# Implementing a Stage-Gate Process for R&D and Innovation Projects – Challenges and Enablers

A case-study in the Paper Industry

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# Implementing a Stage-Gate Process for R&D and Innovation Projects - Challenges and Enablers

*A case study in the Paper Industry*


LUND UNIVERSITY



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## PREFACE

This master's thesis has been performed together with PaperCo, I would like to begin with thanking them for giving me the opportunity to conduct the major part of my studies at their research center in Monchengladbach. By working at the location I certainly got the opportunity to study the interesting area of implementing innovation processes closely. From the first contact with PaperCo I have felt very welcomed and supported with all my questions and reflections. Moreover, I would like to direct a special thank you to C-M. T my supervisor at PaperCo, for all your time, support for making me feel at home in Germany and your insightful feedback on how I could improve my work.

This thesis result is primarily based on insights gathered from a number of in-depth interviews, I am sincerely grateful to all employees at PaperCo whom offered to share their knowledge and valuable insights with me. It has been a pleasure to discuss innovation and the Stage-Gate process with you and all your expertise have provided me with a solid foundation to my result. Furthermore, I would like to thank T. P for introducing me to the Stage-Gate at PaperCo and for answering my questions and supporting me throughout the thesis process.

Finally, I would also like to thank Malin Olander Roese, my supervisor at the Faculty of Engineering in Lund. Without your guidance and feedback this thesis would most likely not have reached the same level. Each meeting with you have given me new energy to continue and improve my thesis.

Malmö, May, 2016

*Emilie Johannesson*

Emilie Johannesson

# IMPLEMENTING A STAGE-GATE PROCESS FOR R&D AND INNOVATION PROJECTS – CHALLENGES AND ENABLERS

## SAMMANFATTNING

Få studier har gjorts på utmaningar och möjliggörare gällande att impelmentera Stage-Gate processer i mogna organisationer. Syftet med denna avhandling är därför att fylla kunskapsluckor samt beskriva och diskutera övergripande utmaningar och möjliggöranden som Stage-Gate processer innebär för R&D- och innovationsprojekt. PaperCo, ett företag inom pappersindustrin, påbörjade 2015 en implementation av en Stage-Gate process för att utveckla och skapa en överblick över sina projekt inom R&D och innovation. PaperCo är intresserade av att utvärdera hur väl Stage-Gate modellen är lämplig för deras organisation och hur den bör utformas för att vara en hjälpande verktyg för deras projekt. För att besvara frågeställningen i denna avhandling har en litteraturstudie och en fallstudie på PaperCo genomförts. Fallstudien bestod av nio djupintervjuer, med anställda på olika positioner, främst inom PaperCo Paper Division och två observationer av workshops om implemenationen av Stage-Gate på PaperCo.

Resultatet från denna studie föreslår vilka utmaningar och möjliggörare som är viktigast att ta itu vid implementation av en Stage-Gate process i en mogen organisation. De fem övergripande utmaningarna är acceptans från medarbetare, tvärfunktionellt engagemang, definitioner och riktlinjer för Gate-keepers, flexibilitet och skalbarhet och möjliggörande av kreativitet och innovativt arbete. De fem övergripande möjliggörarna är processens strukur och transparans, förenklad kommunikation, förbättrad riskhantering, stöd för kontinuerlig feedback och motivationsarbete samt effektivare rapportskrivning både under projekt och efter avslutade projekt. De föreslagna rekommendationerna till PaperCo är att i involvera medarbetare i förändringsprocessen sträva efter tvärfunktionelld engagemang, ta hänsyn till Stage-Gate processens möjliga påverkan på kreativiteten, utarbeta tydliga riktlinjer för Gate-keepers och Gate-beslut, sträva efter att göra processen flexibel samt tillåta en testperiod och mäta förändringarna.

*Nyckelord:* Innovation Management, Stage-Gate processer, R&D och Innovations projekt, Mogna organisationer

## ABSTRACT


**TITLE:** Implementing a Stage-Gate Process for R&D and Innovation Projects – Challenges and Enablers. A case-study in the Paper Industry.

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**ISSUE OF STUDY:** Few studies have been made on challenges and enablers with implementing Stage-Gate processes in mature organizations. The aim with this thesis, is therefore to fill the gaps in knowledge within implementation of Stage-Gate processes and additionally describe the general challenges and enablers with Stage-Gate processes for R&D and innovation projects.

After initiated the implementation of a Stage-Gate Process, PaperCo wish to evaluate how well the model is suitable for their Paper Division and how it should be designed, in order to be a helping tool for their projects within R&D and innovation.

Emilie Johannesson

# IMPLEMENTING A STAGE-GATE PROCESS FOR R&D AND INNOVATION PROJECTS – CHALLENGES AND ENABLERS


PURPOSE: The purpose of this study is to describe challenges and enablers with implementing a Stage-Gate Process in a mature organization for R&D and innovation projects.

METHODOLOGY: To answer the research question stated in this thesis, a literature review and a single case study at PaperCo was undertaken. The case-study consisted of nine in-depth interviews with employees at different positions mostly within PaperCo's Paper Division and two observations of workshops regarding the implementation of Stage-Gate at PaperCo.

CONCLUSIONS: The findings, from this study, suggests recommendations regarding challenges and enablers most important to address, when implementing a Stage-Gate process. The five general challenges found are employee acceptance, cross-functional engagement, definitions and guidelines for Gate-Keepers, flexibility and scalability and allowance for creativity and innovation projects. The five general enablers found are the process structured approach with transparent overview, enhanced and simplified communication, improved risk-management, support for feedback and motivation and more effective reporting and review writing. The proposed recommendations to PaperCo is to involve employees in the change, aim for cross-functional teams, consider the Stage-Gate process effect on creativity, develop clear guidelines for Gates and Gate-keepers, allow the Stage-Gate to be flexible and scalable and allow a pilot period and measure the changes.


KEY WORDS: Innovation management, Stage-Gate processes, R&D and Innovation projects, Mature organizations

## DEFINITIONS

| | |
|---|---|
| *Challenge* | A difficult task or a problem, something that is hard to do |
| *Enabler* | Something or someone that makes it possible for a particular thing to happen or to be done |
| *Freedom to Operate (FTO)* | An Intellectual Property (IP) right analysis has been conducted and no patents or regulations are preventing a project to continue. |

### DEFINITIONS OF GATE-MEETING OUTCOMES

| | |
|---|---|
| *Go* | The project is approved to continue |
| *Kill* | The project is considered a poor investment and all work or investment on it will stop |
| *Hold* | The project passes a Gate but the timing is not correct or other projects are more important. The project will be continued at a more appropriate time |
| *Recycle* | The project is approved conditional on specified future events occurring or the completion of key actions |

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# 1 INTRODUCTION

*In this first chapter, the reader will be introduced to the research field of this master thesis. The case company PaperCo will be described as well as the background to the chosen subject. Moreover, the statement of the problem, purpose and research questions of this thesis will be presented. Finally, the delimitations of the study and the outline of the thesis are explained.*

## 1.1 BACKGROUND TO RESEARCH FIELD

Most people are aware of that successful market launch of innovations or new products do not happen overnight. An initial idea might occur quickly as in comic books where a light bulb is switched on above someone's head. Thus, in order to create value from that initial idea, organization need to manage the idea as a process, not as a single event (Tidd & Bessant, 2014).

Historically, the way of working with innovation processes has changed. In the beginning, process models were simple and linear. Ideas were developed after customer demand or pushed out from technology development. Since then models for innovation management have gradually transferred into involving feedback loops, interacting with upstream and downstream partners and highlighting focus on linkages and alliances (Rothwell, 1992).

The Stage-Gate process was introduced in the mid-1980s by Robert G Cooper, and is a blueprint for organizations to move a new product from an ideation phase to implementation- and market launch phase (Cooper, 2009). The Stage-Gate process divides the project development into a predetermined set of stages, normally between three to seven stages, each separated by a decision gate. During each Gate, senior managers, or Gate-keepers as they are referred to in the model, make a decision if the project are to continue further in the process or not. The model is both conceptual and operational and provides a solution for firms to manage and control their product development process (Cooper, 1990). The concept of the Stage-Gate is based on observations, experiences and suggestions from about 450 organizations combined with Cooper's own research covering over 2000 new product development cases. When the Stage-Gate process first was officially presented, several companies, as for example Procter & Gamble, Polaroid, The Royal Bank of Canada, Lego and Shell implemented parts or the full process (Broum, et al., 2011).

The Stage-Gate process has been both highly appreciated and criticized. If successfully implemented, the Stage-Gate process can speed-up and energize an organization's new-product development projects (O'Connor, 1994). Criticism towards the Stage-Gate however, reports risk with the process as it is said to be, i.e. time-consuming, result in time-wasting activities, have bureaucratic procedures and restrict learning opportunities (Sethi & Iqbal, 2008).

Today many mature organizations need to undergo organizational change in order to stay innovative and be responsive to changes in the external environment. Executing implementation of new processes in order for this, such as the Stage-Gate process, is a challenge for managers of mature organizations (Dougerthy & Hardy, 1996). The Stage-Gate process itself has been widely researched and organizations have for years implemented the process and adjusted it after their specific needs (Cooper & Kleinschmidt, 1993). However, little research exists on how to most sufficiently implement a Stage-Gate in different organizational settings (O'Connor, 1994). Moreover, is implementation of a linear structure, such as the Stage-Gate process for innovation and R&D projects debated in literature (Schaubroeck, et al., 2016) Mature organizations, as mentioned previously, often face challenges implementing organizational change (Dougerthy & Hardy, 1996). Therefore, the aim with this thesis to fill the gaps in theory on general challenges and enablers with implementing a Stage-Gate process for R&D and innovation projects in mature organizations.

## 1.2 BACKGROUND TO MASTER'S THESIS

This thesis aims to examine how a mature organization preferably should implement their Stage-Gate Process, enablers and challenges with implementing such a process and which specific factors are in most need of attention from the organization, to attain the best possible result.

PaperCo implemented in 2015, Stage-Gate Processes at all their five Divisions and each Division got the possibility to customize their Stage-Gate Process. The customization involved developing own templates for the Stages and Gates as well as own definitions of participants and roles in the process. The aim with the overall implementation was to receive a better project overview and to introduce a common language between project teams, top-management, and the five Divisions. One of these Divisions, the Paper Division, will in this thesis be analyzed regarding their implementation of the Stage-Gate Process for R&D and innovation projects.

## 1.3 STATEMENT OF THE PROBLEM

Management of implementing a Stage-Gate process is in theory described as difficult (Tidd & Bessant, 2014; Dougherty & Hardy, 1996). Moreover, managers in mature organizations often face challenges pursuing organizational change. The suitability of applying a Stage-Gate process for innovation and R&D projects is debated in literature and reports of experience from such implementations are rather limited (Högman & Johannesson, 2013). The aim of this thesis is therefore, to fill the gap in knowledge of implementing a Stage-Gate process for R&D and innovation projects in mature organizations and contribute to theory with general challenges and enablers.

