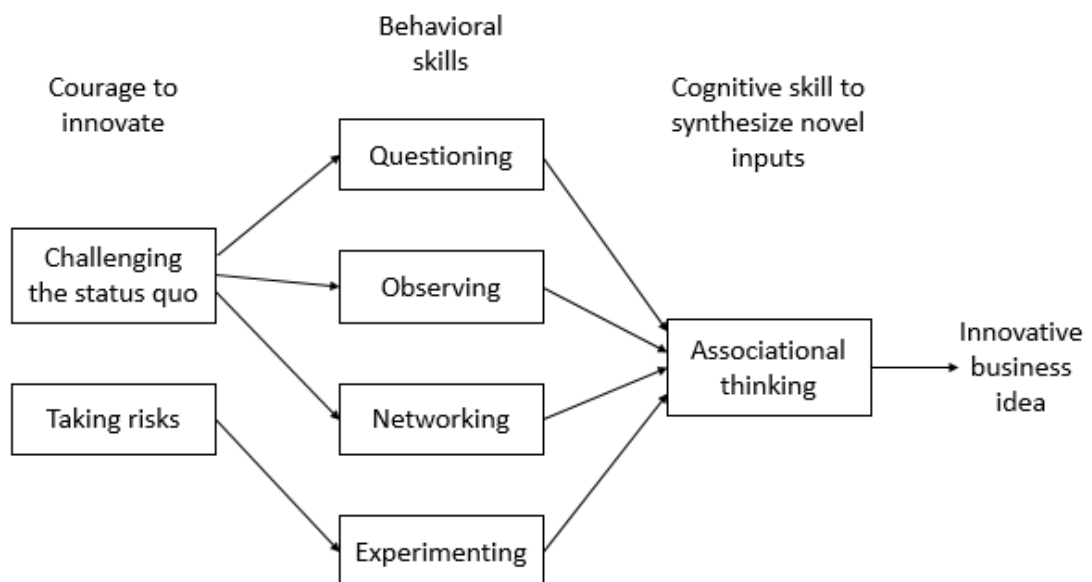


Figure 2, the innovator’s DNA model for generating innovative idea (Dyer, Gregersen and Christensen, 2011, page 27)

(Dyer, Gregersen and Christensen, 2011) describes the four behavioral skills that constitute what he calls the innovator’s DNA, or the code for generating an innovative business idea.

Questioning

“Innovators are consummate questioners who show a passion for inquiry. Their queries frequently challenge the status quo, just as Jobs did when he asked, “Why does a computer need a fan?” They love to ask, “If we tried this, what would happen?” Innovators, like Jobs, ask questions to understand how things really are today, why they are that way, and

how they might be changed or disrupted. Collectively, their questions provoke new insights, connections, possibilities, and directions. We found that innovators consistently demonstrate a high Q/A ratio, where questions (Q) not only outnumber answers (A) in a typical conversation but are valued at least as highly as good answers.” (Dyer, Gregersen and Christensen, 2011, page 23)

Observing

“Innovators are also intense observers. They carefully watch the world around them—including customers, products, services, technologies, and companies—and the observations help them gain insights into and ideas for the new ways of doing things. Jobs’s observation trip to Xerox PARC provided the germ of insight that was the catalyst for both the Macintosh’s innovative operating system and mouse, and Apple’s current OSX operating system.” (Dyer, Gregersen and Christensen, 2011, page 24)

Networking

“Innovators spend a lot of time and energy finding and testing ideas through a diverse network of individuals who vary wildly in their backgrounds and perspectives. Rather than simply doing social networking or net working for resources, they actively search for new ideas by talking to people who may offer a radically different view of things” (Dyer, Gregersen and Christensen, 2011, page 24)

Experimenting

“Finally, innovators are constantly trying out new experiments and piloting new ideas. Experimenters unceasingly explore the world intellectually and experientially, holding convictions at bay and testing hypotheses along the way. They visit new places, try new things, seek new information and experiment to learn new things. Jobs, for example, has tried new experiences all his life.” (Dyer, Gregersen and Christensen, 2011, page 24-25)

As both John Cleese and Jeff Dyer describe that creativity is not purely cognitive skill and human behavior and external environment can have a create effect on the ability for individual to be creative. This creates a good opportunity for innovation management to foster the organizational environment to support these human behaviors that support creativity. This can be supported by management behavior and applying resources to innovation efforts described in Chapter 3.2.

2.4 Innovation environment

In Chapter 2.3, we concluded that individual creativity is affected by the individual's behavior patterns and the external environment. In the Amabile's study on organizational behavior describes the qualities of environment that promotes individual creativity with the following qualities.

1. **Freedom (74%):** Freedom in deciding what to do or how to accomplish the task, a sense of control over one's own work and ideas. The most important type of freedom, as described by these interviewees, is operational autonomy.
2. **Good Project Management (65%):** a manager who serves as a good role model, is enthusiastic, has good communication skills, protects the project team from outside distractions and interference, matches tasks to workers' skills and interests, and sets a clear direction without managing too tightly.
3. **Sufficient resources (52%):** access to necessary, including facilities, equipment, information, funds and people.
4. **Encouragement (47%):** Management enthusiasm for new ideas, creating an atmosphere free of threatening evaluation.
5. **Various Organizational Characteristics (42%):** A mechanism for considering new ideas, a corporate climate marked by cooperation and collaboration across levels and divisions, an atmosphere where innovation is prized and failure is not fatal.
6. **Recognition (35%):** a general sense of that creative work will receive appropriate feedback, recognition, and reward.
7. **Sufficient Time (33%):** time to think creatively about the problem, to explore different perspective rather than having to impose an already determined approach.
8. **Challenge (22%):** a sense of challenge arising from the intriguing nature of the problem itself or its importance to the organization (internalized by the individual as a personal sense of challenge)
9. **Pressure (12%):** a sense of urgency that is internally generated from competition with outside organizations, or from a general desire to accomplish something important.

Study also describes qualities that inhibit creativity with following qualities.

1. **Various organizational characteristics (42%):** inappropriate reward systems in the organization: excessive red tape: a corporate climate marked by a lack of cooperation across divisions and levels, little regard for innovation in general.
2. **Constraint (48%):** lack of freedom in deciding what to do or how to accomplish the tasks, lack of sense of control over one's own work and ideas.
3. **Organizational Disinterest (39%):** a lack of organizational support, interest, or faith in a project; a perceived apathy toward any accomplishments coming from the project.
4. **Poor Project Management (37%):** manager unable to set clear direction, manager with poor technical or communication skills, manager who controls too tightly or allows distractions and fragmentation of the team's efforts.
5. **(tied rank) Evaluation (33%):** inappropriate or inequitable evaluation and feedback systems, unrealistic expectations, an environment focused on criticism and external evaluation.
6. **(tied rank) Insufficient Resources (33%):** a lack of appropriate facilities, equipment, materials, funds, or people.
7. **(tied rank) Time Pressure (33%):** insufficient time to think creatively about the problem; too great a workload within an unrealistic time frame; high frequency of "fire-fighting."
8. **Overemphasis on the Status Quo (26%):** reluctance of managers or co-workers to change their way of doing things; an unwillingness to take risks.
9. **Competition (14%):** interpersonal or intergroup activity within the organization, fostering a self-defensive attitude.

Amabile's study concluded that creativity promoters and creativity inhibitor's qualities have clear opposites that create clear qualities that should be promoted in order to create the optimal environment for human creativity. The opposites that need promoting is the following:

Freedom vs Constraint *"Freedom was the most prominent environmental promoter of creativity, and constraint was the second most prominent environmental inhibitor of creativity."* (Amabile, 1988, page 148)

Project management *“A good project manager is skilled technically and socially, and can successfully protect the project team. The poor manager is unskilled and allows distractions or fragmentation of the team's efforts.”* (Amabile, 1988, pages 148-149)

Organizational climate *“Good organizational climate is marked by cooperation and collaboration among different areas of the organization; poor organizational climate is marked by the absence of these factors.”* (Amabile, 1988, page 149)

Resources and time *“Sufficient time and sufficient resources serve as stimulants to creativity, insufficient time and insufficient resources serve as obstacles.”* (Amabile, 1988, page 148-149)

Despite the presence of clear opposites in Amabile's study, not all of the elements listed as environmental factors are quite so straightforward. There need to be balance in the following environmental factors:

Goal setting *“Project managers can stifle creativity if their goal setting is either too loose or too tight. If they fail to provide a clear direction for the project as a whole, if they fail to carefully conceptualize and communicate the overall mission, members of the project team may make fragmented and disjointed efforts (at best) or may fail to make any efforts at all (at worst). On the other hand, if project managers attempt to manage too tightly at the procedural level—the day-to-day carrying out of specific tasks—team members may become demotivated and their efforts may be uninspired rote responses.”* (Amabile, 1988, page 149)

Reward and bonuses *“If employees feel that every move they make is tied to bonuses, awards, salary increases, or promotions, they are unlikely to take risks trying out new ideas. On the other hand, if there are no rewards for creative efforts, employees may feel that creativity is not valued by the organization. The trick is to establish a reward system that generously and equitably recognizes and rewards good work (a good effort as well as a good outcome) after it has been produced, without holding out salient rewards as carrots for each phase of each task.”* (Amabile, 1988, page 149)

Evaluation *“Evaluation pressure, where people feel threatened by unfavorable performance reviews for failures, can lead to extremely low levels of risk-taking and, as a result, low levels of creativity. On the other hand, people do need to feel that attention is being paid to their work that management cares about it enough to find out what is going on, and to give constructive feedback. The nature and timing of the feedback are crucial. If employees only find out “how they are doing” once or twice a year in very formal performance appraisal settings, creativity is likely to be undermined. If, however, there is a constant, constructive, less formal exchange of information about a project’s progress on the part of all team members and management, evaluation can be seen as useful and supportive.”* (Amabile, 1988, page 149)

Pressure *“On the list of inhibitors to creativity, we find time pressure and competition (which is another form of pressure). But competition also appears on the list of creativity promoters, as one of a few pressure sources that can actually stimulate creativity; time pressure appears there, too. It appears that a balanced amount of pressure is appropriate to creativity. If there is no sense of time urgency, people may feel that their project is unimportant. If time pressure is too great, it may force people to take the simplest, most unimaginative route. (Recall the maze metaphor.) If competition is perceived as threatening, as is often the case with in-group competition, creativity will tend to be affected negatively. But positive effects on creativity can result if competition with an outside group or corporation pulls the team closer together. Under these circumstances, the competition may just add to the positive tension of challenge.”* (Amabile, 1988, page 149-150)

Amabile’s study creates a good image of an environment that promotes and removes obstacles from human creativity. Another good characteristic of innovative company is the ability to create and share knowledge. Ikujiro Nonaka in his article in “The Knowledge-Creating Company” describes characteristics of an organization that is able to manage both tacit and explicit knowledge.

Nonaka promotes “From Chaos to Concept” model that promotes the following actions to manage the Knowledge- Creating Company:

“The company organizes product-development teams according to “the principle of internal competition.” A team is divided into competing groups that develop different approaches to the same project and then argue over the advantages and disadvantages of their proposals.” (Nonaka, 2007, page 168)

“Another way to build redundancy is through strategic rotation, especially between different areas of technology and between functions such as R&D and marketing. Rotation helps employees understand the business from the multiplicity of perspectives.” (Nonaka, 2007, page 169)

“Free access to company information also helps build redundancy. When information differentials exist, members of an organization can no longer interact on equal terms, which hinders the search for different interpretations of new knowledge.” (Nonaka, 2007, page 169)

“No one department or group of experts has the exclusive responsibility for creating new knowledge in the knowledge creating company. Senior managers, middle managers, and frontline employees all play a part.” (Nonaka, 2007, page 169)

“Senior managers give voice to a company’s future by articulating metaphors, symbols, and concepts that orient the knowledge-creating activities of employees. They do this by asking the questions, What are we trying to learn? What do we need to know? Where should we be going? Who are we? If the job of frontline employees is to know ‘what is,’ then the job of senior executives is to know ‘what ought to be.’” (Nonaka, 2007, page 170)

“Another way top management provides employees with a sense of direction is by setting the standards for justifying the value of the knowledge that is constantly being developed by the organization’s members. Deciding which efforts to support and develop is a highly strategic task. In most companies, the ultimate test for measuring the value of new knowledge is economic – increased efficiency, lower costs, improved ROI. But in the knowledge-creating company, other, more qualitative factors are equally important. Does the idea embody the company’s vision? Is it an expression of top management’s aspirations and strategic goals? Does it have the potential to build the company’s organizational knowledge network?” (Nonaka, 2007, page 170)

“It is important to emphasize that a company’s vision needs also to be open-ended, susceptible to a variety of different and even conflicting interpretations. At first glance, this may seem contradictory. After all, shouldn’t a company’s vision be unambiguous, coherent, and clear? If a vision is too unambiguous, however, it becomes more akin to an order or an instruction. And orders do not foster the high degree of personal commitment on which effective knowledge creation depends. A more equivocal vision gives employees and work groups the freedom and autonomy to set their own goals. This is important because while the ideals of senior management are important, on their own they are not

enough. The best that top management can do is to clear away any obstacles and prepare the ground for self-organizing groups or teams. Then, it is up to the teams to figure out what the ideals of the top mean in reality.” (Nonaka, 2007, page 171)

“Teams play a central role in the knowledge-creating company because they provide a shared context where individuals can interact with each other and engage in the constant dialogue on which effective reflection depends. Team members create the new points of view through dialogue and discussion. They pool their information and examine it from various angles. Eventually, they integrate their diverse individual perspectives into a new collective perspective.” (Nonaka, 2007, page 171)

“As team leaders, middle managers are at the intersection of the vertical and horizontal flows of information in the company. They serve as a bridge between the visionary ideals of the top and the often chaotic market reality of those on the front line of the business. By creating midlevel business and product concepts, middle managers mediate between ‘what is’ and ‘what should be.’ They remake reality according to the company’s vision.” (Nonaka, 2007, page 171)

While Amabile’s study points out environment that promotes creativity and Nonaka’s model describes organization that is good at knowledge management these are both important models in the fuzzy front end of innovation. As both models give practical advice on how to improve innovation environment. Chapter 3.2 describes a model of innovation programs that aim to generate environments that have the same characteristics that Amabile’s and Nonaka’s models aim for.