After one year of developing their custom made Stage-Gate Process, PaperCo is interested in evaluating its suitability for the Paper Divisions' innovation and R&D projects and gain insight in how this process should be implemented in order to be successful. PaperCo is considering how the future implementation activities should be undertaken and are hence interested in learning which features and activities that are of most importance, in order for the Stage-Gate Process to be beneficial.

## 1.4 PURPOSE

The purpose of this study is to describe and explore enablers and challenges with implementing a Stage-Gate Process for R&D and innovation projects in a mature organization.

### 1.4.1 RESEARCH QUESTION

This master's thesis aims to answer one research question. By answering this question, the purpose of this thesis will be fulfilled.

- RQ 1. What are the main enablers and challenges when implementing a Stage-Gate process for R&D and innovation projects in a mature organization?

## 1.5 DELIMITATIONS

Within the concept of Stage-Gate Processes, the main research done is made by the founder, Robert, G, Cooper. Therefore, the theoretical facts regarding the Stage-Gate are mostly built upon his research. This master thesis will thus, also include theory in a wider spectrum, from findings in other project process models, both of innovation processes and product development processes. The concept of project process models

is in general well covered in research and includes several different findings and best-practice execution methods. Due to the limited time frame of 20 weeks for this master's thesis, the presentation of general project process models is not an excessive list, but rather a first presentation of some common models and challenges and enablers with implementing a new project process.

The single case study of PaperCo in this report will limit the possibility to make casual inferences from this study. Instead, the result from this thesis can act suggestive of enablers and challenges of what may be found in similar organizations. Thus, additional research would be demanded to ensure that the result from this one study can be applicable elsewhere.

## 1.6 OUTLINE OF REPORT

### INTRODUCTION

*In this first chapter, the reader will be introduced to the research field of this master thesis. The case company PaperCo will be described as well as the background to the chosen subject. Moreover, the statement of the problem, purpose and research questions of this thesis will be presented. At last, the delimitations of the study and the outline of the thesis are explained.*

### METHODOLOGY

*The methodology chapter will explain the choice of a qualitative research strategy and the single case-study research design. Following, the methods and reasons for the selected data for this report are presented. Finally, the reliability and validity of this report are discussed in terms of trust-worthiness and authenticity.*

### THEORETICAL FRAMEWORK

*The theoretical chapter begins with introducing the reader to innovation management and general challenges and enablers with implementing an innovation process. Thereafter, the focus will be narrowed down to theory regarding the Stage-Gate process. The theoretical chapter is finished with a table summarizing all found challenges and enablers when implementing a Stage-Gate process.*

### EMPIRICAL STUDY

*The empirical study consists of two parts. First, PaperCo and their specific Stage-Gate process is described. For further description on responsibilities of the roles mentioned, see Appendix 3. The second part presents the results from interviews and observations of the workshops. The interview- and observation guides can be found in Appendix 1 and 2.*

## DISCUSSION

*Chapter five is initiated with a discussion comparing three types of innovation processes. The discussion headline continues with a comparison between results from the empirical analyzes and theory. Challenges and enablers at PaperCo are discussed with a focus on the main similarities and differences between empiric results and theory. The discussion chapter is finished with two summarizing tables, one for challenges and one for enablers with solvent suggestions as found in theory.*

## FINAL CONCLUSION

*In this final chapter, the formulated research question is answered. Thereafter, recommendations are presented to PaperCo and lastly, suggestions for further research are discussed and explained.*

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# 2 METHODOLOGY

*The methodology chapter will explain the choice of a qualitative research strategy and the single case-study research design. Following, the methods and reasons for the selected data for this report are presented. Finally, the reliability and validity of this report are discussed in terms of trust-worthiness and authenticity.*

## 2.1 RESEARCH STRATEGY – A QUALITATIVE RESEARCH

With the objective to study enablers and challenges when implementing a Stage-Gate process, a qualitative research study was used. Distinguishing objectives for choosing the qualitative research is the need to observe a current situation, provide an opportunity for observed participants to express their opinions and to allow the environment and context to influence the research (Yin R, 2013). The current situation at PaperCo will be studied and opinions of involved participants, in the implementation process, will be collected and analyzed in order to provide conclusions to the formulated research question. To deliver a convincing single case-study, a combination of data collection methods are used, such as semi-structured interviews, non-participate observations and a literature analysis (Houghton C, 2012; Yin R 2009).

### 2.1.1 BACKGROUND TO PAPERCO

In this thesis, the name PaperCo will be used as a synonym to the case company, which wishes to be anonymous. PaperCo is a mature global multinational company within the wood, pulp, and paper business. The first documented operation of PaperCo took place in 1288. Since then, has the business had many forms and been through several mergers and acquisitions. The current shape of PaperCo was formed in 1998. Today, the organization has over 26 000 employees, business in 35 countries and is built up by five separate Divisions. Customers include packaging joinery, construction industries as well as publishers, printing houses and paper merchants. In 2015 PaperCo sales were EUR 10.0 billion.

### 2.1.2 RESEARCH DESIGN – CASE STUDY

By gathering data from multiple sources, in the everyday environment of PaperCo, a deeper understanding and an ability to notice smaller insights can be gained in comparison to analyze the situation from a distance (Yin, 2013). Case studies are a method which allows systematical analysis of situations and specific designing of a

research. The collection, regimentation and integration of data and information for this report, were made with the aim to answer the formulated research question (Merriam, 1994). Since this report aims to study the current situation at PaperCo and get an in-depth understanding, by analyzing available material as documents, interviews and observations, a single case study is a suitable method. Single case studies and their contributions can, however be debated. They are not suitable if the confirmation of generalization among multiple cases is the main objective. Instead, the single case study can help to strengthen the theoretical understanding as well as deepen the knowledge within specific cases (Ulriksen & Dadalauri, 2016). A case study is described as the research of a specific phenomenon, a well-defined area or system which is chosen due to its importance or because the area itself can be seen as a hypothesis (Merriam, 1994). At PaperCo, the implementation process is a clearly defined area and in need of research. According to Hoaglin (1982), characteristics of the case study are that it can:

- Provide the reader with suggestions of actions to take or not to take in a similar situation
- Analyze a specific situation but at the same time highlight a common problem
- Be affected by the writers own values or previous experience

Further suitable benefits with a case study as a research method, for this thesis, are the descriptive characteristics. A case study can provide results describing the complexity of a situation, how personal values can influence a certain problem, how it can involve "live" material as interviews and how it can display different opinions and reflect that influence on the current situation (Hoaglin, 1982).

## 2.2 THE WORK PROCESS

The abductive reasoning approach is a logical work process where the most suitable conclusion is derived by analyzing collected data. The result must not be scientifically true for all similar cases, as for the deductive reasoning approach, or fully logical as the inductive reasoning approach (Visconti & Kunzendorf, 2015). The abductive approach is a way to extract new knowledge by inference of the deductive and inductive approaches (Mirza, et al., 2014). As an introduction to the empiric research for this report, a literature study was conducted. By reading existing literature, a knowledge base of the subject could be built, as well as increased awareness of the models and

theories used. After the initial literature study, the research was built up by an iterative process, empiric data and theoretical facts were collected simultaneously. Due to the iterative work process, the abductive reasoning is a suitable approach (Alvehus, 2013). A qualitative work process can take different shapes, Bryman and Bell (2003) summarized a six-step process of the main steps, as can be seen in Figure 2.1 below:

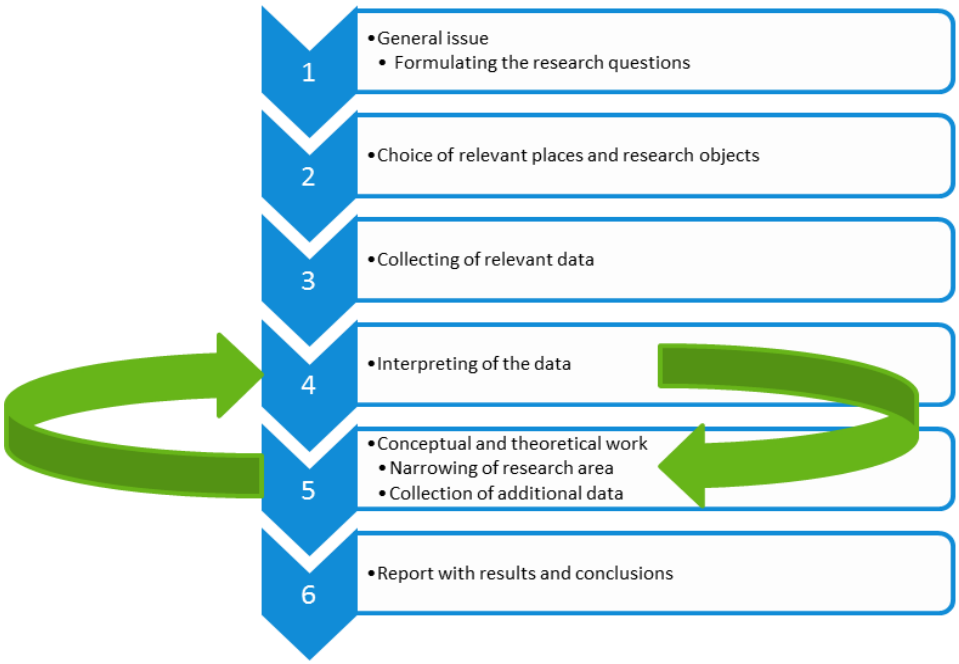


Figure 2.1: Bryman and Bell 6-step overview for the general qualitative work process

During step 4 and 5, an iterative process will take place before the final result is delivered in step 6. The author will use parts of this general definition of a research process. The differences take place in the first two steps. Both step 1 and 2 was made in collaboration with representatives from the PaperCo organization and was defined before the thesis work began. Furthermore, the work will follow the process described above by Bryman and Bell (2003). An initial literature study is followed by an empirical research with interviews and observations. The theoretical research and empirical research will after the initial phase overlap and be conducted iteratively. Subsequent the data gathering a summary of all found challenges and enablers are described in a table. Thereafter, in order to distinguish a final result, the data from the empiric studies will

be compared to the theoretical data and the protruding result, in the shape of challenges and enablers, will be explored.

## 2.3 DATA SELECTION AND COLLECTION

### 2.3.1 IN-DEPTH SEMI-STRUCTURED INTERVIEWS

The main part of the data for the empirical research was conducted by nine semi-structured interviews see Table 4.2. Choosing interviews as the principal source is for case-studies a suitable way to extract the information needed (Hoaglin, 1982). Interviews are beneficial due to their flexibility and are the most commonly used data collection tool for qualitative research. (Bryman & Bell, 2003) Another positive aspect is the possibility to receive information which could not be observed or found in the literature (Merriam, 1994). The interviews were semi-structured in order to discover the interviewees own opinions and allow the focus of the interview to shift into the area most appropriate for the interviewee. During qualitative semi-structured interviews, the interviewer has the possibility to deviate from the interview guide and ask follow-up questions or change the order of the questions depending on the situation. The aim is to receive both a broad overview and deep focused answers (Bryman & Bell, 2003).