2.5 Open Innovation

In Chapter 2.4 we Nonaka and Amabile describe effective internal innovation environment. Both of these models lack the importance of realizing that knowledge and innovations exist outside of the internal organization. If we tap into the external sources for innovations and realize that we don't have to develop everything by our self.

Open innovation was promoted by Henry Chesbrough to improve the use of internal and external knowledge to improve the innovation process.

“Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (Chesbrough, 2003)

Chesbrough argues that in Closed Innovation paradigm innovations are reserved to specific R&D department that has been assigned the responsibility to do research and create new innovations. This limits the diversity and amount of ideas generated. When people creating ideas have the same background, they tend to rely on the same proven or accepted approaches. Ideas generated outside are rejected because of “Not invented here” (NIH) principle. This leads to not using third party solutions because of their external origins and R&D department invents the wheel again and again even if similar solution already exists.

“Not invented here” (If a technology was not produced inside a company (i.e., not invented here), the company could not be sure of the quality, performance, and availability of the particular technology.) (Chesbrough, 2003, page 30)

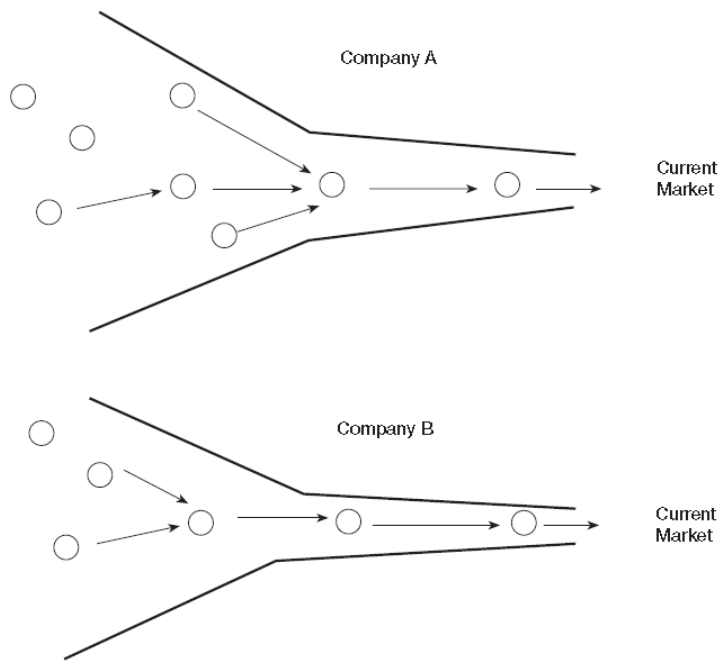


Figure 3, *The Knowledge landscape in Closed Innovation* (Chesbrough, 2003, page 31)

The open innovation in Chesbrough's concept seeks to tackle this problem by emphasizing the importance of searching and sharing ideas outside your own organization.

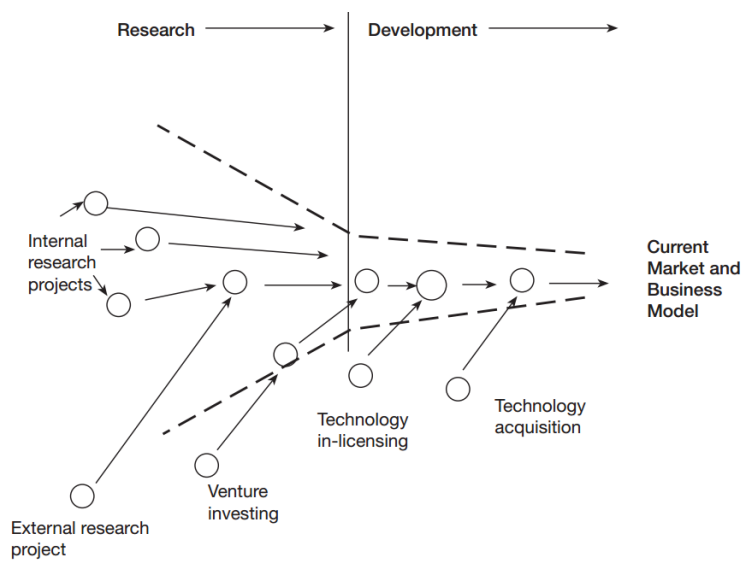


Figure 4, *filling the gaps with external technologies* (Chesbrough, 2003, page 183)

According to (Chesbrough, 2003) many companies have problems exploiting their own research results and ideas because they don't fit their current business model. Changing their business model to fit the needs of new business would lead them to lose the focus on the core business. This leaves a lot of research result to be left "sitting on the shelf" and waiting for a moment when they can be exploited. Instead of managing intellectual property (IP) as a way to exclude anyone else from using your technology, you should manage IP to advance your own business model and to profit from your rivals' use. This creates possibilities on sharing research results and ideas between companies and enables the creation of start-up and spin offs companies that will be free to exploit ideas on their own and not disturbing the original company's business.

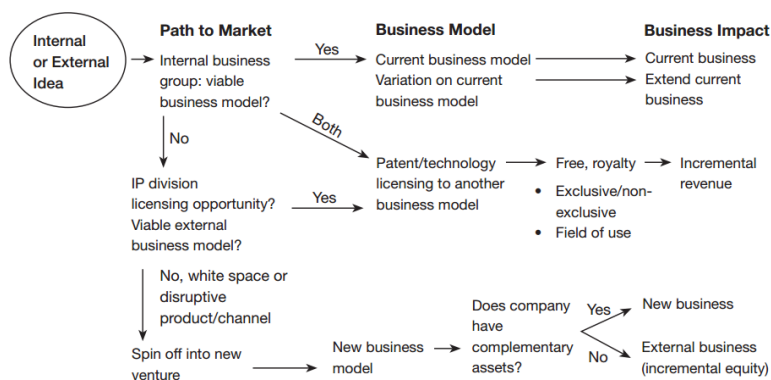


Figure 5, alternative paths to market (Chesbrough, 2003, page 188)

In order to exploit open innovation concept (Chesbrough, 2003, page 53) argues that internal R&D's focus needs to be to:

- To identify, understand, select and connect to the wealth of available external knowledge
- To fill in the missing pieces of knowledge not being externally developed
- To integrate internal and external knowledge to form more complex combinations of knowledge, to create new systems and architectures
- To generate additional revenues and profits from selling research outputs to other firms for use into their own systems

Benefits of the open innovation concept (Chesbrough, 2003)

- Enabling innovation beyond their normal areas of expertise.
- Allowing access to a wider range of innovative ideas from which they choose which to take forward for commercialization.
- Reduces the risks of innovation by transforming potential competitors into collaborators.
- Provides faster returns (monetization of value) through the manufacture, marketing and distribution of new products

Erosion Factors that are causing open innovation (Chesbrough, 2003, pages 34-40)

- The Increasing Availability and Mobility of Skilled Workers
- The Venture Capital Market
- External Options for Ideas Sitting on the Shelf
- The Increasing Capability of External Suppliers

Chesbrough's Open Innovation model supports effectively searching ideas also from outside of your organization. This model also benefits the execution and launching of the innovation because you can benefit from good partnerships and have included external stakeholders in your innovation process in already in the early stages.

2.6 Innovation system architecture

Dundon introduces a systematic approach to innovation where ideas can be created and moved through the system into application. The Innovation system architecture model describes a design of optimal organizational environment of “innovation centric” organization. The model consists of eight key pillars that define architecture for building and sustaining innovations.

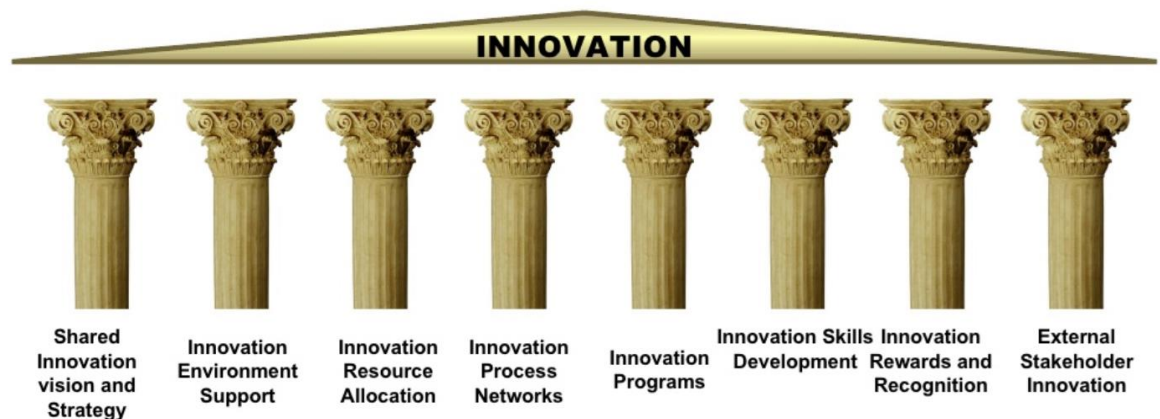


Figure 6, pillars of organizational innovation (Dundon, 2002)

Pillar #1: Shared Innovation vision and strategy

Dundon argues that strong organizations need to encourage everyone to look for new ideas, not just some department in the organization. This requires a shared innovation vision and strategy to be communicated through organization that can be accomplished in four steps.

1. Discuss what the concept of innovation means for your organization
2. Develop an innovation vision statement for the organization
3. Develop an innovation strategy for integrating your organization’s diverse innovation activities so that the overall goal of the innovation can be supported.
4. Communicate that innovation is an organizational goal and that everyone is encouraged to participate in developing their own and as well as the organizations innovation strategy.

Dundon description of effective innovation has the similarities of Nonaka’s description of corporate vision in Chapter 2.44

Pillar #2: Innovation Environment supports

Dundon promotes creating innovation environment that encourages innovation efforts by actual practices and behaviors, not simply by the statements of “principles and policies” of what innovation environment could be. Innovation environment creates a free environment where employees feel free to challenge each other and experiment with alternative approaches.

Dundon’s description of effective innovation environment resembles the Amabile’s innovation environment described in Chapter 2.4.

Pillar #3: Innovation Resource Allocation

Dundon argues that organizations have resources to fund more innovative efforts but are unwilling to take risks and hide behind financial hurdles or processes that serve to protect status quo and slow down the innovations process. Dundon present four actions that add more resources to innovation efforts.

1. Allowing more time for the innovation process, especially during the early phase of exploring new opportunities and ideas
2. Allowing more time for innovation champions to lead and coordinate their team’s innovation efforts.
3. Redesigning the planning and budget process to allow for more flexibility in funding the investigation, development and implementation of new ideas.
4. Widening the access to capital, especially for ideas in the seed phase.

Dundon’s description of organization that is unwilling to invest in innovation has the same characteristics as organization that is only investing in the first horizon of Mehrdad Baghai’s three horizons in Chapter 2.2. Investing in innovation also improves the innovation environment in pillar #2.

Pillar #4: Innovation Process Network

For innovation process network Dundon proposes to develop procedures to identify, develop, and implement innovative ideas quickly.

“Unless an organization has an idea-capture system, it is missing out on the opportunity to learn from the past and avoid repeating mistakes.” (Dundon, 2002, page 178).

“Adding some structure to your idea-gathering process does not have to represent added bureaucracy in your organization. The increased flow of comments and ideas should add positive energy to your organization, not results in more dead-end paperwork or wasted effort.” (Dundon, 2002, page 178)

“Establishing cross-functional or cross-organizational group idea sharing forums to share ideas and fresh perspectives” (Dundon, 2002, page 178)

“Employees are often reluctant to submit their create suggestions because they don’t understand what will happen to their ideas, how their ideas will be evaluated, how much time it will take to evaluate them, and how they might be rewarded for participating.” (Dundon, 2002, pages 178-179)

Dundon’s innovation network has resembles sharing the responsibility of creating knowledge (Nonaka, 2007) and employee encouragement and recognition (Amabile, 1988) in Chapter 2.4. Also the innovation network provides the same need for structured an innovation process that (Tidd and Bessant, 2013) describes in Chapter 2.77.

Pillar #5: Innovation Programs

Dundon proposes to create innovation programs is designed for specifically to focus everyone's attention on improving and sustaining innovation. Innovation program should have designated starting and finishing time and focus to generate new ideas in certain areas.

Pillar #6: Innovation Skills Development

Dundon emphasizes that innovative thinking is a skill that can be taught and with practice can be improved.

“Consider designing and implementing an innovation-skill development program with the objective of developing innovation as a core competency throughout the organization.” (Dundon, 2002, pages 182-183)

Dundon promotes including training elements such as:

1. Creative-thinking training so that everyone is taught to notice trends, look for alternative approaches, and make new connections
2. Strategic-thinking training so that everyone has the basic skills to develop a creative idea into a strategic one that can bring value to the organization. An understanding of the commercialization process is critical to all members of the organization, especially those in the research and development function.
3. Transformational-thinking training so that everyone can become more aware of the interconnectivity of their attitudes and behaviors and can find new ways to support innovation throughout the organization.

Pillar #7: Innovation Rewards and Recognition

Dundon emphasizes consideration on the reward and recognition policies so that they promote change and innovation over maintaining current status.

“Although the call for innovation presumes that people are ready and willing to stretch into new territory and even break rules, many organization reward the opposite, the protection of the status quo. It is important to set innovation as performance objective for everyone, regardless of the position or department. Make sure each manager discusses and sets an innovation objective for each and every member of the team.” (Dundon, 2002, page 183)

“Recognize both individual and group efforts through recognition. But remember not to put too much emphasis on the reward because people might become focused on the reward than they lose sight of the overall objective.” (Dundon, 2002, page 183)

This is very similar to Amabile's view on rewards.

“If employees feel that every move they make is tied to bonuses, awards, salary increases, or promotions, they are unlikely to take risks in trying out new ideas. On the other hand, if there are no rewards for creative efforts, employees may feel that creativity is not valued by the organization.” (Amabile, 1988, page 149)

Pillar #8: External Stakeholder Innovation

Dundon emphasizes to look beyond your own organization for innovations.

“All too often, organizations rely primarily on ideas generated internally instead of capitalizing on ideas from both inside and outside the organization. In addition to broadening their perspective via Internet, research reports and tradeshow each innovation team should connect with teams outside its organization to form a community of extended stakeholders, including customers, suppliers, regulatory agencies, other partners, and even competitors.” (Dundon, 2002, page 184)

Dundon suggest following actions to strengthening stakeholder network

1. Create alliances with the players at the beginning of the design and production process. Work with them to shorten product-development cycles, cut costs, and capitalize on technological breakthroughs.
2. Create alliances with the players at the implementation and follow-up phases of the process. Work with then to develop more innovative ways to find and service customers.
3. Create alliances with other organizations that may be offering products and services similar to yours.

Dundon’s external stakeholder innovation has strong similarity to Chesbrough’s Open innovation concept.

“Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (Chesbrough, 2003)

2.7 Innovation process model

Tidd and Bessant (2013) argues that successful innovation management is primarily about building and improving effective routines and learning to do this comes from recognizing and understanding effective routines and facilitating their emergence across the organization. “Innovation is a process, not a single event, and needs to be managed as such”.

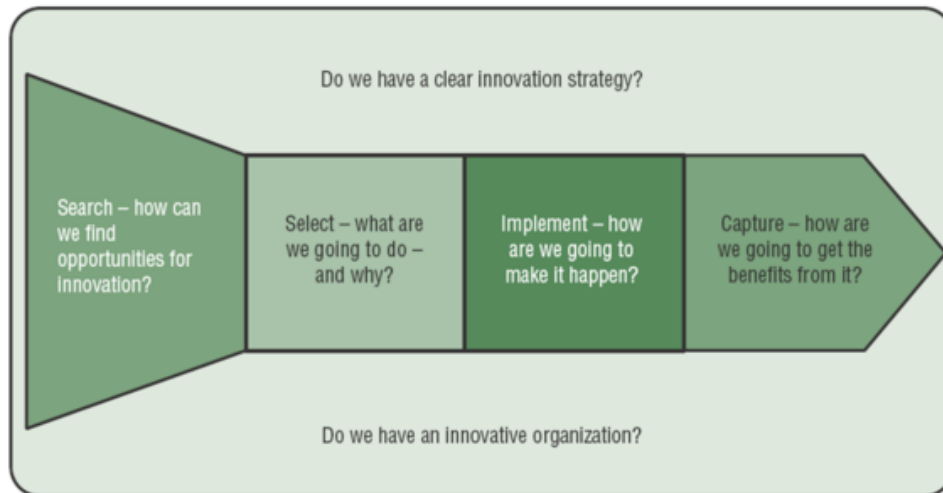


Figure 7, a model of innovation process (Tidd and Bessant, 2013, page 60)

The Joe Tidds innovation process model consists of four phases search, select, implementation and capture.

Search phase

The Joe Tidd’s first search phase involves detecting signals in the environment about potential sources of change. Most innovations come from interplay between several forces and, some coming from the need for change pulling through innovation and others from the push which comes from new opportunities. Successful innovation management needs to have well-developed mechanism for identifying, processing and selecting information from environment. Organizations don’t search in infinite space but rather in places where they expect find something helpful.

The search phase describes the same effort that “(Baghai, Coley and White, 2000)” promoted as the ways to manage the horizon 3 in Chapter 2.2. The search phase supported with innovation programs in Chapter 3.2 as a means to push resources on finding information from the most likely sources.

Selection phase

Purpose of the selection phase is to resolve the inputs into an innovation concept which can be further progressed through the development organization. In the selection phase selection is done from three different input signals.

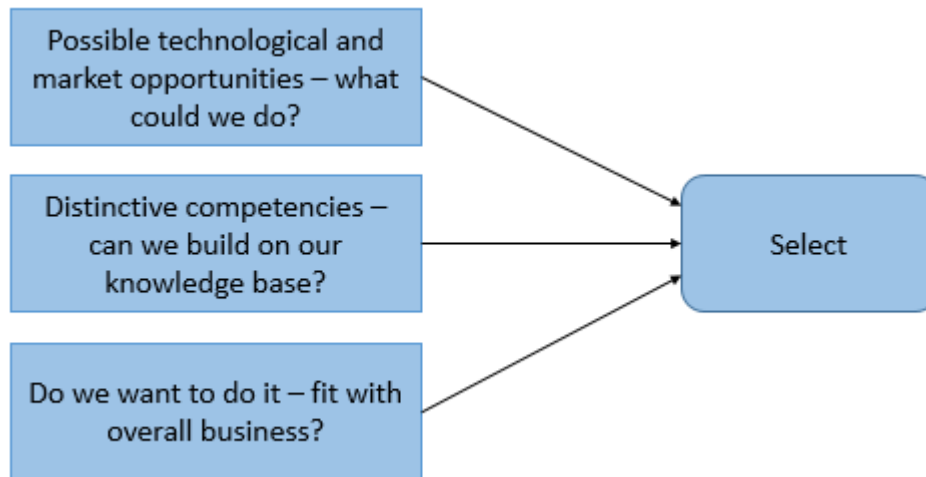


Figure 8, Key questions in the select phase (Tidd and Bessant, 2013, page 90)

1. Possible technological and market opportunity
2. The current knowledge base of the firm and its distinctive competence
3. Fit with the overall business

Selection should not prevent to move to new areas of competence. There needs to be an element of change if there is to be any learning. However, rather there needs to be balance and a development strategy.

After having picked up relevant trigger signals and made a strategic decision to pursuing some of them, the next key phase is actually turning those potential ideas into some kind of reality. New product or service, a change process, a sifting business model, and so on. The implementation phase can be seen as one that gradually pulls together different pieces of knowledge and weaves them into innovation.

The (Tidd and Bessant, 2013) selection phase provides a similar way for management to “setting the standards for justifying the value of the knowledge that is constantly being developed by the organization’s members” that (Nonaka, 2007, page 170) was promoting in Chapter 2.4 and provides the purpose for the selection of ideas in Chapter 3.3.

Implement phase

Having picked up relevant triggers signals and made strategic decision to pursuing some of them, the next key is actually turning those potential ideas into some kind of reality. New product or service, a change process, a shift in the business model, and so on.

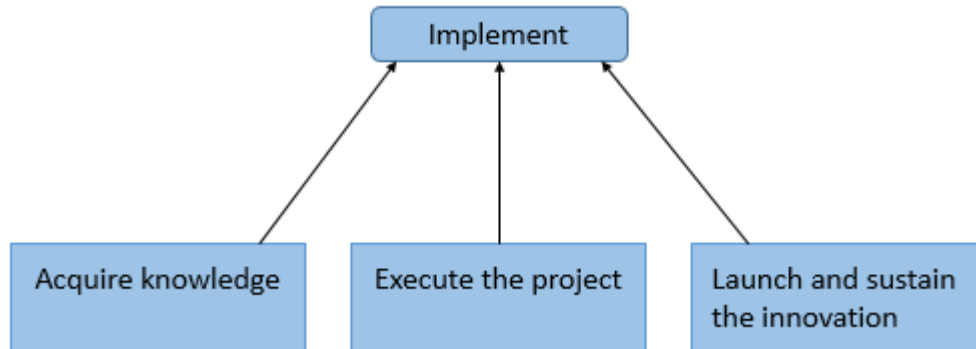


Figure 9, Key questions in the implement phase (Tidd and Bessant, 2013, page 91)

Based on (Tidd and Bessant, 2013) acquiring knowledge involves combining new and existing knowledge (available within and outside of the organisations) to offer a solution to the problem. It involves both generation of technological knowledge and technological transfer. As such it represents a first draft of the solution, and it is likely to change considerably in its development. This can be supported by the open innovation model (Chesbrough, 2003) in Chapter 2.5 and the initialing and planning process groups of (Project Institute, 2013) at Chapter 2.9. These efforts are visible in the innovation process as project proposals in Chapter 3.4.

Joe Tidd's emphasizes that executing the project forms the heart of the innovation process. Its inputs are clear strategic concept and some initial ideas for realizing the concept. Its outputs are both a developed innovation and a prepared market (internal or external), ready for launch. The executing phase can be managed with executing process group of (Project Institute, 2013) an is visible in innovation process as executing and launching project at Chapter 3.5

Joe Tidd's describes that in the launch and sustaining phase innovation (new products, services or process) brings the need to understand the dynamics of adoption and diffusion. The underlying process of adoption of something new typically involves a sequence of awareness, interest, trial, evaluation and adoption. The successful implementation of internal (process) innovation also requires skilled change management and stresses communication, involvement, and interventions to minimize resistance to change. Under-

standing user needs has always been a critical determinant of innovation success and one way of achieving this is by bringing users into the loop at much earlier stages.

Capture value

Tidd and Bessant emphasizes that his model's capturing value phase that the purpose of innovating is rarely to create innovations in their own sake but rather to capture some kind of value from them.

“Be it commercial success, market share, cost reduction or as in social innovation changing the world. History abounds with examples that success in the technical level but which fail to deliver value or archive it briefly, only to have the advantage to compete away by imitators.” (Tidd and Bessant, 2013, page 94)

Tidd and Bessant describes that inevitable outcome of the launch of an innovation is the creation of new stimuli for restarting the cycle. If the product/service offering or change process fails, this offers valuable information about what to change for next time. But although the opportunities emerge for learning and development of innovations and the capability to manage the process which created them, they are not always taken up by organisations. Amongst the main requirement in this stage is the willingness to learn from completed projects.

Tidd and Bessant supports the argument in Chapter 3.6 that the captured value from the innovation process is not only business value but also knowledge on what was done right or wrong and can stimulate new innovations.

2.8 Innovation audit

In order to define how the innovation process can improve organisations innovation management capability we need a model that can measure the overall innovation capability.

Tidd and Bessant promotes the diamond innovation framework with 5 dimensions for innovation assessment. Framework was analyzed in a study on “How to measure organizational Innovativeness?” by (Gamal, Salah And Elrayyes, 2011) as following:

1. Strategy

“In this dimension, three major areas are identified. First is whether the company has a well-managed strategic planning process in place. Second is whether innovation is appreciated by the entire organization and thus incorporated within the corporate strategy. Third is whether the company has put in place mechanisms that will effectively implement the corporate strategy.” (Gamal, Salah And Elrayyes, 2011)

2. Process

This dimension considers the robustness and flexibility of the organization's new product development (NPD) process and whether it brings the attention of everyone involved into the customer's need (as opposed to just marketing focusing on the customer's need). In this dimension, organization's ability to manage its internal processes is also considered. (Gamal, Salah And Elrayyes, 2011)

3. Organization

In this dimension, two major areas are considered. The first would be whether the organizational structure encourages, rather than stifles, innovation through effective top-down, bottom-up, and lateral communication and coordination within the firm. Second, and just as important, is whether management has put in place a system that encourages employees to bring forth new ideas. (Gamal, Salah And Elrayyes, 2011)

4. Linkages

In this dimension, the focus is on the firm's ability to create healthy relationships with external entities such as suppliers, customers, the academe, firms from other industries, specialist individuals, as well as competitors. With a look at the potential of these links to provide knowledge/information to the firm. (Gamal, Salah And Elrayyes, 2011)

5. Learning

Four major areas in this dimension. First, it tries to gauge the organization's commitment to the training and development of its employees. Second, the organization's ability to gather knowledge/information from its linkages. Third, the firm's ability to learn from its successes and failures. Finally, the firm's ability to share these learnings to the entire organization. (Gamal, Salah And Elrayyes, 2011)

Based on these five dimensions organizational innovation capability can be mapped into an innovation profile that can help to analyze the strength and weaknesses areas of the organization.

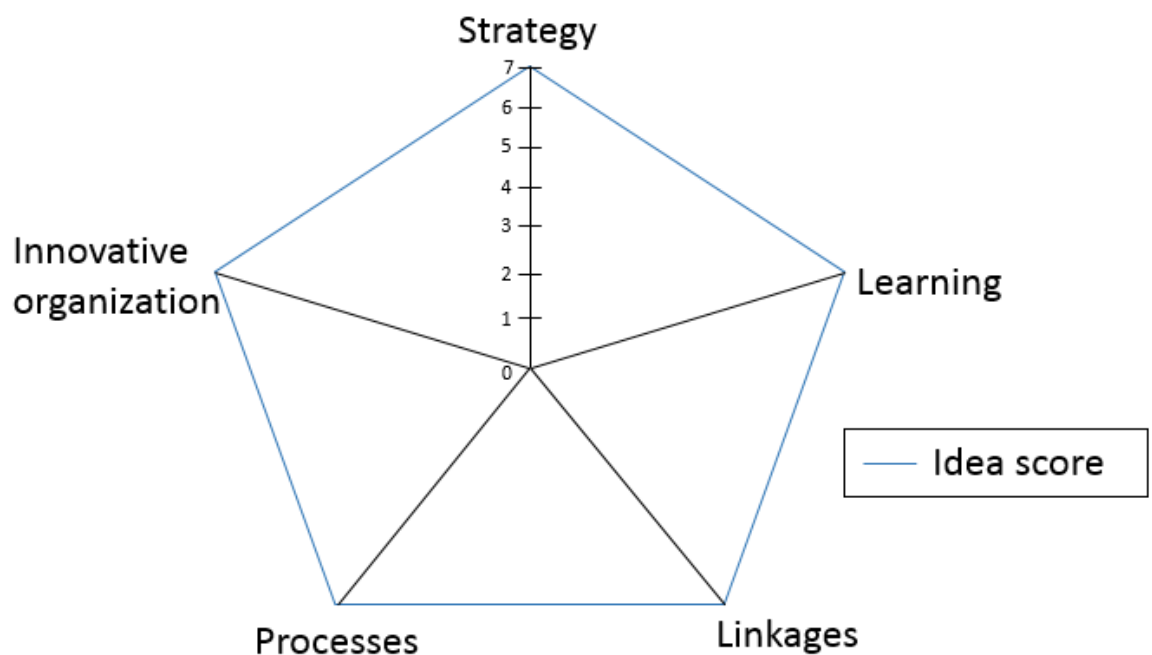


Figure 10, Innovation audit model (Tidd and Bessant, 2013, page 637)

The dimensions of Joe Tidd's innovation audit model provide a good basis for the analysis of the effects of the innovation process and the implementation of a software tool for support the innovation management in Chapter 3.7.