The semi-structured format was chosen to make sure to involve all interesting subjects within each interview. Nevertheless, an interview guide was conducted prior to the interviews, see Appendix 1. The interviews consisted of two parts, first general questions and second, more specific questions regarding separate parts of the process. Qualitative interviews strive towards making the interview session have the format of a conversation rather than a structured question-answer session. The conversation characteristics make it important for the researcher to listen carefully to the interviewee behaviors, such as free-spoken, avoiding or personal ulterior motive (Yin, 2013). The selection of the nine employees to interview has been done in cooperation with PaperCo with respect to time schedules and logistics. Due to the in-depth focus of the interviews and the found consistency in the answers, the number of interviews and choice of respondents was considered statistically relevant (Bryman & Bell, 2003). The interviews were held either at the case study location or via telephone meetings.

### 2.3.2 OBSERVATIONS

In combination with interviews, contribution to the data collection was two observations of management workshops regarding the implementation of the Stage-Gate process. Participating in the workshops were 15 representatives from PaperCo, see Table 4.1. The strength of observations as a method for data collection is the first access to the data. In other words, the data has not been previously filtered by another author (Yin, 2013). The difference between interviews and observations is that the location of the observation is in the field and the mentioned first-hand data. Conducting interviews will provide second-hand data and the location of the interview session is often chosen to be in private. Using observations as a part of the data collection has multiple benefits. As an outsider, the observer can notice behaviors and routines not famous for the observed, the participating observer will receive a first impression of a specific happening and finally observations make it possible to observe actions as they take place. As a result, the knowledge and expertise of the observer can be used instead of only trusting second-hand data. Observations can, as interviews, have different levels of structure (Merriam, 1994). As for the interviews, observations at PaperCo will be made in a semi-structured way. Together with PaperCo, two workshops were in forehand planned for the author to observe. To make the observations useful in the analysis and not to forget different situations and moments, a template for registration of the activities was used (Merriam, 1994). The template requested information regarding the environment, the participants, the activities taking place, the date and durability as well as an open field for more "difficult to define factors", such as informal activities or what did not happen even if it was supposed to, see Appendix 2.

### 2.3.3 LITERATURE ANALYSIS

A literature study was conducted as a first step in the work process in order to gain knowledge within the research area and to distinguish the research already performed. To initially conduct a literature study is a common process for qualitative research. However, there are some critique meaning that the author might become biased and influence future interviewees with own opinions. The opponents of initial literature studies have however, themselves many times got a negative response on their lack of proof of uniqueness of their study. Thus, the best practice is that a literature study will support the relevance of the final result (Yin, 2013). To be able to fully understand the area of innovation management and implementing an innovation process, the need for an initial literature study, for this report, was necessary. Another reason was the need to learn the "language" of *Innovation Management*, in order to be able to optimize the output from interviews and observations. The literature study was made to find and

establish the needed concepts and models as well as display how these previously have been discussed within literature, as well as how they are connected to the research area for this thesis (Alvehus, 2013). To find interesting and valuable references and publications, research was made both online at LUBsearch (contains all Lund University's assets to electronic published resources) and by acquiring published material from libraries. The articles and publications from LUBsearch were found in two steps, first by searches of keywords, as for example "Stage-Gate processes", "Innovation processes", "Organizational change" and "Employee acceptance", inputs from supervisors and second, by analyzing the reference lists of found relevant articles. Input from the literature analysis was supposed to serve both as a theoretical background to introduce the reader to the subject area, and secondly to provide a frame of reference. The content of the frame of reference are theories and models which will serve as materials for the analysis in combination with the results from the empirical study. (Alvehus, 2013)

## 2.4 RELIABILITY AND VALIDITY OF THE STUDY

A common approach to discuss the quality of a scientific research is to analyze reliability and validity of the study. Reliability intends how "likely" the result will be repeated if the research is done a second time or by another researcher. If a result can be proved by multiple independent researches, using the same measurement instrument, it implies a high reliability (Alvehus, 2013). The validity of a study intends how well the research "observes, identifies or measures" what it is supposed to analyze. (Bryman & Bell, 2003) A study can therefore have a high reliability with low validity (Alvehus, 2013). No matter the orientation of a research, reliability and validity are important aspects to ensure credibility and dependability of a study. Thus, it is important to adjust the demands of the measurement after the study in question (Merriam, 1994). Some authors suggest that qualitative studies need to be estimated on other criteria than quantitative studies. Guba and Lincoln (1984) proposed the two basic criteria to be trust-worthiness and authenticity. The trust-worthiness consists of four sub-criteria which all have an equivalent in the quantitative research, credibility, transferability, dependability and conformability. The main concern of Guba and Lincoln (1984) was that the reliability and validity criteria, on qualitative research imply that there must be one finite description of the social reality (Bryman & Bell, 2003). Since the aim of this report is to describe and explore challenges and enablers of implementing an innovation process, trust-worthiness and authenticity will be used as criteria to verify the quality of this report, and will be further discussed and described below.

### 2.4.1 CREDIBILITY

Due to influence of social aspects in qualitative research, credibility of a result is depending on how acceptable it is from an external reader's point of view (Bryman & Bell, 2003). Credibility can also be called internal validation. Two important perspectives to keep in mind as a researcher is firstly, the information will not speak for itself, an interpreter or translator will exist. Secondly, it is impossible to observe or measure an event without influencing it (Merriam, 1994). To ensure the credibility of this report both regarding the methods used and the reality presented, feedback will continuously be received both from the supervisor at Lund University and from supervisors at PaperCo (Bryman & Bell, 2003). Representatives from PaperCo have good insight in the ongoing business and each week, together with the author, the developed worked was discussed and defined.

### 2.4.2 TRANSFERABILITY

Qualitative research often strives towards analyzing situations or areas in depth instead of in wide. Therefore, results tend to be focused on the uniqueness of the objects in the research and their opinions regarding a change or a situation (Bryman & Bell, 2003). Transferability can also be referred to as external validity. Transferability deals with the possibility to use the result in a different context, study or situation (Guba & Lincoln, 1984). To increase the transferability for this report, the current situation for PaperCo will be described and explored (Bryman & Bell, 2003). The final recommendations are both suitable for PaperCo´s situation and can with further research be transferred to some extent, into general challenges and enablers when implementing a Stage-Gate process.

### 2.4.3 DEPENDABILITY

A counterpart to the reliability for quantitative research is dependability. The dependability implies making sure that all material from the research is available. Material can, for example, be problem formulation, choice of interview objects, notes from observations and transcripts from interviews. To make it a tool for validation a group of colleagues or partners is required to analyze the research material to validate the result (Bryman & Bell, 2003). The dependability of this report is based on transcripts from interviews and templates from observations which could be asked for in retrospect, if needed. The result will, as mentioned in the credibility section, be

revised by representatives from the case-company and if necessary they can use the transcripts to fully understand the results.

### 2.4.4 CONFIRMABILITY

Confirmability is the strength to confirm the results objectivity. The researcher must prove that the result is built up by arguments not biased by the researchers own opinions or experiences (Bryman & Bell, 2003). To ensure an objective report, the findings from the data collection and analysis for this report will be discussed with external supervisors from Lund University and representatives from PaperCo before publishing.

### 2.4.5 AUTHENTICITY

In addition to the four criteria regarding the trust-worthiness of a report, Bryman and Bell (2003) lists five criteria regarding the results authenticity. The criteria can be described as five questions, as seen below:

1. Does the result provide a justified explanation of the reality?
2. Will the result help the objects involved to better understand their social situation and the reality they live in?
3. Has the research helped the participants to gain a better understanding of the other participants' opinion/reality?
4. Has the research made it possible for the involved participants to change their situation?
5. Has the research increased the facilities for the participant to improve their situation?

One of the objectives with this result is to help the participating case company, PaperCo, to better understand their current situation. All involved in the Division analyzed will get the possibility to bring forward their opinions and to discuss the situation. Thus, the final result will provide a summary and conclusion of all input and the authenticity can be strengthened.

# 3 THEORETICAL FRAMEWORK

*The theoretical chapter begins with introducing the reader to innovation management and general challenges and enablers with implementing an innovation process. Thereafter, the focus will be narrowed down to theory regarding the Stage-Gate process. The theoretical chapter is finished with a table summarizing all found challenges and enablers when implementing a Stage-Gate process.*

## 3.1 INNOVATION MANAGEMENT

The first aspect of innovation management is to decide that an organization delivers innovation worth managing. Innovation can be seen as a way to increase the value adding work within a company, by changing and challenging the status quo. Thus, in order to certify that the changes are not made in a risky and undefined way, effective innovation management is performed with a transparent and clear path forward. Innovation management will answer the question: "How will the current innovation help the organization to advance?" Compared to regular project processes, innovation work is more complex. The processes are built up by sequences of beforehand known experimentation. Inevitably, due to the complexity, innovation processes involve risk-taking and is therefore in need of a systematic and well-developed management. The sequel outline will at the minimum consist of three strategic phases, a phase of searching for different opportunities (searching), a phase where one or several possibilities are picked (choosing) and finally a phase where the chosen opportunity is implemented and developed (implementation). An organization's innovation management is shaped by the behaviors in these three phases (Tidd & Bessant, 2014).

Regardless of the size of an organization, successful innovation processes do not only include implementing ideas but also how well organizations are prepared to manage the process. Many companies try to find their answer to the question "how do we successfully innovate?" In addition, they search for the most appropriate practice allowing sustained innovation processing (Tidd & Bessant, 2014). However, structured planning of sustainable innovation processes is debated. The main argument to not implement a planned process is that a structured approach can reduce the innovation possibility. Innovation as an activity is unstructured, complex and dynamic, thus fitting it into a structure can decrease the basic innovation mechanisms such as freedom to try and employee motivation. Nevertheless, positive arguments are as well building on the complex nature of innovation mechanisms. If faced with a complex, unstructured

environment, which is typical for creative performance, many organizations/employees will instead for being innovative, be resistant to change and choose the old familiar path and thus, not challenge the status quo. Therefore, one solution is to develop a comprehensive plan with guidelines and an objective creative goal. Even if innovation often needs to be an iterative process, a plan can be the starting point of the process. Planning the process can also help with resource allocation and to align efforts for a wider perspective of organizational innovation strategy (Hunter, et al., 2012). Development of new products or innovation projects within organizations does in almost all cases entail organizational changes and managing those changes can be challenging for managers. The challenges lie in the need of a fostering of creativity within the whole organization while opening up the possibility to be both innovative and creative. The two concepts are closely related, but different. Creativity is about creating something new whereas innovation is the implementation of a new idea, putting an idea into practice (Dunne & Dougherty, 2012).

Product innovation involves development and combination or recombination of existing knowledge of product elements. Elements are factors such as technologies, user needs, manufacturing or basic science. Innovation is developed when these elements are integrated in new ways and forwarded into market launch (Dougherty, et al., 2013).