2.9 PMBOK's project management process groups

In the innovation process, the actual project management phases are split into project candidate/proposal and the project execution phase. How these phases are managed depends highly on the purpose of the project and the organization should develop their own framework. To support high level portfolio management the alternative frameworks to PMBOK could be PRINCE2 or more agile SAFE model. Scum as a project management model won't be sufficient alone because it lacks the support for project portfolio management.

According to PMBOK project management process is divided into five process groups that interact with each other in the lifespan of the project.

Initiating Process Group

PMBOK states that the key purpose of initiating process group is to align the stakeholders' expectations with the project purpose, give them visibility about the scope and objectives, show how their participation in the project and its associated phases can ensure that their expectations are achieved. These processes help set the vision of the project—what is needed to be accomplished.

The Initiating Process Group consists of those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase. Within the Initiating processes, the initial scope is defined and initial financial resources are committed. Internal and external stakeholders who will interact and influence the overall outcome of the project are identified. If not already assigned, the project manager will be selected. This information is captured in the project charter and stakeholder register. When the project charter is approved, the project becomes officially authorized. Although the project management team may help write the project charter, this standard assumes that business case assessment, approval, and funding are handled externally to the project boundaries. (Project Institute, 2013, page 54)

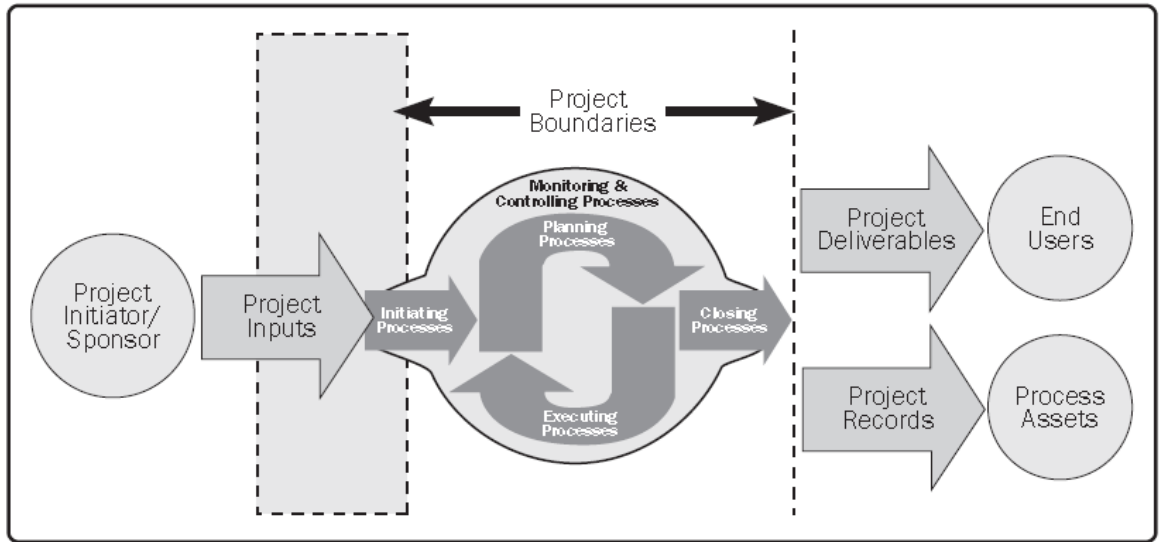


Figure 3-4. Project Boundaries

Figure 11, Project boundaries (Project Institute, 2013, page 54)

Planning Process Group

PMBOK states that the key benefit of this Process Group is to delineate the strategy and tactics as well as the course of action or path to successfully complete the project or phase. When the Planning Process Group is well managed, it is much easier to get stakeholder buy-in and engagement.

The Planning Process Group consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives. The Planning processes develop the project management plan and the project documents that will be used to carry out the project. (Project Institute, 2013, page 55)

According to PMBOK the project management plan and project documents developed as outputs from the Planning Process Group will explore all aspects of the scope, time, cost, quality, communications, human resources, risks, procurements, and stakeholder engagement.

Executing Process Group

During project execution, results may require planning updates and rebaselining. This may include changes to expected activity durations, changes in resource productivity and availability, and unanticipated risks. Such variances may affect the project management plan or project documents and may require detailed analysis and development of appropriate project management responses. The results of the analysis can trigger change requests that, if approved, may modify the project management plan or other project documents and possibly require establishing new baselines. A large portion of the project's budget will be expended in performing the Executing Process Group processes. (Project Institute, 2013, page 56)

Monitoring Process Group

"The Monitoring and Controlling Process Group consists of those processes required to track, review, and orchestrate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes. The key benefit of this Process Group is that project performance is measured and analyzed at regular intervals, appropriate events, or exception conditions to identify variances from the project management plan. " (Project Institute, 2013, page 57)

According to the PMBOK the monitoring and controlling process group also involves:

- Controlling changes and recommending corrective or preventive action in anticipation of possible problems.
- Monitoring the ongoing project activities against the project management plan and the project performance measurement baseline, and
- Influencing the factors that could circumvent integrated change control or configuration management so only approved changes are implemented.

"This continuous monitoring provides the project team insight into the health of the project and identifies any areas requiring additional attention. The Monitoring and Controlling Process Group not only monitors and controls the work being done within a Process Group, but also monitors and controls the entire project effort. In multiphase projects, the Monitoring and Controlling Process Group coordinates project phases in order to implement corrective or preventive actions to bring the project into compliance with the project management plan. This review can result in recommended and approved updates to the project management plan. For example, a missed activity finish date may require adjustments and trade-offs between budget and schedule objectives. In order to reduce or control" (Project Institute, 2013, page 57)

Closing Process Group

“The Closing Process Group consists of those processes performed to conclude all activities across all Project Management Process Groups to formally complete the project, phase, or contractual obligations. This Process Group, when completed, verifies that the defined processes are completed within all of the Process Groups to close the project or a project phase, as appropriate, and formally establishes that the project or project phase is complete. This Process Group also formally establishes the premature closure of the project. Prematurely closed projects may include, for example: aborted projects, cancelled projects, and projects having a critical situation. In specific cases, when some contracts cannot be formally closed (e.g. claims, termination clauses, etc.) or some activities are to be transferred to other organizational units, specific hand-over procedures may be arranged and finalized.” (Project Institute, 2013, pages 57-58)

At project or phase closure according to PMBOK, the following may occur:

- Obtain acceptance by the customer or sponsor to formally close the project or phase.
- Conduct post-project or phase-end review.
- Record impacts of tailoring to any process.
- Document lessons learned.
- Apply appropriate updates to organizational process assets.
- Archive all relevant project documents in the project management information system (PMIS) to be used as historical data
- Close out all procurement activities ensuring termination of all relevant agreements.
- Perform team members’ assessments and release project resources.

Process Group interactions

According to the PMBOK the complex nature of project management may require the use of repeated feedback loops for additional analysis. As more project information or characteristics are gathered and understood, additional planning will likely be required. Significant changes occurring throughout the project life cycle trigger a need to revisit one or more of the planning processes and possibly some of the initiating processes.

Updates arising from approved changes during the project (generally during monitoring and controlling processes and specifically during the Direct and Manage Project Work Process) may significantly impact parts of the project management plan and the project documents.

PMBOK's project management process groups are linked by the outputs which are produced but the process groups are seldom either discrete or one-time events; they are overlapping activities that occur throughout the project. The output of one process generally becomes an input to another process or is a deliverable of the project, subproject, or project phase.

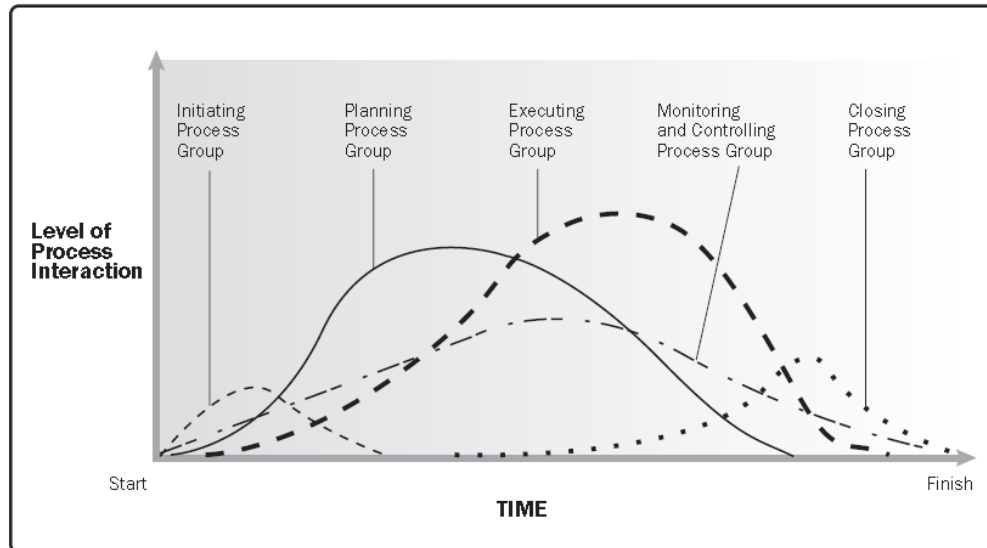


Figure 12, Process Group Interact in a Phase or Project (Project Institute, 2013, page 51)

The PMBOK's Initiating and planning process groups correlate to the acquire knowledge question in the Joe Tidd's innovation process model's implementation phase in Chapter 2.77 and to the innovation process project candidate/proposal phase described in Chapter 3.4.

The PMBOK's executing and monitoring process groups correlate to the execute project question in the implementation phase of Joe Tidd's innovation process models in Chapter 2.77 and to the "Execute and launch projects" sub-process in Chapter 3.5.

2.10 Project portfolio management

Shan Rajegopal defined the purpose of the project portfolio management process as follows: *“The portfolio management process is intended to drive project specification and prioritization via business goals, objectives, opportunities and strategies. Projects with the highest value to the organization must be identified, initiated, and brought to a successful conclusion. Throughout the life of a project the business case (cost/benefit, feasibility, market attractiveness and strategic value) must be re-evaluated (or reconfirmed) as additional funding is allocated for each successive stage of the project.”* (Rajagopal, Mcguinn and Waller, 2007, page 143).

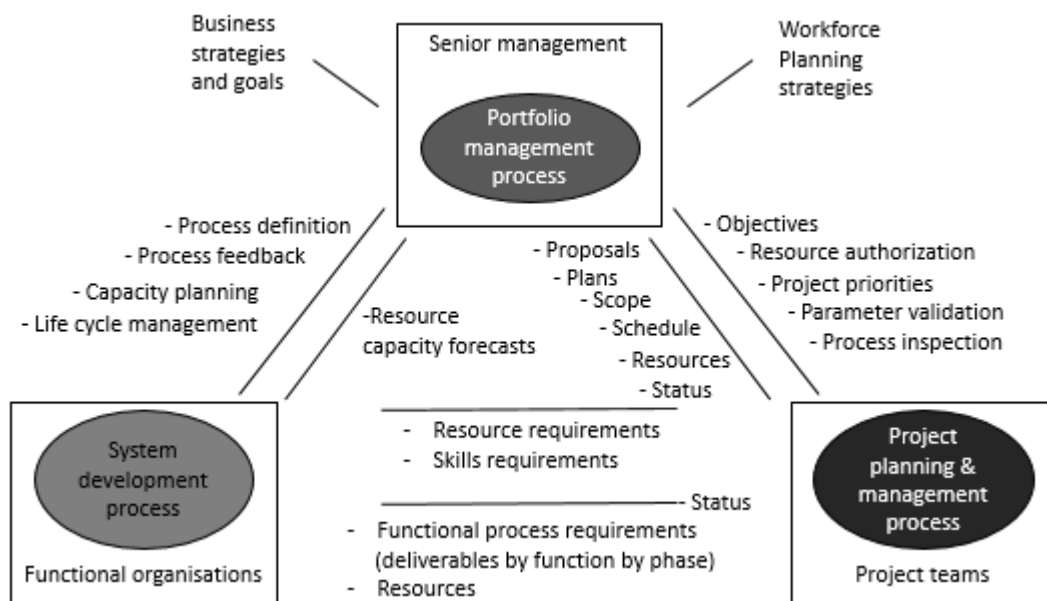


Figure 13, Portfolio process relationship (Rajagopal, Mcguinn and Waller, 2007, page 142)

Credible project planning and definition are essential to the portfolio management process. According to (Rajagopal, Mcguinn and Waller, 2007, page 143) the minimum elements necessary in order to provide the information required for effective portfolio management are:

- Project schedules (work breakdown structure, with duration estimates and dependencies)
- the resource requirements to complete individual project tasks
- phase start and end dates
- dates for deliverables
- reliable communication of project information among stakeholders
- periodic project status and resource forecast updates
- a document repository containing project documents, templates, and artifacts

Shan Rajegopal PPM model's project information is designed as a part of the innovation process in Chapter 3.4 as a part of the project metadata structure.

(Rajagopal, Mcguinn and Waller, 2007) defines that portfolio sub-structure can be comprised of domains, programs and projects shown in the figure XX. Domains enable projects to be grouped based on their strategic significance to the organization. Programs are allocated into domains based on how well they meet the domain criteria and it is possible for the program to qualify for multiple domains. Example program can be "strategic/enterprise" program and "New product" program.

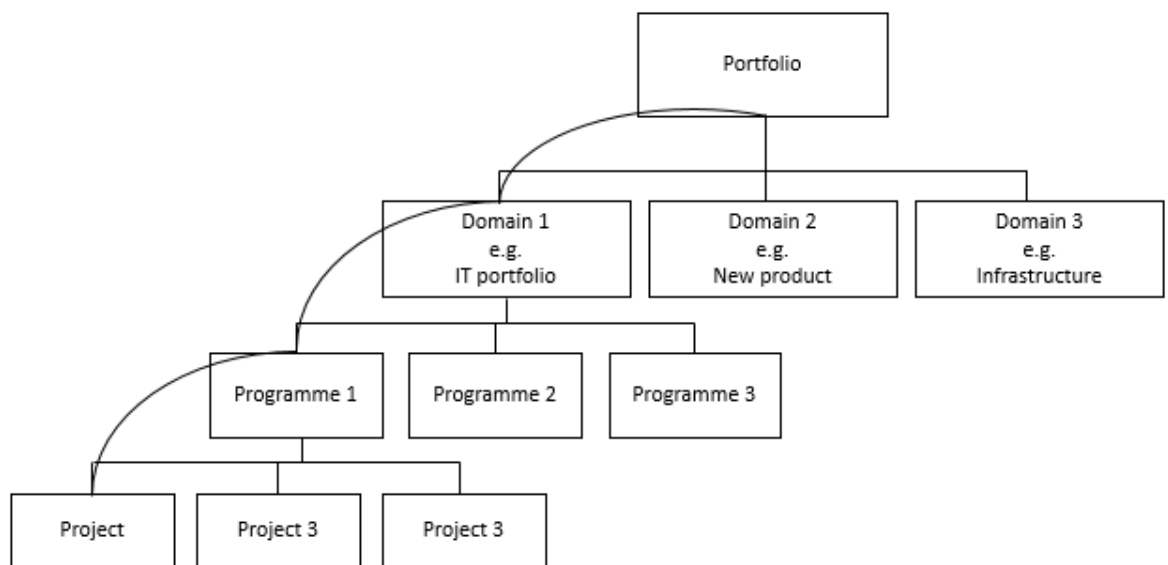


Figure 14, Portfolio sub-structure (Rajagopal, Mcguinn and Waller, 2007, page 147)

The Shan Rajegopal model in designing the project sub-structure becomes a part of the innovation process in Chapter 3.4 as a part of the PPM structure.

According to (Rajagopal, Mcguinn and Waller, 2007) when creating correct application of PPM process clear and common understanding how the organizational structure supports the managements project activities. For instance, the company can be a market driven organization, with each business unit supporting the product, service line or the infrastructure, as shown in the figure xx. For the portfolio process to be meaningful it needs to be translated into specific resource utilizations at the project level. Decision on what levels the PPM is operating needs to be made when defining PPM process.

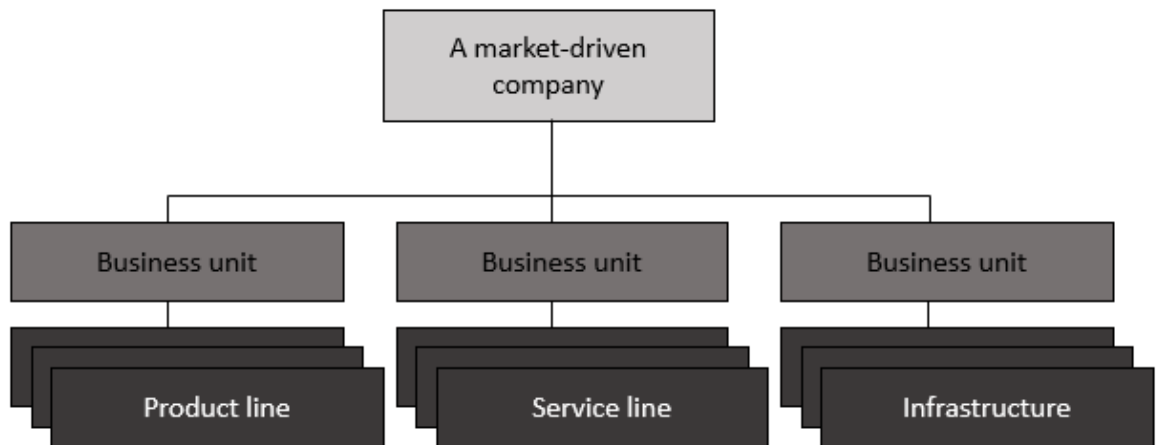


Figure 15, Portfolio management structure (Rajagopal, Mcguinn and Waller, 2007, page 147)

The Shan Rajegopal's model of linking the project to the organizational structure becomes a part of the innovation process in Chapter 3.4 as a part of the PPM structure.

3 Building innovation process to Company X

3.1 Introduction

Chapter 3 will describe building of the innovation process for Company X and link the phases of the innovation process to the theoretical framework. The basis of the process model is Keto innovation life-cycle model processes and Keto Innovation software application. Because the case study company's identity is disclosed the data and structure demonstrated is example data and not actual business data.

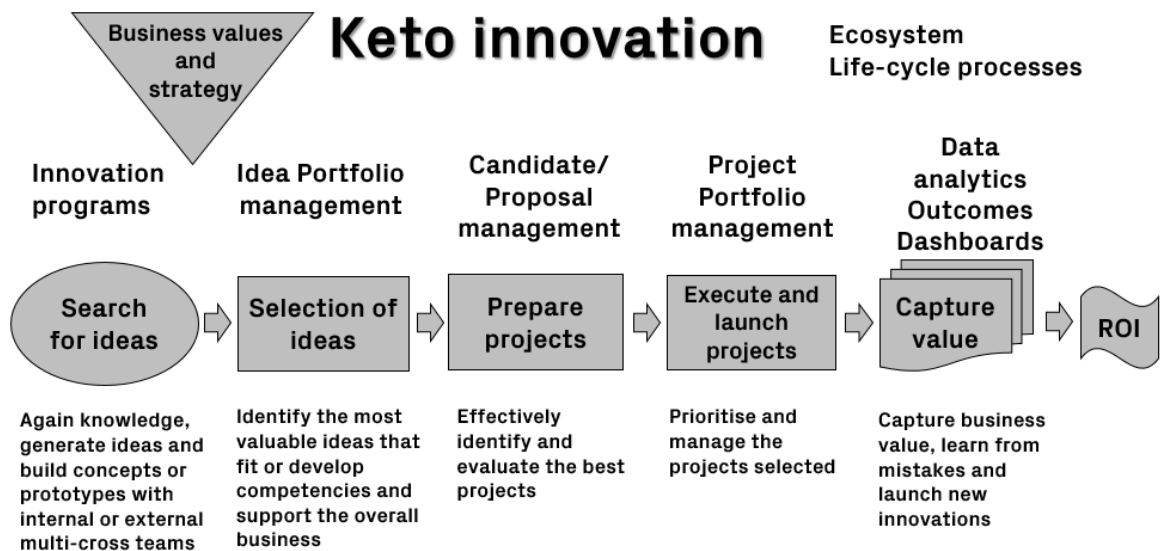


Figure 16, Keto innovation life-cycle processes

The innovation process starts from the search process where the company X implements innovation program(s) that aim to generate ideas for the selected topic or objective.

Second process is the idea evaluation process where innovation evaluation teams develop, evaluate and score ideas. Most valuable ideas will proceed into the candidate process.

Third process is the candidate and proposal process that links ideas into project preparation and planning phases. This phase acts as the important business evaluation phase where business case of the projects build and approved for the execution of the project.

The role of the fourth process is to control the execution of projects with project portfolio management. This provides transparent control and estimation of the use of resources and enables management to track the statuses and progress of the projects.

The last process tracks and analyses the effectiveness of the other process and provides valuable information for the top management. Capture business value, mistakes and lessons learned provide valuable information for improvement and create new ideas for innovations.

3.2 Search for ideas

In the search for innovations, we have to first realize where the innovations start from.

The starting point of innovation is individual human creativity like “Individual creativity is the most crucial element of organizational innovation, but it is not, by itself, sufficient” (Amabile, 1988) and “Innovation is the process of turning ideas into reality and capturing value from them” Tidd and Bessant (2013) clearly states.

In Chapter 2.3, we discussed John Cleese model of 5 factors of innovations that state that “*Creativity is not a talent. It is a way of operating.*” (Cleese, 2009) and Dyer, Gregersen and Christensen (2011) innovators DNA model that describes four behavioral skills related to human creativity. Both models support that external environment can have a create effect on the ability for individual to be creative and this creates good opportunity for innovation management to foster the organizational environment to support these human behaviors that support creativity.

In order to organization to generate knowledge and ideas for innovations Amabile’s model of creativity and innovation in organizations and Nonaka’s model of knowledge-creating company both describe factors that support organizational innovation environment. Both of the model emphasize the role of the management actions on supporting human creativity and emphasize that management needs to set direction and resources to support new innovations. In Chapter 2.2, Mehrdad Baghai described the third horizon of growth that generates viable options for growth for the organizations by seeding numerous options of future business.

“Horizon 3 contains the seeds of tomorrow’s business – options on future opportunities. Although embryonic, horizon 3 options are more than ideas; they are real activities and investments, however small. They are the research projects, test market-pilots, alliances, minority stakes, and memoranda of understanding that mark the first steps towards actual businesses, even if they may not produce profits for a decade.” (Baghai, Coley and White, 2000, page 6)”

In order to seed these options of future business Dundon’s model of innovation system architecture promotes innovation programs. *“An innovation program is designed for specifically to focus everyone’s attention on improving and sustaining innovation. It is a campaign with designated starting and finishing time.”* (Dundon, 2002, page 181).

This requires organizations to assign necessary resources to an innovation program so this program is granted the access to sufficient resources, including facilities, equipment, information, funds and people. This is supported by *“Sufficient time and sufficient resources serve as stimulants to creativity, insufficient time and insufficient resources serve as obstacles.”* (Amabile, 1988, page 148-149) and *“Widening the access to capital, especially for ideas in the seed phase”* (Dundon, 2002, page 177).

It is important to execute these programs with cross functional and cross organizational teams and include external stakeholders in the program. This is supported by *“Teams play a central role in the knowledge-creating company because they provide a shared context where individuals can interact with each other and engage in the constant dialogue on which effective reflection depends.”* (Nonaka, 2007, page 171), *“All too often, organizations rely primarily on ideas generated internally instead of capitalizing on ideas from both inside and outside the organization. In addition to broadening their perspective via Internet, research reports and tradeshow each innovation team should connect with teams outside its organization to form a community of extended stakeholders, including customers, suppliers, regulatory agencies, other partners, and even competitors.”* Dundon, 2002, page 184) and *“Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology”* (Chesbrough, 2003). This will provide the necessary diversity required for the successful idea generation. Persons involved in innovation programs need to be free from the burden of actually implementing and evaluating the business case of each individual idea. Implementing, business risk and benefiting calculations are not required for a good idea but if these can be provided they will help in the next phase of selecting ideas that need to be implemented.

It is important to note that innovation programs are not different than another programs in PPM management. The Innovation programs exists in PPM structure and have objectives, resources, status and forecast updates just like normal programs and the information are communicated to stakeholders.

The focus of these programs is knowledge creation, improving innovation environment, strengthening external stakeholder's network and innovation skill development.

Innovation program can be brake down to phases that focus the activities to certain areas. Simple example of innovation program could be following.

- Study of the subject to again knowledge
- Idea generation for triggers
- Concept and prototype building

The results of the innovation programs knowledge, ideas, concepts and prototypes are evaluated in the next selection phase.

It is important to select right innovation champions to run innovation projects. Innovation champion don't need to be the most innovative or creative person in the company. More important qualities for the innovation champion are that they have curiosity to learn, have a habit of asking questions, is good facilitator and coach, knows how to find elegant solutions to complex problems and has the basic knowledge about the business. People need to feel comfortable when approaching the champion to share their ideas and seek guidance. Because so much of what need to accomplish is not a matter of what the champion can do on its own, but rather what others will contribute through their own participation.

If a person or a team generates idea outside their own normal work responsibilities that has full cost and benefit calculations. That person or a team can be rewarded with a part of the savings or revenues generated by the idea. But this is rarely the case. More important focus of the on rewarding must be on rewarding on efforts to change. "*The trick is to establish a reward system that generously and equitably recognizes and rewards good work (a good effort as well as a good outcome) after it has been produced, without holding out salient rewards as carrots for each phase of each task.*" (Amabile, 1988, page 149). Employees need to feel that creativity is valued by the company and people are not punished for taking risks. Because innovations programs end at specific timetable that generates a natural point when to celebrate the results and reward people involved to the program.

Problems occur when shifting resources from the current business to innovation programs. Justification and results of investing to innovation efforts need to become visible and employees need to be rewarded on good efforts trying new possibilities in safe environment. This is highly management exercise and common methods and tools are not sufficient to supporting these efforts. Support of the top management and developing new management leadership skills and training of individuals to the elements of creative, strategic and transformational thinking.