### 3.1.1 LEADERSHIP AND ORGANIZATION OF INNOVATION

It does not exist a single way or solution to how an innovative organization should be managed. Tidd and Bessant (2014) have by analyzing cases of innovative companies and less innovative companies developed a list of important components of an innovative organization, as seen in Table 3.1 below.

| **Component** | **Key features** |
|---|---|
| *Shared vision, leadership and the will to innovate* | Clearly articulated and shared sense of purpose. Stretching strategic intent and "top-management commitment" |
| *Appropriate Structure* | Organization design which enables creativity, learning and interaction. Key issue is to find the appropriate balance between structure and innovation flexibility. |

| | |
|---|---|
| *Key individuals* | Promoters, champions, Gate-keepers and other roles which energize or facilitate innovation |
| *Effective team working* | Appropriate use of teams at different levels (local, cross-functional and inter-organizational) |
| *Continuing and stretching individual development* | Long term commitment to education and training, to ensure high level of competence and the skill to learn effectively. |
| *Extensive communication* | Within, between and outside the organization. Internally in three directions: up, down and horizontal |
| *High-involvement innovation* | Wide-ranging organization participation in improvement activities |
| *Learning organization* | High level of involvement within and outside the firm in proactive experimentation, finding and solving problems, communication and sharing of experiences. Ensuring knowledge capture and dissemination |
| *Creative climate* | Positive approach to creative ideas with support in relevant motivation systems |
| *External focus* | Internal and external customer orientation |

Table 3.1: Components of the innovative organization (Tidd & Bessant, 2014)

Commitment and contribution from managers in an organization make a great impact on the success of innovations. Top-management will influence the business by their assessment of the environment, strategic decision making and their support for innovation (Tidd & Bessant, 2014). Relationships between employees working with innovation have been proved important for successful development and implementing new ideas. However, the shape of relationship between co-workers and managers has been discussed. One perspective highlights the importance of supportive and visible managers. Another contrasting perspective highlights the importance of managers being

more demanding and more focused on strategic factors and resource allocation (Dunne & Dougherty, 2012).

### 3.1.2 INNOVATION AS A PROCESS

The process of innovation planning can be divided into two perspectives, first, a structural view and second, a process-oriented view. Structural planning involves developing lists of tasks in order to reach a desired objective. These lists, have the aim is to increase efficiency and make actions take place. The process-oriented view, on the other hand, highlights the cognitive processes of developing a plan and the new possible plans which can be the result. The process-oriented view on planning is important, due to the dynamics of innovation need a flexible approach (Hunter, et al., 2012). Innovation processes contain four key stations according to Tidd and Bessant (2014), see figure 3.2 but other approaches exist, for example, Mumford's, et al with eight stages (2002), see figure 3.1 or Hunter, et al (2012) four stage process, see figure 3.3. All three models have similar content, the eight-stage model is more detailed and all information can be put into either of the four-stage models. Therefore, in this report, the four-stage models will be analyzed in more depth.

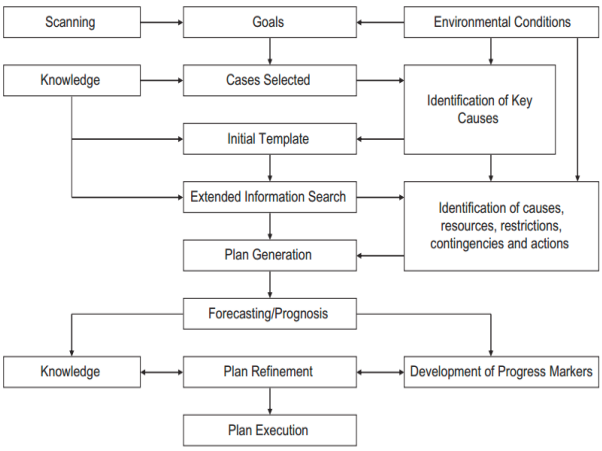


Figure 3.1 Mumford's, et al 8-Stages innovation process

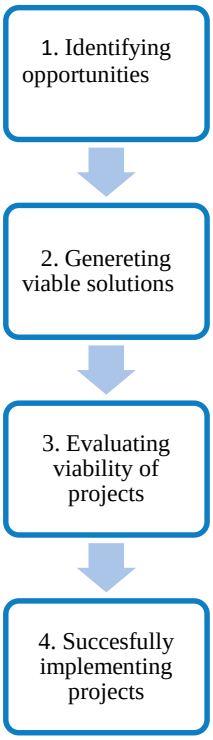


Figure 3.2 Hunter, et al., (2012) four-stage approach

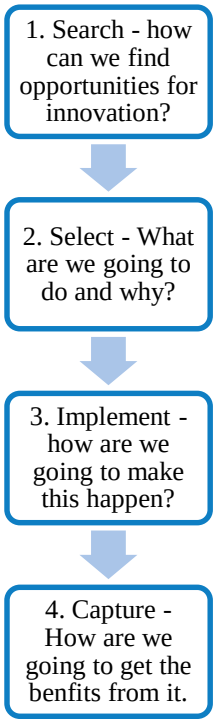


Figure 3.3 Tidd and Bessant's, (2014) 4-stage innovation process

Each stage involves new challenges. In the first stage, the challenge lays in having a developed system for gathering ideas and the ability to pick up different trigger signals, which can prove to be valuable new ideas for the organization.

In the second stage, the challenge consists of making strategic choices and being able to defend an idea regarding strategic questions. Questions could, for example, be: How well does this idea match the organization´s core competencies? Is the resource needed available? Developing innovative projects is, as earlier mentioned, by nature a risk-taking business and it is important to build a project portfolio striving towards balancing risk-taking and increasing possible future rewards (Tidd & Bessant, 2014). In combination with choosing ideas to continue with, organizations can develop back-up/alternative plans in order to reduce the risk, if the current environments or situations change (Hunter, et al., 2012).

During the third stage, the idea is changed into reality and launched on the market by combining input from market, technology, research and competitors' actions. Challenges during the third stage are to collect only the desired data, work time efficient, have correct timing and marketing positioning and to keep the implementation smooth (Tidd & Bessant, 2014).

In the fourth Stage when the product has hit the market, the challenge shifts to value capturing. Value capturing can be financial benefits or a social change, depending on the project. Even if innovation projects fail, an organization can benefit from the learnings throughout the project and use the knowledge in upcoming projects (Tidd & Bessant, 2014).

## 3.2 ENABLERS FOR AN INNOVATION PROCESS

Innovation processes have specific needs, the process of shifting an idea into a viable product will be affected both by internal and external inputs. First, the leadership needs to be clear and with a strategic direction. Management needs to be both risk-averse and courageous. Few organizations have resources to waste on ideas without a strategy, still leaders need to dare to "think outside the box", in order to steer their organization away from competitors and find new possibilities. The second need is a creative environment where employees are able to share their ideas and knowledge. Finally, an important need is proactive communication between internal and external partners that play a vital part in the innovation process to the firm. Important partners can, for example be suppliers, customers and sources of finance (Tidd & Bessant, 2014).

Dougherty (1992) defined three findings in existing literature being important to enhance product innovation processes in large firms. The first finding is a liaison between a product's commercial success, and how well the product design meets the customer need. The second finding is that cross-functional work between technical, sales, manufacturing and marketing units enhances product success. The final finding is that technological results and market issues in most cases are not joint by product innovators and cross-functional work do not exists between units. Therefore, the result will be less successful (Dougherty, 1992).

Organizations need to develop their own way of managing innovation processes. No two firms have the same preconditions and can do it in the same way. However, in order to find the way "we do it here", organizations need to let time define the routines and be open to practicing it and rehearsing it until the routines become part of their culture.

The skill of innovation management is to be able to notice the best routine and be able to repeat it again. A manager can, according to Tidd and Bessant (2014), ask himself/herself the following questions:

- Do we have effective enabling mechanisms for the core process?
- Do we have a strategic direction and commitment for innovation?
- Do we have an innovative organization?
- Do we build rich proactive links?
- Do we learn and develop our innovative capability?

### 3.2.1 ENABLERS FOR ORGANIZATIONAL CHANGE

Graham (2006) has through his research developed a list of five important lessons in order for an organization to go through change:

1. Have a long perspective; the larger the organization, the longer will the installment of new procedures take.
2. Begin at Top-Management. If the change is supposed to be valid for the whole organization, especially in a hierarchal organization, the change needs to come from the top.
3. Allow everyone to be included in the organizational change. Not only project managers need to be educated in the new processes. If processes are to be successful in the organization, the behavior and change need to come from the top and be supported throughout the whole organization down to the bottom.
4. Measure the progress. By comparing results with other teams, participants can get motivated. Organizations can use normed instruments and also verify the improvements of the changed effort.
5. Keep up the good hope, even though it might seem as there is no progress. After a period, the result that makes the difference will show.

### 3.2.2 NEW PRODUCT DEVELOPMENT

Developing new products or services from an initial idea to final market launch, and a finished product or service is a gradual process. Throughout the different phases, the risks and uncertainties need to be managed and reduced as much as possible. Management of new product development is a balancing act between investing resources needed to continue with a project, which might not end in anything fruitful,

cost in terms of other not pursued projects, and closing projects too soon, eliminating the possible success (Tidd & Bessant, 2014).

Past research provides evidence that a structured development system with decision gates is an effective approach for innovation processes. Key-activities in the system are cooperative engineering, cross-functional teams, advanced methods and early involvement of top-management. Examples are Coopers Stage-Gate process (Further described in chapter 3.5) and the "Development funnel", see figure 3.4. The development funnel involves, compared to the Stage-Gate model, the decreasing uncertainty and the influence of resource limits in the process progress (Tidd & Bessant, 2014).

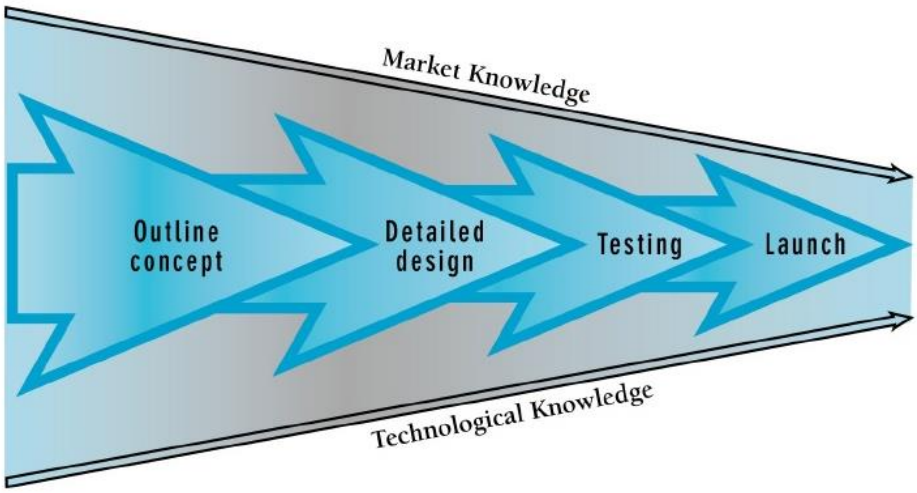


Figure 3.1: The Development Funnel (Tidd & Bessant, 2014)

## 3.3 CHALLENGES WHEN IMPLEMENTING INNOVATION PROCESSES

An aspect that makes innovation management difficult is how the targets and obstacles are in continues movement. There will constantly be new competitors, markets, technology or regulatory conditions. Therefore, an organization need to be able to change with the external environment and have a dynamic approach to their innovation capabilities. Key-questions regarding dynamic capability are; with the mind on our routines for innovation: What aspects can our organization do more of? Which aspects need to decrease or stop? Is there anything we need to learn? (Tidd & Bessant, 2014).

Table 3.2 below lists some examples of how a one-sided focus can have a negative impact on the results (Tidd & Bessant, 2014).

| **If innovation is only seen as…** | **… the result can be** |
|---|---|
| *Strong R&D capability* | Technology which fails to meet customer needs and might not be accepted |
| *Meeting customer needs* | Lack of technical progression and inability to reach competitive edge |
| *Technology advances* | Produced products which is unattractive on the market or design processes not meeting the needs of the user |
| *Only associated with key individuals* | Failure to utilize the creativity of remaining employees and failure in securing their input as another perspective to innovation improvements |
| *Only internally generated* | The "not invented here" effect. Good ideas developed externally are resisted or rejected |

Table 3.2: Risks with a one-sided focus on innovation (Tidd & Bessant, 2014)

### 3.3.1 THE CHALLENGE OF GAINING EMPLOYEE ACCEPTANCE

One important factor in building an innovative organization, is the people. Therefore, a successful organization objective needs to be to motivate employees to share their creativity and ideas. Plenty of research exist that focus on the need to reduce bureaucratic slowness, unnecessary structures and other obstacles in order to increase innovation and enhance opportunities for ideas to be investigated and developed. However, reducing structures to much can be dangerous, a loose and organic environment might not increase the innovative opportunities and too little structure and order might be as negative as too much. Thus, successful organizations use an appropriate level of structure, techniques, and tools in order to find a balance (Tidd & Bessant, 2014).

Kotter (2007) performed a research with more than 100 firms and their work towards changing their organizations to become more competitive. The firms were of mixed sizes and positions on the global market, including for example Ford, General Motors, British Airways and Landmark Communications. Kotter's main finding from the

research was that a successful change takes time and it is necessary not to rush through it. An objective to speed up the process will most likely make the result less satisfactory. A first action to change for companies often takes place when either a manager or a group of managers begin to analyze the current situation of the company. If finding some evidence, for example potential new markets, new products or a three-year trend of declining margins in a core business, the individual or group often tries to communicate this to the organization with as much emphasis as possible. This first step is important for the change for several reasons. Without commitment and motivation from key-individuals, employees will not give their time and help with the idea. Many organizations fail in this phase. Kotter's study presents a 50 % failing rate. Reasons can however vary. In some cases, executives underestimate the effort to push their employees out of their comfort zones or managers overestimate how well the change has been accepted in the organization. The most important key-player is the leader of the change. This person must use the advantage of the situation and understand the importance of each phase in the change process.

To gain employee understanding for the need of change, successful methods are increased transparency and involvement of all affected employees in discussions and analyzes. Furthermore, due to the human tendency not to welcome the carrier of bad news, many organizations use external sources to share unwanted information, for example if a change will require reorganization or laying off employees (Kotter, 2007). After making the major part of the organization understanding of the need for change, the next task is to gather a powerful guiding coalition. Failure with a strong enough guiding team is often based on lack of understanding of the challenge of implementing change and the importance of a strong senior based guiding team. The team responsible for the change must have the power to execute the changes and enough insight in the whole organization to motivate full involvement (Kotter, 2007).

Communication is a key factor for successful change implementation and according to Kotter (2007), organizations tend to fall into one of three dangerous communication patterns. If falling into the first pattern, a guiding team develops clear change visions and continues to communicate it by sending out one e-mail or hosting one meeting, implying they have used about 0.0001 % of the yearly internal company communication. Afterwards, managers are confused when few of the employees seem to understand the value of the change. Falling into the second pattern, the head of the organization devotes plenty more time to communicate the change and hold speeches to employees and teams. Nevertheless, the part of the yearly communication is still only

0,005%. The final dangerous pattern is initially good, with even more time devoted to communicate the change both via newsletters/e-mails and speeches. However, the danger lays in senior managers being anti-ethical to the vision. Thus, the final result is that the cynics inside the organization increases while the trust in communication decreases. To achieve great results with communication, the vision and the idea needs to be communicated in all channels, newsletters, speeches, office meetings etc. On top of this, a major responsibility lays at senior manager's desk. To prove the value of the idea and to avoid inconsistency, the behavior of managers are of high importance (Kotter, 2007).

### 3.3.2 TIME MANAGEMENT AND BUREAUCRACY

One of the biggest myths regarding time management is that it is possible to get everything you wish for done, if only using the correct to-do list or follow the right system. Today, there is an uninterrupted stream of new information and communication which, combined with the deceasing accessibility implies we could work 24 hours of the day and still not keep up. Thus, choosing what aspects to ignore can be the most important time management decisions of all (Bregman, 2013). Bevins and De Smet (2013) asked almost 1500 executives positioned all over the globe how they spent their time. The result was that only 9 % of the interviewees considered their time allocation as "very satisfied". About one-third of the respondents were "actively dissatisfied" and less than 50 % were "somewhat satisfied". When asked "how well their time spend matches their organization's strategic priorities" almost half the group of respondents answered that they did not concentrate sufficiently on guiding the direction of the firm. These results explain how efficient time management is important, not only for individuals but for the well-being of organizations.

Bevins and De Smet (2013) could from their survey distinguish four distinct dissatisfied executives "Online Junkies", "Schmoozers", "Cheerleaders" and "Firefighters".

Online Junkies spend a lot of their time in the office, busy with e-mailing, phone calls and have thus, less time to motivate others or delivering direct reports. Cheerleaders talk and meet a lot of people, face to face or in meetings. Nevertheless, cheerleaders have less time to meet external stakeholders. Schmoozers have very little time to work with strategy and analyzing together with colleagues. Instead, they share almost all their time with external stakeholders. The final group, the firefighters spend a lot of their time

alone, handling emergencies via email or phone. Thus, firefighters do not have time for reflective thinking or setting direction (Bevins & De Smet, 2013).

If instead focusing on what the satisfied executives do, the result from the survey displays that the key is a balance of time-consuming activities. On average they spend 34 % interacting with internal and external stakeholders, 39 % in internal meetings and 24 % working alone. The satisfied group could also identify four key activities that they spend approximately two-thirds of their time on: managing external stakeholders, managing and motivating people, making key business and operational decisions and setting direction and strategy (Bevins & De Smet, 2013).

To solve the issue with time-management, Bevins and De Smet (2013) developed five remedies from which organizations can use suitable advice for their specific case. The first remedy is to have a "Time leadership budget" and a defined process to use it. Organizations need to define how much management time the firm needs in order to "finance" its new ideas. The second aspect is to "Think about time" when introducing organizational change. For example, new managerial roles might only add to the complexity of the process and instead, a broader perspective with fewer managers might be a more time sufficient solution. "Ensure that individuals routinely measure and manage their time" is the third remedy. In many cases firms and executives are surprised on how their own and their employees time are spent and how it shifts from the organization's objectives. The fourth remedy is "Refine the Master Calendar", a firm's leaders need to be aware of what they and their team must focus on. Thereafter they can create time and space for critical priorities. A successful tool is to clearly state the characteristics of each meeting in advance, for example: information-sharing, decision-goals, discussion-topics etc. The final remedy is "Provide high-quality support". It can be reached by hiring administrative staff or enhance administration systems for (Bevins & De Smet, 2013).

## 3.4 MEASURING THE EFFECTIVENESS OF PRODUCT INNOVATION

Dougherty and Bowman (1995) developed a method to measure the effectiveness of product innovation, by analyzing three domains of activities. Product innovation can as earlier mentioned be seen as a complex process of problem solving and by dividing the process into three domains of activities, the results and effectiveness can be measured in a more approachable way. The first domain involves conceptualizing the product idea by involving customers and bringing the design idea into existence. The effectiveness

of this activity can be measured by how quick innovators solve problems within this activity domain. The second activity to measure, is how well the organizing of cross-functional work is coordinated between different functions. For example, how well problems are solved between engineering and manufacturing or how well multidisciplinary teams are built up. The activity is measured by the rate at which innovators solve issues within this activity and it indicates how effectively the organization can work with lateral activities. The final, third domain of activities deals with activities regarding how well the new products can be linked to the firm´s resources, structure, and strategy. The speed of how innovators manage the issues regarding product-to-organization indicates how efficiently they can deliver strategic linking activities (Dougherty & Bowman, 1995).

## 3.5 THE STAGE-GATE PROCESS

The objective with a Stage-Gate process is to break down the process of project development into a predetermined set of Stages. Before entering a new Stage, the project needs to pass through a checkpoint a "Decision Gate" where a Go/Kill/Hold/Recycle, further explanation can be found under definitions, decision is undertaken. Companies or divisions can involve different amount of Stages, usually between three to seven (Cooper, 1990). Figure 3.5 illustrates a typical 5-Stage process. Each Stage consists of prescribed activities and a cross-functional inclusion of employees.

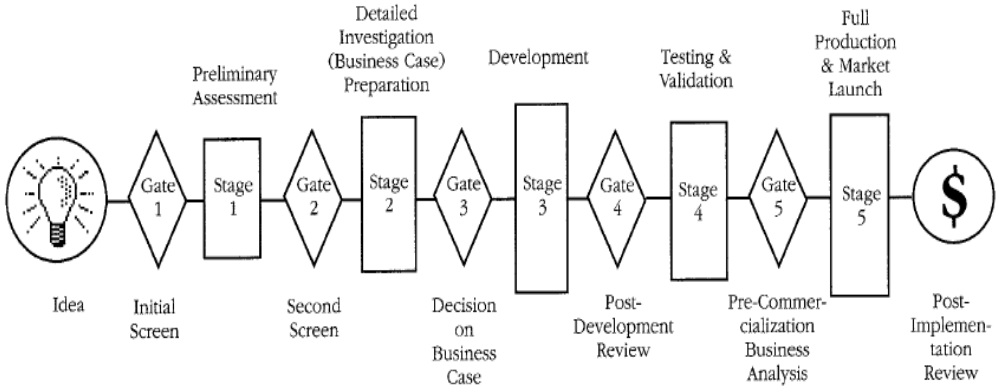


Figure 3.2: Overview of Cooper Stage-Gate Process (Cooper, 1990)

Product innovation requires due to its complexity of elements, often involvement among cross-functional specialty units both within the affected division and across the organization. Integration of knowledge will allow the product innovation to be designed, developed and launched (Dougherty, et al., 2013). The aim with multifunctional inclusion of experiences is to keep the project moving forward at a higher pace. The comparative contrast would be having one Stage for each activity such as marketing or technical investigations (Cooper & Kleinschmidt, 1993). As the resource investment required, as well as the amount of information, for each Stage increases as the project passes through Gates, risk is managed. Each Gate is supposed to serve as a quality checkpoint and include "must-meet" project requirements and "should meet" desirable characteristics (Cooper & Kleinschmidt, 1993). The input to each Gate is the deliverables that the project leader is responsible for delivering within the ongoing Stage. The must meet criteria are the variables the project will be judged on and needs to fulfill in order to pass the Gate. Should- meet characteristics are not as obligatory but can make a difference if resources are limited. The decisions during the Gate make the output, typically a Go/Kill/Hold/Recycle decision and a defined and accepted action plan for the upcoming Stage (Cooper, 1990). The decision makers in the Gates are usually cross-functional senior management from different units responsible for the resources the projects require (Cooper & Kleinschmidt, 1993). The decision makers can also be referred to as "Gate-keepers". The project leader is the person responsible for carrying the process through the different Stages and must be well aware of the demands and requirements obligatory to pass each Gate (Cooper, 1990).