3.3 Selection of ideas

The purpose of the idea selection sub-process is to provide structured idea management process that identifies, develops and processes innovative ideas quickly. *“The purpose of this phase is to resolve the inputs into an innovation concept which can be progressed further through the development organization”* (Tidd and Bessant, 2013, page 89). The need for such process is supported by *“Unless an organization has an idea-capture system, it is missing out on the opportunity to learn from the past and avoid repeating mistakes.”* (Dundon, 2002, page 178).

The selection sub-process of the innovation process starts from the idea collecting. The organization needs to provide everyone an easy way to input ideas to be evaluated. This can be provided by a simple form that asks basic questions about the idea.

- Title for the idea
- Description of the idea
- Benefits of the idea
- Creator(s) name
- Possible attachments or links to supporting material

The threshold of providing your ideas to be evaluated needs to be as low as possible. Providing business case or risk analysis are not mandatory and it is good to have option to provide ideas anonymously.

All ideas in the organization need to be public except for the ideas that have IPR data or ideas that can be patented. There needs to be separate evaluation team for evaluating IPR or patented ideas. Public ideas give opportunities for other employees to comment or develop ideas further.

Ideas are forwarded to evaluation teams. Organization needs to create evaluation teams according to its products, business units and functions as “*Establishing cross-functional or cross-organizational group idea sharing forums to share ideas and fresh perspectives*” (Dundon, 2002, page 178) states.

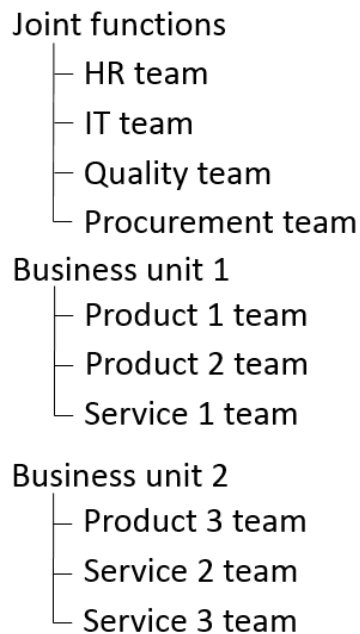


Figure 17, Example evaluation team structure

Evaluation teams consists from team leader(s) and evaluation members. Same person may be in multiple teams at the same time. Basic responsibility of the team members is to evaluate the idea and the team leader(s) to make decision of the idea.

The evaluation of the idea consists of the evaluation matrix, evaluation comment and proposed decision.

The evaluation matrix is designed to answer to basic questions from Tidd and Bessant innovation process model selection phase in Chapter 2.7. Because Tidd and Bessant questions are on the high level and without any scoring levels a more detailed evaluation matrix was developed.

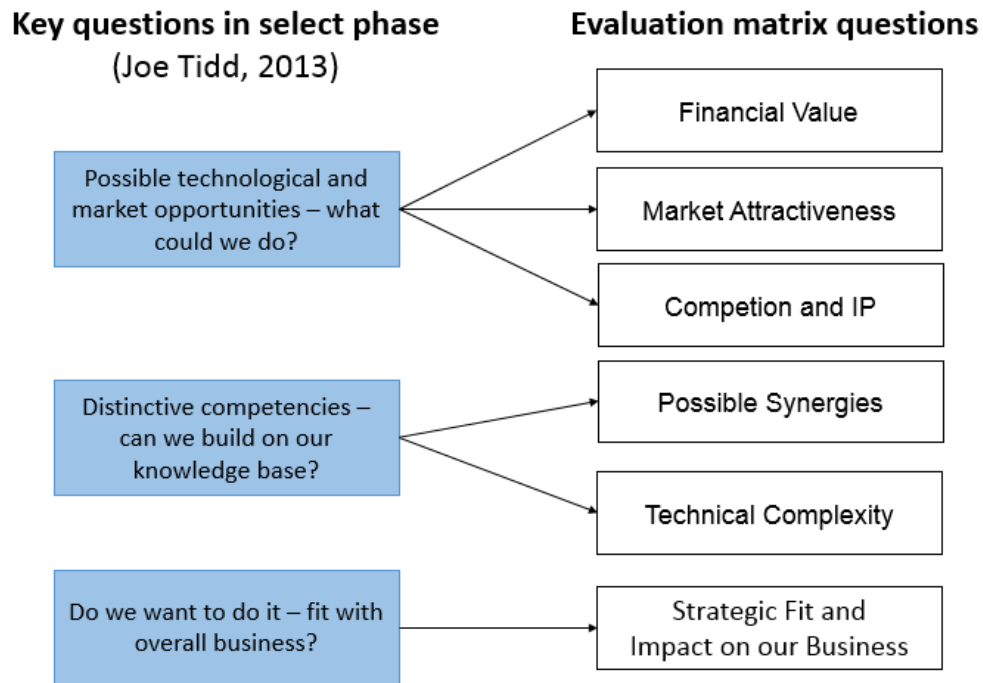


Figure 18, relationship between Tidd and Bessant evaluation matrix and key questions.

From scoring questions evaluation matrix with scoring point levels was created that is used by evaluation team members to evaluate the idea.

Evaluation matrix	Points Awarded			Kill ?
	1 point	5 points	15 points	
Joker	91 points			
Strategic Fit and Impact on our Business	Low Not in alignment with our strategy, Low business impact	Medium Supports our strategy Good business impact	High Important to strategy High business impact	Yes, unless a "joker" idea
Possible Synergies	Low Can't combine with other products / product groups	Medium Can somewhat combine with other products / product groups	High Can combine with other products / product groups	No
Financial Value	Minor 0<NPV<1MEUR	Medium 1<NPV<5MEUR	Major NPV>5MEUR	Yes, unless a "joker" idea
Technical Complexity	Very difficult Very complex, New technology to company	Somewhat difficult Most technology known to the company, Skills required are easily found	Easy We have the required competence and technology in-house	No
Market Attractiveness	Low Not attractive to customers / stakeholders / employees	Medium Adds value to customers / stakeholders / employees	High Unique solution Significant market potential	Yes, unless a "joker" idea
Competition and IP	High Many competitors Weak IP protection	Medium Some competition Normal IP protection	Low Low competition Strong IP protection	No

Figure 19, Evaluation matrix for Company X

First variable in the evaluation matrix is strategic alignment. If the idea has low strategical alignment and low business impact, it would receive one point, if the proposal has supports strategy and has good business impact it receives five points and finally fifteen points if it is important to the strategy and has high business impact. In addition, this variable has been designated as a "kill" category. If the idea is not aligned to the strategy and it has no business impact is becomes a candidate for being archived and not implemented, unless awarded a "joker" status by the senior management.

Second variable possible synergies is not a kill variable but distributes points in the following manner:

- Can't combine with other products / product groups - 1 point

- Can somewhat combine with other products / product groups - 5 points

- Can combine with other products / product groups - 15 points

Third variable financial value is critical to keep the organization competitive. If the idea would receive one point for NPV less than one million, five points for NPV between one and five million EUR, and fifteen points for NPV exceeding five million EUR. This category is also a "kill" variable if the ideas NPV was less than zero unless awarded a "joker" status by the senior management.

The fourth variable technical complexity was required to manage the risk of moving into new technologies. New technologies commonly need external expertise that can't be found from internal resources. Point distribution is in following manner:

- Very complex, new technology to company - 1 point

- Most technology known to the company, Skills required are easily found - 5 points

- We have the required competence and technology in-house - 15 points

Fifth variable is rewarded by market attractiveness. This is measured by how attractive the idea is to customers, stakeholders and employees. As a result if the idea is not attractive it would get one point, ideas adds value to customers, stakeholders or employees - five points and if idea provides unique solution with significant market potential - fifteen points. In addition this variable has also been designated as a "kill" category if the idea has no attractiveness.

Finally, the last variable included is the competition and intellectual protection variable in order to ensure that the new ideas that are unique and could be protected by patents. The points have been distributed in the following way:

Many competitors and weak IP protection - 1 point

Some competition and normal IP protection - 5 points

Low competition and strong IP protection - 15 points

In the evaluation comment the evaluator will provide his/her own insights to the idea and how well it could be implemented.

Evaluator will also propose a decision on the idea.

- Idea can be archived for future use if idea can't be implemented right away. These archived ideas can be in use in the future if the current situation changes.
- Ideas that receive good scoring and should be implemented approved as idea candidate. Ideas that are candidates will be used when drafting project proposals.
- Ideas can be implemented outside on project portfolio. These can be small continuous improvement ideas that can be implemented with already existing resources and need no project management.

If the evaluation team is unclear on the specifics of the idea they can request more details to the idea from the idea creator. Because ideas are public to all employees ideas can be commented by everyone. This helps also other people develop the idea or create supporting ideas.

When all members of the evaluation team have evaluated the idea the idea team leader is able to make decision about the idea with the same decision options that the evaluation team members have proposed.

The idea selection phase creates idea portfolio that contains ideas that are proceed and are scored with the idea matrix. This enables to monitor the performance of the evaluation process and the quality of ideas. Idea portfolio and idea scoring matrix is made public to all employees to promote transparency of the idea handling process.

NUMBER	IDEA TITLE	EVALUATION TEAM	CREATOR	SCORE	REW	NEW	HAN	DEC	CAN	PRO
2015-0010	Creative-thinking training	HR team	Tauno Tavallinen	3		▶▶▶▶				
2015-0009	Idea management software	IT team	Matti Virtanen	34		▶▶▶▶				
2015-0008	Cost reduction idea	Service 1 team	John Doe	0		▶▶▶▶				
2015-0007	Lead time monitoring	Service 1 team	Matti Meikäläinen	90		▶▶▶▶				
2015-0006	New process engineering	Product 1 team	Markus Halonen	22	🏆	▶▶▶▶				
2015-0005	Reclamation process improvement	Quality team	Joe Bloggs	52	🏆	▶▶▶▶				
2015-0004	Process Development	Service 2 team	Erika Mustermann	0		▶▶▶▶				
2015-0003	New product category	Product 3 team	Juan Perez	32	🏆	▶▶▶▶				
2015-0002	New supplier found?	Procurement team	Maija Meikäläinen	32	🏆	▶▶▶▶				
2015-0001	New product feature	Product 3 team	Matti Meikäläinen	37		▶▶▶▶				

Figure 20, Ideas portfolio view in Keto Innovation software

This is supported by:

“Employees are often reluctant to submit their create suggestions because they don’t understand what will happen to their ideas, how their ideas will be evaluated, how much time it will take to evaluate them, and how they might be rewarded for participating.” (Dundon, 2002, pages 178-179) and “Another way top management provides employees with a sense of direction is by setting the standards for justifying the value of the knowledge that is constantly being developed by the organization’s members. (Nonaka, 2007, page 170)

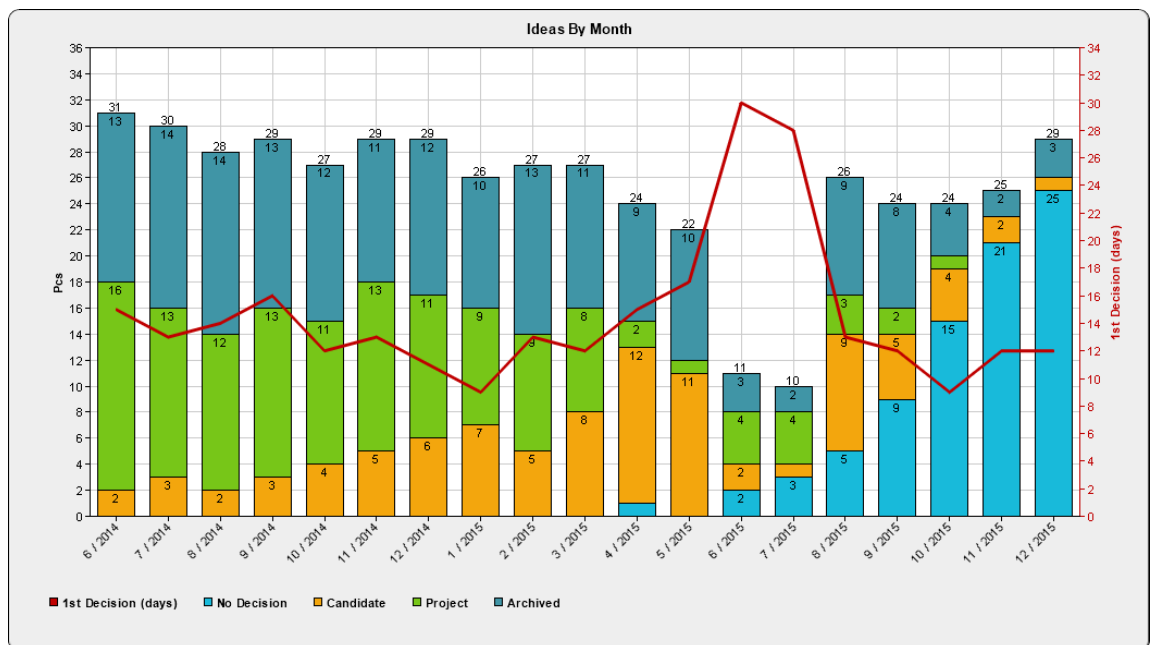


Figure 21, Ideas by month dashboard in Keto Innovation software

With simple dashboard you can monitor how many ideas are generated per month and how fast the decisions are made from the ideas. You can also view how many of the ideas generated in one month are still with no decision or have decision to be archived or in candidate phase. You can also view how many ideas have been selected to be implemented in projects.

Ideas that have reached the candidate phase can be analyzed by risk vs benefit. Benefit of the idea can be calculated by the average financial value of the evaluations and the risk can be calculated from the technical complexity and market attractiveness of the idea.