### 3.5.1 THE FIRST STAGE-GATE SYSTEM

*Below is a description of Cooper (1990) 5-Stage-Gate process as it was first introduced. From this general perspective, organizations and firms can develop their own custom-made model. In other words, not all projects need or must go through all Stages and Gates. The most suitable route for each project is decided in the first Gate.*

**Ideation phase.** Preceding the introduction of a new project, involves all the work with requirements to submit a new idea to Gate 1, Initial Screen.

**Gate 1: Initial Screen**. In Gate 1, the first screening of a project idea is made by the Gate-keepers. The input criteria that decide if the project will continue to Stage 1, Preliminary Assessment, consist of aspects of strategic alignment, project feasibility, magnitude of the opportunity, differential advantage, and synergy with the firm's core

business, resources, and market attractiveness. In the initial screening, the first decision if the project will get resources for further development is undertaken. However, financial criteria are not the major focus and the first Gate can be considered a first "gentle" screening. To help the Gate-keepers to be able to rank the different projects, a checklist of important criteria is developed in advance. It consists both of must-meet criteria and should-meet criteria (Cooper, 1990).

**Stage 1: Preliminary Assessment**. During the preliminary assessment, information regarding the project's technical and market preliminary demands are evaluated. The technical assessment aims to understand the development and manufacturing feasibility, costs and timeframe. Objectives in the market assessment are to determine market size, market potential, and market acceptance. Both the budget and the timeframe for the Stage 1 are limited and the result will be the first input for a deeper re-evaluation of the project in Gate 2 (Cooper, 1990).

**Gate 2: Second Screen**. The second screening Gate is in some way a repetition of Gate 1, however, additional "should meet" criteria as sales force and customer reaction to the proposed product should be included. In Gate 2 a first simple financial assessment is calculated. If the Gate-keepers give the project a "Go" in this Stage the project will continue into more investment demanding Stages (Cooper, 1990).

**Stage 2: Definition**. In this Stage, the market-, technical-, operational- and financial assessments are further developed in order to ensure the attractiveness of the project, before larger investments. During Stage 2, the project need to be clearly defined. Firstly, the market assessment must answer the customer's needs, aspirations, and preferences. In combination, a competitive analysis needs to be performed. Secondly, the technical assessment is assigned to evaluate the do-ability of the project. Customer needs must be transferred into technically and economically feasible solutions. Depending on the project, an operational appraisal can be a part of Stage 2 as well as Intellectual Property (IP) landscaping. Finally, a more detailed financial analysis is developed as an input to Gate 3 (Cooper, 1990).

**Gate 3: Decision on Business Case**. After Gate 3, the project may require large investments. Therefore, if the project gets a Go in this Stage, the financial engagement is substantial. Again, the Gate-keepers need to evaluate if the project meet the must-meet and should-meet criteria in order to continue. The activities in Stage 2 are reviewed with particular focus on the financial assessment. Additionally, definitions of the project

need to be clear before entering the development Stage. Key-factors can include: definition of the market, product concept, positioning strategy and agreement of desired product benefits. During Gate 3, plans regarding development, operations and marketing are reviewed and approved (Cooper, 1990).

**Stage 3: Development.** Stage 3 consists of continuous development of the product as well as extended work with the operational, marketing and financial plans. During Stage 3 the IP-landscaping is revised and finished (Cooper, 1990).

**Gate 4: Post Development review**. The mission for the Gate-keepers in Gate 4 is to analyze the projects progress and the product attractiveness. Gate-keepers need to evaluate if the project meets the predefined must-meet and should-meet criteria in order to continue. The financial plan is revised with the new data and marketing and operational plans are reviewed in advance for future execution (Cooper, 1990).

**Stage 4: Validation**. During Stage 4, a number of activities are executed in order to evaluate the viability of the entire project such as: the product, the production process, customer acceptance and the finance of the project. A series of activities are performed, as for example in-house product tests, user trials, pilot production, pretesting of the market and finally a revision of the financial analysis (Cooper, 1990).

**Gate 5: Pre- Commercialization Decision**. The final Gate is the last step before complete commercialization. Gate 5 is also the final point where the project can be killed. Again, the Gate-keepers need to evaluate if the project meets the must-meet and should-meet criteria in order to continue. Important inputs are the results of the validation Stage, financial projections, the final revisions, and approvals of both operations- and marketing plans (Cooper, 1990).

**Stage 5: Commercialization.** The last Stage includes implementation of the marketing launch plan and the operations plan (Cooper, 1990).

**Post- Implementation Review.** After commercialization, when the developed product is considered a fixed member in the organization's line, it is time for a post-implementation review. At this point, the project and the developed products will be reviewed both with a critical audit and with a summary of learnings during the project work. The critical audit includes the final result of all the data put in the project, such as costs, profits, timing and the products performance. Learnings of the project group's

strengths, weaknesses and improvement areas are documented and marks the end of the project (Cooper, 1990).

## 3.6 ENABLERS FOR IMPLEMENTING A STAGE GATE PROCESS

Today, in order to stay competitive on the global market, organizations are obliged to have a sustainable innovation process which provides development of successful new products and services. Product innovation helps organizations to adapt to changes: in the market, in technology, and from competitors (Dougerthy & Hardy, 1996). The relationship between technology, innovation, and engineering design is commonly formulated as an enabler for development of new products, services and production systems. It is built up by theoretical and practical experiences and together with management influence, it has attracted researcher's attention from a diversity of perspectives (Högman & Johannesson, 2013). Important factors that relate to successful product innovation are: organizational configurations, culture, strategy, leadership and various combinations of these (Dougerthy & Hardy, 1996). To achieve a successful product development process, organizations need to rest on three fundamentals: stretch goals, radical simplicity, and inherit a retooled culture. Stretching of goals implies, making strategic targets only reachable through group work. In other words, breakthrough new products should rather be developed by teams than by individuals. Additionally, it implies making cross-functional teams accountable for performance. Radical simplicity is about making the whole operation model as simple as possible. Including job descriptions, capability definitions, and cultural values. The aim with a retooled culture, is to ensure organizational and cultural change with a focus on collaboration and high levels of execution. To sustain the reform, investments in leadership capabilities are valuable (Schaubroeck, et al., 2016).

A common mission for organizations is, as previously mentioned, to reduce and balance risk and aim to ensure future success. Common characteristics for organizations which have succeeded in being ready for unexpected events, protect their resources and be ready for new circumstances follow according to Hopkin (2014) his five R's of resilience. Only following one or most of these principles is not sufficient enough. In order to achieve resilience, all five of the following needs to be fulfilled. These are as described below:

- *Risk Radar*, i.e. the ability to foresee problems and have the possibility to seize new opportunities.

- *Resource and assets,* well-dilated resources and assets deliver the flexibility to answer new possibilities and adverse circumstances.
- *Relationships and networks*, information regarding risks are transparent and accessible within the organization.
- *Rapid Response*, capability to answer quickly to a crisis and restore the situation back to normality.
- *Review and adapt,* use gained experiences and constantly improve strategy, tactics, processes and capabilities.

From the first use of Stage-Gate processes, 30 years ago, many organizations have influenced the original process after their own needs and the original process has evolved and been modified into many different shapes and versions of next-generation Stage-Gate processes (Cooper, 2009). A standardized and structured process can help to decrease the number of different operating models across a company and instead enhance the possibility for cross-functional teams and cross-business teams. By having innumerable variations of operating models across either the organizations different units, or geographical locations, organizations risk to: restrain innovation, constrain cross-business sales, complicate economics of scales and inhibit sharing of knowledge and skills (Schaubroeck, et al., 2016).

### 3.6.1 KEY ATTRIBUTES FOR IMPLEMENTING A SUCCESSFUL STAGE-GATE PROCESS

A research done by Cooper and Edgett (2012) with 211 participating companies identified best- performing organizations and their best-practice tools regarding idea-to-launch processes. The result from their studies presents some key attributes for the idea-to-launch process. Firstly, to be operational, the process needs to be accessible and documented, described and stated at the operational level. Secondly, management must enable project teams to access the resources they need to succeed. The organizational environment should facilitate support for research teams regarding development, required resources and how to get products to market. Thirdly, successful organizations incorporate compliance checks to ensure that the guidelines are followed and used: the process is regularly monitored in order to make sure how well the process is practiced. Finally, the process itself is adaptable and scalable: different project types can influence the process shape, as seen figure 3.6 below. Large projects with a higher level of risk, as major new product developments, might require a “Full” Five-Stage-Gate process. Medium sized projects with moderate risk, for example extensions, modifications or

improvement work can use the "Xpress" way with Three-Stages. Sales force and marketing request which have a small impact on the business can use the "Lite" Two-Stage process (Cooper & Edgett, 2012). Case-studies have shown that successful organizations have implemented an alternative Three-Stage process for smaller innovation projects. In these processes, the Gate-decisions are allowed to be more qualitative and nonfinancial and the Stages are more flexible and iterative. New ideas are routed in different versions of the Stage-Gate process depending on factors such as products criteria, the characteristics of the project type, market, technical and IP-landscaping, risk levels, cost and expected time to market (Cooper, 2009).

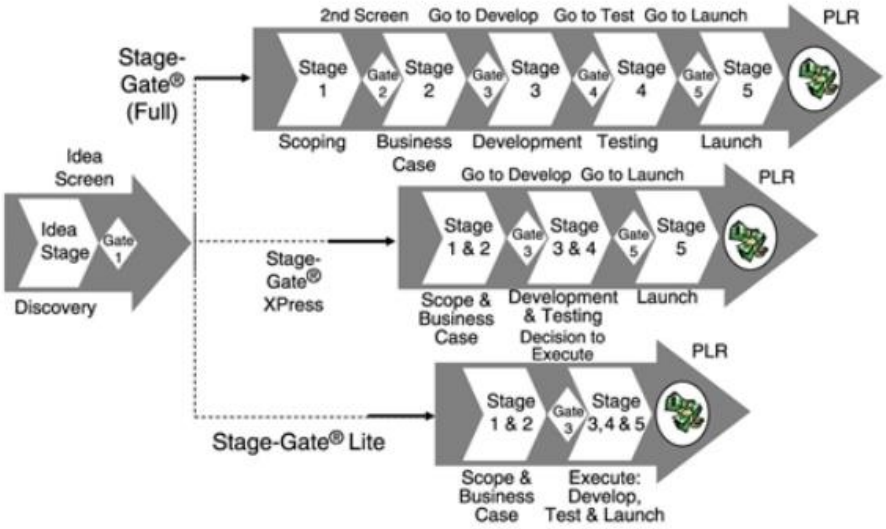


Figure 3.3: Different scales of the Stage-Gate (Cooper & Edgett, 2012)

### 3.6.2 ENABLERS FOR GATE-KEEPERS

Another important part of the best-practice work with Stage-Gate processes is definitions and regulations for Gate-keepers. Implementing a successful Stage-Gate process requires the major part of changed behavior in the top-management. Thus, appropriate behavior as a Gate-keeper is of high importance and the group must have good teamwork and clear "rules of engagement" (Cooper, 2009). Cooper and Edgett (2012) developed four best-practice methods for Gate-keepers. First, pre-defined Gate-keepers are assigned to projects, in order to avoid uncertainty who makes the important Gate-decisions (Cooper & Edgett, 2012). Organizations have commonly had issues defining Gate-keepers, thus, one rule is to only involve senior management with

ownership of the resources required by the project team. If a project requires investments from several departments, the Gate-keepers group must be cross-functional and include representatives from each department. Cross-functional Gate-keepers serve multiple purposes, for example, cross-functional alignment and access to resources and additionally, can a multi-faceted view lead to better decisions (Cooper, 2009).

Second, Gate-keepers can change between Gates and projects in the process. Depending on the risk associated with a project, the Gate-keepers need to be able to change both between Gates and between projects. For example, projects with a high investment risk need Gate-keepers with relevant experience and the authority over resource requirements needed in the project.

Third, all Gate-keepers schedule and attend meetings**.** Attendance to Gate meetings is considered of highest importance for all involved and if cancellation from one Gate-keeper is necessary, a substitute is designed with the same authority.

Finally, Gate-keepers contribute to the decision-making process. Effective Gate-decisions take place when: Gate-keepers are prepared for the meeting, have awareness of the projects and focus during the meetings are on decision making and not information sharing (Cooper & Edgett, 2012). A sign of bad Gatekeeping is if single senior Gate-keepers have “pet projects” which not fulfill the pre-defined must-meet criteria. The pet-project allows continuing through the Stage-Gate because remaining Gate-keepers do not have the authority confront the positive senior manager (Cooper, 2009).

### 3.6.3 ENABLERS FOR GATE-EFFECTIVENESS

A third important group of activities, according to Cooper and Edgett (2012) is improving the Gate effectiveness, thus, they have defined three rules for effective Gate-meetings. Firstly, the Go/Kill criteria are defined. The decision criteria are clearly stated and transparent for all involved. Managers have predefined scorecards to keep the Gate-decisions objective and quick to make (Cooper & Edgett, 2012). One of the major challenges firms face is not the work to reach the Gates but how the work is inefficient during Gate-meetings. In a well-defined system, misfortunate projects are killed early and projects in need of further work are quickly sent back(Cooper, 2009).

Secondly, the input needed to a Gate-decision is clearly defined and is easily accessible for the project team. In other words, the project team is aware of the expected deliveries

before each Gate and often as well has a formulated template (Cooper & Edgett, 2012). It is common that project teams are not enough aware of the required information and instead, the input to the following Gate is excessively bureaucratic and overestimated in an attempt to make a bullet-proof report. Excessive bureaucracy can in some ways be avoided by non-overelaborated templates for each Stage. Suggested solutions are for example, page restrictions, prepared templates and well defined guidelines. (Cooper, 2009)

Thirdly, decisions from Gate-meetings are objective and fact-based. The Gate-keepers are able to make high-quality, fact-based decisions without emotional involvement (Cooper & Edgett, 2012).

Fourthly, during Gate-meetings, decisions are actually made**.** The Gates are decision points and result in a Go/Kill/Hold/Recycle outcome. A problem for many organizations face is that their Gates lack "teeth". Gate-keepers are not objective and let projects slip through and if a project passes the first Gate, the following Gates sometimes function as information meetings and update checkpoints instead of decision points (Cooper, 2009; Cooper & Edgett, 2012).

Finally, all Gate-keepers support the final decisions and can contribute with the resources needed from their department (Cooper & Edgett, 2012).

### 3.6.4 ENABLERS FOR PORTFOLIO MANAGEMENT

Portfolio management can be of value to integrate with the Stage-Gate system, into a unified system. The two different processes both make Go/Kill decisions, however, the portfolio reviews analyze multiple amounts of projects in less depth, at a couple of times per year, and with a focus on getting a desirable project mix. In comparison with Gate-decisions, which evaluate each single project in more depth and follow projects from the beginning to the end. According to Cooper (2009), several tools are available for companies in order to improve the unification between portfolio management and Stage-Gate.

First, organizations can use strategic buckets to achieve an appropriate balance and mix of projects. The strategic bucket method is a tool where senior management yearly develops a preliminary direction on how they aspire to spend their R&D investments. At the portfolio meetings the previous year's investments are displayed in pie charts and compared to the initial targets. Strategic Bucket is based on the premise that "Strategy

becomes real when you start spending money". The aim is to achieve a good balance in the project mix and make sure that the portfolio is not filled with short-term and low-risk projects (Cooper, 2009).

Gate-keepers use scorecards to make better Go/Kill and prioritization decisions**.** The idea with scorecards is that qualitative criteria are in many cases better predictors of success compared to financial projections. By in advance developing a number of key criteria for success, each project is evaluated by the senior management in the Gate meeting. The total score makes an input for the Go/Kill Gate decision as well as a ranking input for prioritizing projects at the portfolio review meetings (Cooper, 2009).

Each Gate has in advanced defined success criteria. For example, expected profitability, launch date or expected sales. During the Gate-meetings, each criterion is evaluated and if any criteria fail, the project might need to be killed (Cooper, 2009).

### 3.6.5 ENABLERS FOR SUCCESSFUL PROJECT DEVELOPMENT

According to Cooper (2000), two paths exist for a successful project development. The first path is to certify working with each project in the best way and the second path is to win by choosing the most suitable projects and create the optimal project portfolio. The first path focuses on the innovation process, by including critical success factors in the product development process, as the Stage-Gate, organizations can launch new products on the market in the most effective and successful way. The second path, creating the right project portfolio, involves management focus on selecting projects after project management principles (Cooper, 2000).

No matter how well-functioning a product process is, the input of high-quality ideas is a key success factor for a good result. To increase the amount of great ideas, some companies replace the ideation Stage with a more excessive and pro-active "Discovery Stage". The Discovery Stage can according to Cooper, et al. (2002) include actions as a "Plan for Idea Capture and Handling". Ideas can be found everywhere and a common problem is that they never make it to a decision point and instead, they remain undiscovered. By spending more time and resources on the idea before design and development, the risk of focusing on the wrong projects can be decreased. The initial work should consist of market analysis, competitive analysis, customer research, concept testing and technical- and operational feasibility assessment (Cooper, 2000). A

discovery plan, as seen below in figure 3.7, has several steps in order to give any idea a proper evaluation.

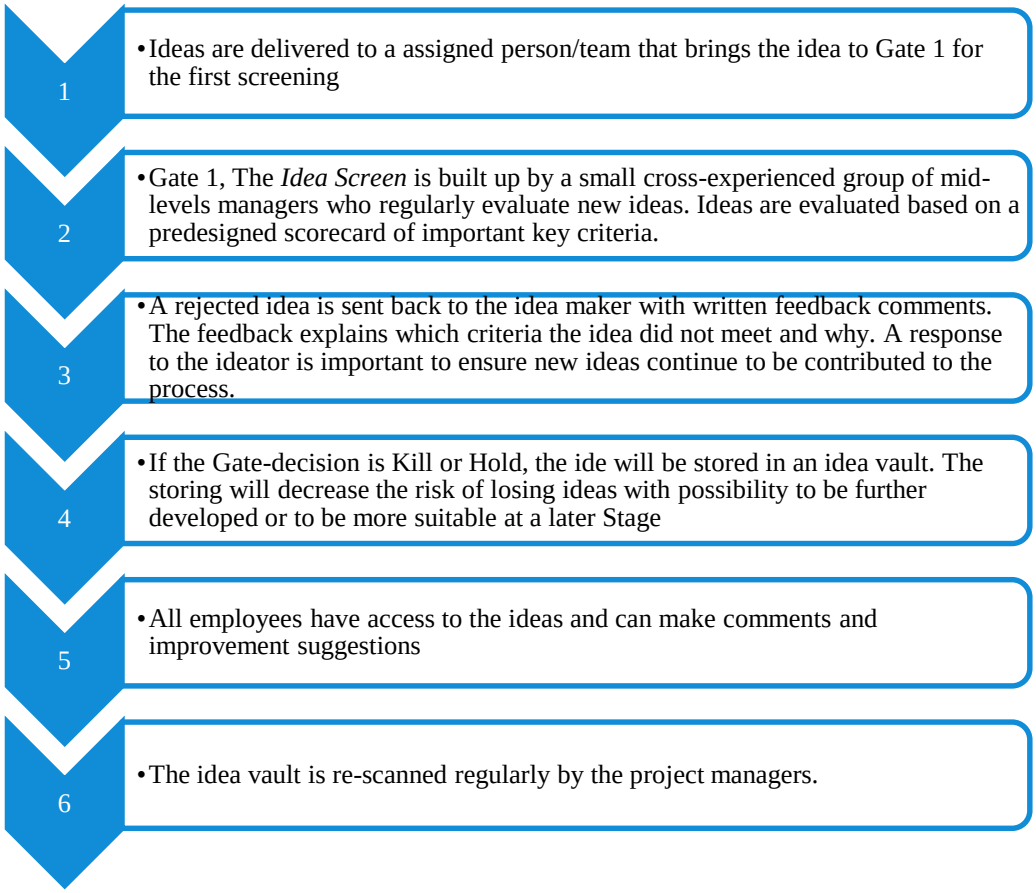


Figure 3.4: The six-stage Discovery plan (Cooper & Edgett, 2012)

Another way of discovering ideas is by working close to customers, listening to the customers' problems and understanding of their business and workflow. Through this a foundation of "Voice of Customers" (VoC) can be integrated into the Discovery Stage (Cooper, et al., 2002). The result of the customer's opinions should be used not only as a confirmation of a product design but also as an input. When working close to customers, according to Cooper, et al. (2002), important aspects are to ask customers about their problems and not only make them indicate which new products/experiences they want.

In combination with working with "regular" customers, organizations can use the knowledge of lead customers. Working with a selected number of customers, innovative and lead users can increase the expectations of finding innovative new ideas (Cooper, 2000).