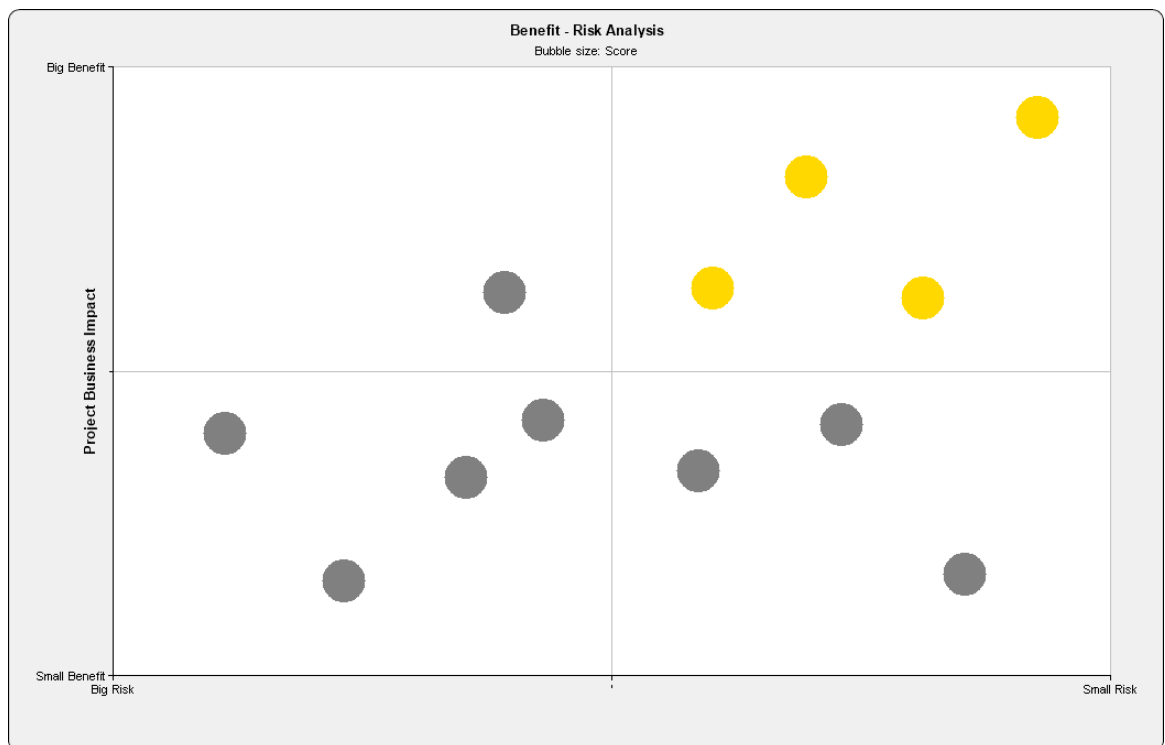


Figure 22, risk vs benefit analysis in Keto Innovation software

From the risks and benefit scores you can draw a risk vs benefit analysis that can be used to select the best idea candidates into project proposals.

3.4 Prepare projects

Project planning is initiated from the business need that seeks a solution (finds ideas) or from the business need that has been realized or developed in the innovation programs or in the selection phase. In both of these cases one or a group of ideas are linked into the project proposal. When creating a new project proposal depending on the type of the project suitable project model can be selected to provide the initial framework for the preparation and planning phases of the project.

Tidd and Bessant describes the project preparation phase as *“Acquiring knowledge involves combining new and existing knowledge (available within and outside of the organizations) to offer a solution to the problem. It involves both generation of technological knowledge (via R&D carried out within and outside the organization) and technological transfer (between internal sources or from external sources). As such it represents a first draft of the solution, and it is likely to change considerably in its development.”* (Tidd and Bessant, 2013, page 91).

The purpose of the preparation in the PPM perspective is described as *“The portfolio management process is intended to drive project specification and prioritization via business goals, objectives, opportunities and strategies. Projects with the highest value to the organization must be identified, initiated, and brought to a successful conclusion.”* (Rajagopal, McGuinn and Waller, 2007, page 143). This has a strong focus on building a structured and comparing different project proposal and prioritizing them according to the business needs. This is crucial aspect as no organization is able to go after all possible solutions. This view on of PPM prioritizing is also supported by *“It is no longer enough to ‘do things right’ with effective project management capabilities; it is also important to ‘do the right things’ using a portfolio-level perspective”* (Cooper, Edgett, & Kleinschmidt, 2001)

According to the PMBOK’s initialization process group, the purpose of the preparation is *“The Initiating Process Group consists of those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.”* (Project Institute, 2013, page 54) that supports the prioritizing and stakeholder commitment aspect of the preparation. PMBOK’s planning process group also emphasizes the acquiring knowledge and planning aspects of project preparations as *“The Planning Process Group consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain*

those objectives. The Planning processes develop the project management plan and the project documents that will be used to carry out the project.” (Project Institute, 2013, page 55)

As Rajagopal, Mcguinn and Waller (2007) described at Chapter 2.10 required project information’s are inputted to the project proposal during the planning phase. Project basic data name or the project, organization link to organizational structure, project owner, project manager, project group, description and targets and returns of the project are inputted to Keto Innovation project proposal.

Also the project type and the initial complexity category is estimated. The complexity category estimates how detailed the project planning, monitoring and controlling processes are suitable for the project. Commonly described as A, B or C category projects.

Figure 23, example project details tab in Keto Project

Commitment from the project owner and other stakeholders is crucial for the success of the preparation phase because they will ultimately make the decision on entering the execution phase.

The preparation and planning phases of the project are focused on gathering knowledge and planning on how to capture business value with the most effective project. The knowledge gathering and planning development depends on the project type and multiple project templates are needed to provide a suitable work plan for the preparation and planning phases. If the project is categorized as C category or/and small development project

the preparation and planning phase may be skipped and the project can be forwarded to execution with simple execution decision.

Work breakdown structure functions as a planning and timetable tool for preparation and planning phases and provides the execution plan for the future execution phase. The timetable planning of the project comes crucial when all project drafts are analyzed on the portfolio level and timing of Go or No-Go decisions are planned.

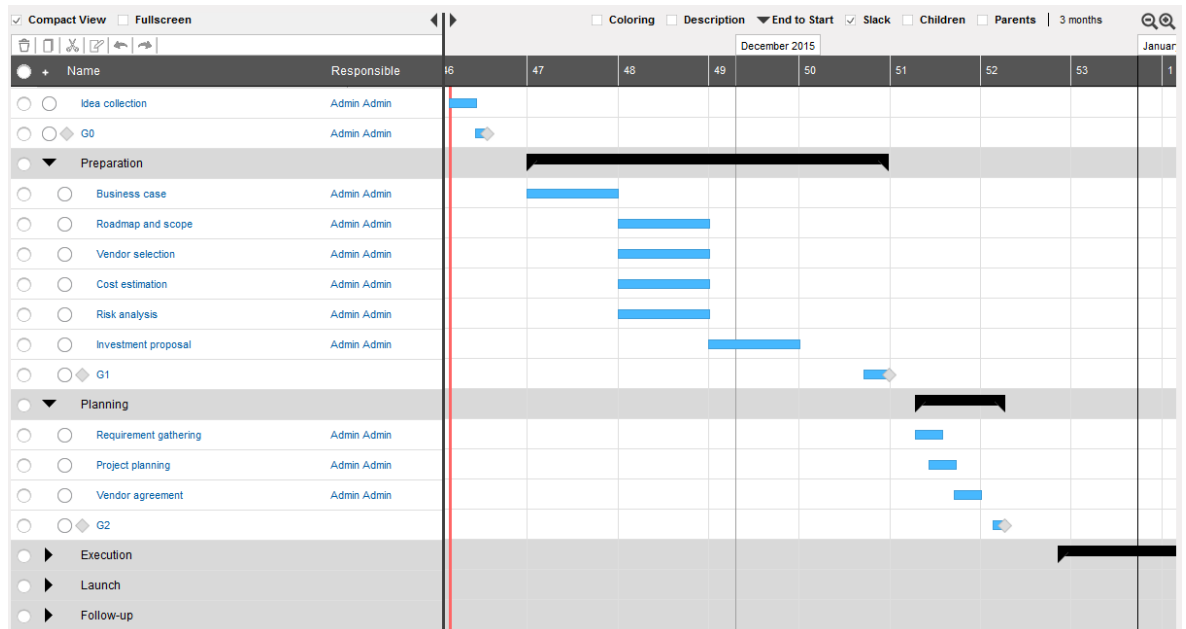


Figure 24, project work structure for preparation and planning in Keto Project

Preparation and planning phases draft the initial budget, cost structure and internal resource demand estimates for the project. Work and cost estimates can be calculated automatically from the work breakdown structure or updated from a separate estimation table.

Budget											
BUDGET	ADD										
CATEGORY	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Engineering	67 000 €	3000	14000	45000	5000						
Travel expenses	12 000 €	1000	4000	6000	1000						
Subcontracting and supplies	84 500 €	500	44000	30000	10000						
	163 500 €	4 500 €	62 000 €	81 000 €	16 000 €	0 €	0 €	0 €	0 €	0 €	0 €
COSTS											
CATEGORY	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Planned from Gantt	77 000 €	0 €	32 000 €	30 000 €	15 000 €	0 €	0 €	0 €	0 €	0 €	0 €
INTERNAL WORK											
CATEGORY	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Estimated from Gantt	245,0 h	0,0 h	15,0 h	100,0 h	130,0 h	0,0 h	0,0 h	0,0 h	0,0 h	0,0 h	0,0 h

Figure 25, budgeting and cost planning tab in Keto Project

For the project to be successful measurable objectives for what is expected as returns from the project must be planned. Planning intermediate measure points for the returns of the project provide good a controlling and monitoring method for the project outcome.

Project returns				
No.	Name	Weight	Last measurement	Achieved
1	Maintenance cost reduction	50	6.1.2016	70 %
2	Service availability improvement	50	4.11.2015	60 %
Total		100		65 %

ADD ROW

Basic information		Measurements			
No.	1	Date	Initial value	Comment	Value
Name	Maintenance cost reduction	04.11.2015	<input type="checkbox"/>	Phase 1 Virtual machine migration completed	52
Description	Datacenter consolidating yearly maintenance cost reduction. Target to save 20% of yearly maintenance costs.	06.01.2016	<input type="checkbox"/>	Phase 2 Cloud based application migration	70
Unit	KEUR	ADD ROW			
Responsible person					
Weight	50				
Target level	100				
Measurement instructions					

Figure 26 project returns tab Keto Project

As Rajagopal, Mcguinn and Waller (2007) described in Chapter 2.10 project portfolio view shows the portfolio sub-structure and comprised of domains, programs and projects shown in project portfolio view. The project portfolio view also displays the timetable, milestone/gate status and other project data like funding and payback financial numbers.

PROJECT NAME	Funding k€			Payback		Gates						Timeline				
	BUDGET	ESTIMATE	ACTUAL	PLANNED	ACTUAL	G0	G1	G2	G3	G4	FU	Q2	Q3	Q4	2016 Q1	Q2
▼ New product program	100000	100000	6234	-200	2	◆	◆	◆	◆	◆	◆					
▼ Program 1	100000	100000	55000	297 000	0	◆	◆	◆	◆	◆	◆					
• Project 1	28000	30000	2200	421	0	◆	◆	◆	◆	◆	◆					
• Project 2	68000	70000	0	4 000	0	◆	◆	◆	◆	◆	◆					
▼ Infrastructure development	140000	150000	1400	30 000	0	◆	◆	◆	◆	◆	◆					
▼ Program 2	48000	50000	2000	26 000	0	◆	◆	◆	◆	◆	◆					
• Project 3	25000	28000	10000	3 223	0	◆	◆	◆	◆	◆	◆					
▼ Program 3	85000	90000	0	433 134	0	◆	◆	◆	◆	◆	◆					
• Project 4	19000	20000	550	40 000	0	◆	◆	◆	◆	◆	◆					
• Project 5	47000	60000	0	60 100	0	◆	◆	◆	◆	◆	◆					
▼ Cost reduction	390000	400000	0	-950	-2 000	◆	◆	◆	◆	◆	◆					
▼ Program 4	85000	100000	0	32 333	235	◆	◆	◆	◆	◆	◆					
• Project 6	55000	60000	45600	224 988	125 988	◆	◆	◆	◆	◆	◆					
• Program 5	12000	100000	12000	460 000	80 000	◆	◆	◆	◆	◆	◆					
	1 202 000	1 358 000	134 984	1 610 049	204 225											

Figure 27, project portfolio view in Keto Project

When project planning phases has been completed management prioritizes and balances the project portfolio. Even if the project planning phase is able to build sufficient business case for the project proposal no organization has unlimited resources to execute all projects. Every projects risk vs reward, funding, duration and expected outcome is analyzed and before the execution decision is made.

3.5 Execute and launch projects

The execution sub-process is mainly to monitor the progress of the executing projects. Regardless of how well the planning phase of the project proposal has been completed unanticipated risks and resource availability causes variance to the projects. This may cause the project to return to the preparation process for further planning.

The purpose of the preparation in the PPM perspective is described as *“Throughout the life of a project the business case (cost/benefit, feasibility, market attractiveness and strategic value) must be re-evaluated (or reconfirmed) as additional funding is allocated for each successive stage of the project.”* (Rajagopal, Mcguinn and Waller, 2007, page 143).

According to the PMBOK’s monitoring process group, the purpose of the executing is *“The Monitoring and Controlling Process Group consists of those processes required to track, review, and orchestrate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes. The key benefit of this Process Group is that project performance is measured and analyzed at regular intervals, appropriate events, or exception conditions to identify variances from the project management plan.”* (Project Institute, 2013, page 57)

Tidd and Bessant emphasizes the importance on change management by stating *“Launch and sustaining the innovation of new products, services or process brings the need to understand the dynamics of adoption and diffusion. Underlying process of adoption of something new typically involves a sequence of awareness, interest, trial, evaluation and adoption. Successful implementation of internal (process) innovation also requires skilled change management and stresses communication, involvement, and interventions to minimize resistance to change. Understanding user needs has always been a critical determinant of innovation success and one way of achieving this is by bringing users into the loop at much earlier stages.”* (Tidd and Bessant, 2013, page 94)

The monitoring the progress of the projects was implemented with timely status reports that update actual and estimated use of costs and resources. The project manager uses traffic light symbols to report if the project requires the attention of the steering group to problems that might affect the project schedule or outcome. Premade project status report templates help the project managers to provide standardized reporting for the management.

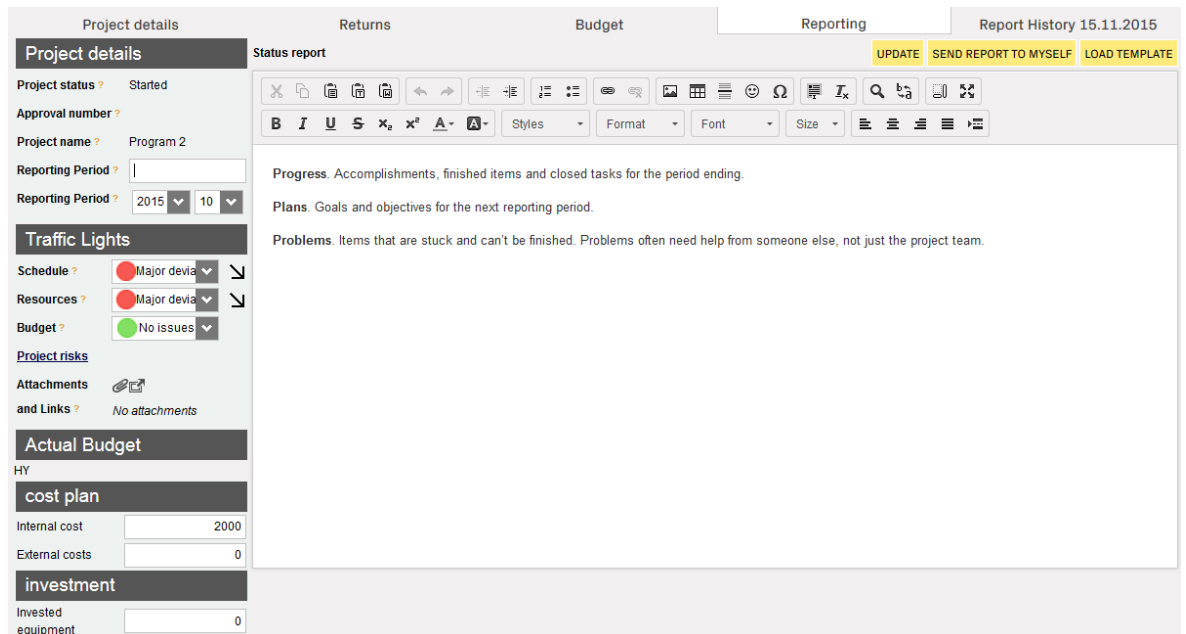


Figure 28, status returns tab Keto Project

The management will have an up-to-date project portfolio view that displays the budgeted, estimated and actual use of resources, payback, milestone status, schedule, the progress of objectives and the portfolio sub-structure.

PROJECT NAME	Funding k€			Payback		RETURNS %	Traffic Lights		G0	G1	G2	G3	G4	FU	Q3	Q4	2016	
	BUDGET	ESTIMATE	ACTUAL	PLANNED	ACTUAL		SCH	RES									BUD	Q1
▼ New product program	100000	100000	6234	-200	2	45.5	●	●	●	◆	◆	◆	◆	◆				
▼ Program 1	100000	100000	55000	297 000	0	0.0	●	●	●	◆	◆	◆	◆	◆				
• Project 1	28000	30000	2200	421	0	0.0	●	●	●	◆	◆	◆	◆	◆				
• Project 2	68000	70000	0	4 000	0	0.0	●	●	●	◆	◆	◆	◆	◆				
▼ Infrastructure development	140000	150000	1400	30 000	0	0.0	●	●	●	◆	◆	◆	◆	◆				
▼ Program 2	48000	50000	2000	26 000	0	0.0	●	●	●	◆	◆	◆	◆	◆				
• Project 3	25000	28000	10000	3 223	0	0.0	●	●	●	◆	◆	◆	◆	◆				
▼ Program 3	85000	90000	0	433 134	0	0.0	●	●	●	◆	◆	◆	◆	◆				
• Project 4	19000	20000	550	40 000	0	0.0	●	●	●	◆	◆	◆	◆	◆				
• Project 5	47000	60000	0	60 100	0	0.0	●	●	●	◆	◆	◆	◆	◆				
▼ Cost reduction	390000	400000	0	-950	-2 000	99.0	●	●	●	◆	◆	◆	◆	◆				
▼ Program 4	85000	100000	0	32 333	235	0.0	●	●	●	◆	◆	◆	◆	◆				
• Project 6	55000	60000	45600	224 988	125 988	96.0	●	●	●	◆	◆	◆	◆	◆				
• Program 5	12000	100000	12000	460 000	80 000	105.0	●	●	●	◆	◆	◆	◆	◆				
	1 202 000	1 358 000	134 984	1 610 049	204 225													

Figure 29, project portfolio view in Keto Project

As the project proceeds the project the project steering group monitors and approves the project milestones and adjustments are made if necessary.

3.6 Capture value

The purpose of innovating is to create value example commercial success, improved market share, cost reduction or just changing the world. The world is full on examples of efforts that have been planned and implemented with create skill and effort but still remain to provide only a little of none value. Sometimes the world is just not ready for the innovation yet or the design or the innovation is not sufficient to provide the value and a renovation is required. As for the innovation process the capture value process is not only important as it realizes the value generated but it is also a create source of new innovations as *“An inevitable outcome of the launch of an innovation is the creation of new stimuli for restarting the cycle. If the product/service offering or process change fails, this offers valuable information about what to change for the next time.”* (Tidd and Bessant, 2013, page 94) promotes.

PMBOK takes on a very formal approach to the closing process group by emphasizes of capturing knowledge by conduction team member assessments, post project or phase end reviews, documenting lessons learned and the analyzing impacts of tailoring made to any process during the lifecycle. All relevant data should be preserved in the project management information system. PMBOK's formal process provides valuable data for future analysis.

Using innovation management software tool as knowledge base of ideas and project history the software tool can help to automatize innovation process KPI metrics. Whit these KPI metrics the performance and development goals of each sub-process can be measured effectively. This provides management simple metrics to follow how their innovation efforts are proceeding through the innovation process and estimate the value created from these initiatives.

KPI metrics provided in the case study innovation process were following.

Search for idea process

- Resources allocated to innovation programs – people and budget
- Number of ideas generated per innovation program

Selection of ideas

- Number of ideas evaluated and approved
- 1st decision lead time for evaluation teams
- Benefit – Risk analysis for scored ideas

Prepare projects

- G0-G2 Stage-gate pass rates and lead time
- Budgeted costs
- Number ideas implemented
- Planned timeline, payback analysis and resource load

Execute and launch projects

- G2-G3-G4 Stage-gate pass rates and lead time
- Earned returns
- Estimated and actual cost, timeline and resources
- Actual payback realization

Overall KPI metrics

- Value of the innovation pipeline
- Average time from idea approval to implementation
- ROI on innovation spend

Creating a formal value capturing phase with software application that supports it will provide valuable data, knowledge base and KPI metrics for monitoring the innovation process. This will provide opportunities for learning and development of innovations but they might not always be taken up by the organization. Projects are often taken as an exercise of blame accounting and covering up mistakes and problems although the need is to capture the hard learned lessons of success and failures and pass it on to the next cycle of innovation. If the organization is not successful in this they end up reinventing the wheel again and again.

3.7 Impacts of the software tool

By using the Tidd and Bessant innovation audit model the impacts of the software tool to the innovation process can be analyzed as following:

Innovation software does provide a tool that supports the implementation of corporate strategy by a framework for gathering valuable ideas monitoring the execution of innovation projects. However, the software provides support for strategic planning and only some support on earning the appreciation for the innovation as a part of the organizations strategy. This is mainly the planning and communicating task for the top management. For these reasons I score the impact on strategy as 3.5 points.

For the process aspects, the tool will support and help to develop organizations internal processes. Process automation, a shared knowledge base and automated KPI metrics are useful in supporting the innovation process. Although the tool itself won't provide any value if the organization won't develop common methods and practices on managing the innovation process. This creates the need for joint organizational effort on developing the innovation process and requires top management commitment. For process element I score 5.

If the organizational structure prohibits innovation, by stiffening effective communication the tool won't make any impact on the innovation process. The reorganization and developing supporting cross functional teams need to take place before the tool can be taken in use and be effective. If this is successful, the tool can support on effective team communication. In this aspect, I score the effects 2 points.

For linkages to external entities, the tool provides support if the external identities have access to contribute or share ideas within the tool. In this case study, an external person who has user accounts and access to the company X network had the possibility share their ideas but access to read all ideas was prohibited. So this aspect is a mixed one between data protection and open knowledge sharing. The effects of the tool depending on the openness can be either null of major improvements. In the case study company I score this effect with 3 points.

For the learning aspect of the innovation audit model the tool don't provide support on the training or development of employees in creativity. The tool may effect on the ability of the organization to gather knowledge from its linkages if open knowledge sharing is supported

and the capture value process can help on learning from success and mistakes. The learning score is 3.

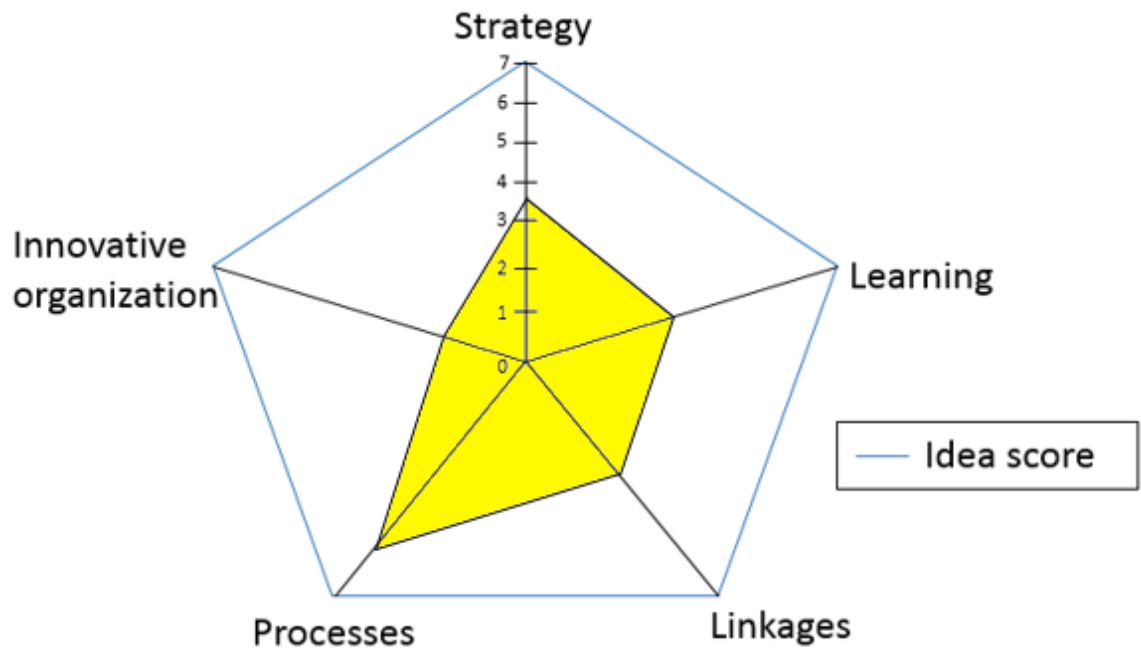


Figure 30, software tool support for innovation process

From this analysis can be concluded that the software tool can support the overall innovation capability mainly by providing processes that support the execution of the organizations strategy and help develop common methods and practices for innovation process. The results can very easily be nulled with poor management support or understanding. If the tool is implemented with a new innovative strategy that launches change initiatives in cooperation with linkages, organizational reconstruction to encourage top-down, bottom-up and lateral communication and supported with the development of a common innovation process that promotes knowledge generation and learning the impact on the organizations success can be major.

4 Conclusion

For the conclusion of this study is that innovation is a complex, uncertain and hard to manage and there is no perfect organization or process for innovation management. However still there are a lot of possibilities on improving and developing the innovation process. Management needs to develop common methods and practices on how to improve the possibilities of major innovations to occur. The main purpose of the innovation management and innovation process is to make business more flexible and adaptive to changes.

The framework introduced in Chapter 3 describes a common innovation process and practical implementation of the process. The framework at high level is easy to understand but mastering all the innovation processes requires expertise and new management skills that lead into innovations. The framework however is to be a good starting point for developing common methods for managing the innovation process.

The conclusions in Chapter 3.7 pointed out that implementing a software tool for supporting the innovation process is not sufficient and the results can be nullified very easily with poor management support or understanding. The lack of innovation strategy that launches change initiatives in cooperation with stakeholders, organization structure that prohibits cross organizational communication and the lack of a common method in managing the innovation process will demote the results received from the implementation.

The purpose of the common innovation process is to support the execution innovation strategy by providing structure in ways for internal and external people can contribute to innovating possible solutions. Innovation analytics provide valuable feedback data for the top management on how the execution of strategy initiatives is proceeding and how the value is captured.

Discussion about the innovation process and the practical implications related to it are required to overcome these problems before the tool implementation should be started. The management commitment to the required changes is crucial and the common innovation process model can help to start this discussion.

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