Even if working close with customers can bring many ideas, employees within the own organization often as well have a lot to contribute with. Therefore, one activity for discovering ideas can be to, camp out with your customers. The point is to have cross-functional employees, such as engineer-, marketing-, sales-, and scientist representatives spending time at the location of the customer. The suggestion is based on ethno-graphic design and aims to observe customers in their normal work environment. The aim is to understand, for example. How do they use the product? What are the frustrating parts? Is the product used in other ways than expected? (Cooper, et al., 2002). When spending time in a customer's environment, hopefully, unarticulated needs can be discovered which further on can lead to development of more differentiated and customer superior valued product. (Cooper, 2000)

In order to prepare for future changes, organizations can use "Value Scenario methods". Scenario thinking can be a way for companies to decrease the risk of missing out on new ideas and help the decision makers to be more aware of "signals of change". The scenario works often include workshops/discussions among senior management with topics as: What is the best future scenario? What is the worst possible scenario? What are relevant dimensions that characterize these scenarios? The result from the workshops is possible future scenarios from which plans regarding new products types or investment possibilities in new technology/technology platforms can be formulated. When possibilities are formulated, a responsible manager is assigned and if the predicted signs take place, this person will communicate the opportunity and the company is ready to implement the change (Cooper, et al., 2002).

An organization's creativity can be enhanced by organizing activities such as a "Major Revenue Generator" (MRG) event. The principle of the MRG event is that senior and middle management spends a couple of days off-site with the goal to develop 2-5 major revenue opportunities. By gathering employees, well aware of the organization, at a new location, instead of the familiar, structured and less creative environment the innovative energy among the team can be increased. During the conference, the group is divided into teams and challenged to discuss major trends, customer needs, technology shifts, company strengths and core competencies. The next step is

opportunity mapping and finally translating the work into actionable new product ideas (Cooper, et al., 2002).

In many companies, the in-house research is decreasing and more and more transferred out to different business units. A solution, if organizations uses fundamental research is to involve it in the Discovery Stage. The fundamental research often includes small parts of great new products or platform. Even if the success rate of these projects often is lower compared to smaller less adventurous projects, the results have the possibility to be huge. One issue for many companies with fundamental research, is that it can be undirected, unfocused and unproductive. A solution for this problem, is to apply the concept of a Stage-Gate process on science projects. The technology Stage-Gate process is different from the standard process: deliverables is new knowledge/capability and the Gate criteria are much less financial and more strategic. Criteria for technology development processes can there are according to Cooper, et al. (2002) be;

- The degree of strategic fit
- Ability to achieve strategic leverage
- Potential for rewards if successful
- Likelihood of technical feasibility
- Likelihood of commercial success

## 3.7 CHALLENGES WITH IMPLEMENTING A STAGE-GATE PROCESS

Implementing a new process for sustainable product innovation is notably more challenging for old mature organizations with a history of stable operations compared to smaller, younger firms. Mature organizations often face challenges in keeping up with the increasing global competition and in order to survive they need become more innovative. Thus, to be able to survive, they need to fundamentally change how they organize. Combining innovation work with their routine operations is more challenging, than for younger firms, since the established structure and routines reinforce the existing work instead of promoting work with innovation (Dougerthy & Hardy, 1996; Schaubroeck, et al., 2016) and according to Hlavacek and Thompson (1973) it can influence the creativity negatively. Dougherty and Hardy (1996) performed a research to explore the issue with sustained product innovation in mature established firms and examined innovation processes in 15 very large firms. Their findings were that most of

the mature organizations were not facilitated for innovation. Innovations occurred but not due to the systems, rather in spite of them.

As the global environment is changing at a higher pace, firms will gain premiums by simplifying processes and be able to adapt more quickly to changed need of products and services. The result of organizations not adaptable enough to the new environment, are sulky relationships with customers, difficulties with delivering complex customized products on time within budget, and blocked communication channels which makes marketing, sales and distribution units suffer (Schaubroeck, et al., 2016). Organizations have tried to solve the issue by putting new products into separate venture units. Nevertheless, has this been proven unsuccessful since it does not fit into the firm's strategic posture or their position decreases after a while, due to power shifts within the organization (Dougerthy & Hardy, 1996).

Two problems, companies have reported with implementing a Stage-Gate model are inflexibility and bureaucracy (Högman & Johannesson, 2013). Additionally, the best-practice level of flexibility has been debated in literature. Do different types of projects require different versions of the process? Or is it possible with one Stage-Gate Process that fits all projects? (Cooper & Edgett, 2012). A Stage-Gate process is often implemented with the objective to add value to operating units in an organization, without risking increased bureaucracy, misguided influence, delays or wasted time. The head-office wishes for rewarding benefits, as for example: economics of scale, new opportunities for cross-functional work and devised strategies for knowledge sharing. Thus, in many cases, the net impact of many initiatives are negative and result in complaints from division executives or result in a spin-off from the parent company (Campbell & Szulanski, 2016).

A challenge discussed in literature has been if the Stage-Gate model might limit organizational learning. The barriers of learning, might not solely have to be the model itself, but rather if the users believe the final development objective can be decided even before the development process has been introduced.

The linear process of a Stage-Gate has been discussed and research has proven the combination of iterative design and design activities with the linear process as a more accepting process for conflicting resources (Högman & Johannesson, 2013). Sethi and Iqbal (2008) conducted a research which presented difficulties in combining rigorous Gate-controls with novel product development. Thorough Gate-controls may work with

incremental products but if the aim is radical products, the market performance can be harnessed. Instead, if novel as well as incremental product development is an objective, organizations can benefit from designing separate Gate-controls for the novel products (Sethi & Iqbal, 2008)..

Another problem facing users of the Stage-Gate process is how different employees hierarchically in a company are responsible for different Stages and Gates in the process. The hierarchy can lead to information asymmetry between senior managers and project managers. Gate decisions are made by senior management, while the work in the Stages is done by project managers. The project managers have a better insight in their project, but are not as aware of the projects position in the project portfolio (Chao, et al., 2014).

Coordination of cross-functional involvement, both for single projects and for multiple projects simultaneously is complex. Organizations have for a long period strived towards reducing silo work and instead increase cross-functional collaboration (Schaubroeck, et al., 2016). Solving the project-level issues for multiple projects and multiple stages simultaneously occurs at the organizational structure level and can be challenging due to the requirement of a sustainable innovation process (Dougerthy & Hardy, 1996) A comprehensive survey with CEO´s presents that organizations struggle with these challenges (Mitchell & van Ark, 2012; Dougerthy & Hardy, 1996).

### 3.7.1 CHALLENGES REGARDING DISTRIBUTING RESOURCES

A mature business has preferably a resource system that channels money, knowledge and information to all parts of the business. As a mature organization combine their core business with innovation projects, the resource channels needs to support the new ideas as well (Kanter, 1983). Innovation resources for cannot be depending on availability of leftover from the core business. Instead, pockets of seed money should be distributed across the firm as well as access to market information, customer information, and expertise from all units. To enhance the possibility for development of new products, important resource systems such as manufacturing facilities and sales channels need to be specially designed (Dougerthy & Hardy, 1996). However, for mature organizations resources often meet resistance flowing smoothly to innovation projects and instead are devoured by established activities (Henderson & Clark, 1990). One solution proposed by several writers is to use product champions and networks of entrepreneurial roles to support innovation projects with resources (Dougerthy & Hardy, 1996; Ancona & Caldwell, 1990). This solution has however, met resistance regarding mature

organizations since new product projects might not match with supporting resources until a manager with budget power steps in and establishes the new innovations position (Day, 1994).

### 3.7.2 REVIEW METHODS FOR A STAGE-GATE PROCESSES

In order to prevent the status quo and receive accountability for results, Stage-Gate processes need rigorous review methods, after a product has finished the market launch. Increased continuous learning during new product development need to follow, according to Cooper (2009), three superior rules for an organization. First, make sure performance metrics are in place. Performance metrics measure how well a product delivered the desired outcome, as for example: Did the profit reach the target? Did the market launch happen on time? Second, make the project team take responsibility for their results. All members of the team should be aware of the outcome and understand their responsibility in the result. Finally, incorporate learning and improvement. If a project team does not reach a target or if a project fails, the focus need to be on understanding the problem instead of solely moving on to the next project. A learning focus instead blaming is important, the aim with reviews should be to make a root-analysis in order to prevent mistakes to repeat themselves.

## 3.8 SUMMARY OF CHALLENGES AND ENABLERS IMPLEMENTING A STAGE-GATE PROCESS

*Table 3.3 below, is a summary of all challenges and enablers, regarding implementing a project process, with the focus on implementing a Stage-gate process, discussed in this thesis. Each characteristic is numbered, and those factors which could be considered both a challenge and an enabler is listed on the same row.*

| Number | Enabler | Challenge | Authors |
|---|---|---|---|
| **1** | *Strategic leadership with a clear objective* | | (Tidd & Bessant, 2014) (Kotter, 2007) (Dougerthy & Hardy, 1996) (Schaubroeck, et al., 2016) |
| **2** | *Risk averse and courageous management* | *Conservative management* | (Tidd & Bessant, 2014) (Hopkin, 2014) (Cooper, et al., 2002) |
| **3** | *Creative environment* | *Uncreative environment* | (Tidd & Bessant, 2014) (Cooper, et al., 2002) (Hlavacek & Thompson, 1973) |
| **4** | | *Allow time define new routines and the "way we do it here"* | (Tidd & Bessant, 2014) (Graham, 2006) (Kotter, 2007) |
| **5** | *High involvement of top-management* | *Less involvement of top-management* | (Graham, 2006) (Tidd & Bessant, 2014) (Kotter, 2007) (Cooper, 2009) |
| **6** | *Measurements of the progress* | *Measurements of the progress* | (Graham, 2006) (Dougherty & Bowman, 1995) (Hopkin, 2014) (Cooper & Edgett, 2012) (Cooper, 2009) |
| **7** | | *Choose the correct time-consuming activities* | (Graham, 2006) (Bevins & De Smet, 2013) |
| **8** | | *Dynamic approach to changed external aspects* | (Tidd & Bessant, 2014) (Dougerthy & Hardy, 1996) (Hopkin, 2014) (Schaubroeck, et al., 2016) |

| | | | |
|---|---|---|---|
| **9** | *Structured development process* | *To loose organic environment* | (Tidd & Bessant, 2014) (Schaubroeck, et al., 2016) (Dougerthy & Hardy, 1996) |
| **10** | *Employee acceptance and involvement in the process* | *Employee acceptance and involvement in the process* | (Tidd & Bessant, 2014) (Kotter, 2007) (Cooper & Edgett, 2012) |
| **11** | *Clear and extensive communication* | *Clear and extensive communication* | (Kotter, 2007) (Tidd & Bessant, 2014) |
| **12** | *Cross-functional work and sharing of knowledge within the organization* | *No cross-functional work exists* | (Dougherty, 1992) (Dougherty & Bowman, 1995) (Dougherty, et al., 2013) (Cooper & Kleinschmidt, 1993) (Högman & Johannesson, 2013) (Schaubroeck, et al., 2016) (Dougerthy & Hardy, 1996) (Mitchell & van Ark, 2012) |
| **13** | | *Project teams do not have access to the resource they nee* | (Cooper & Edgett, 2012) (Dougerthy & Hardy, 1996) |
| **14** | *The Process is adoptable and scalable* | *Inflexibility* | (Cooper & Edgett, 2012) (Cooper, 2009) (Högman & Johannesson, 2013) (Högman & Johannesson, 2013) |
| **15** | *Gate-keepers are clearly assigned and can change depending on the risk-level of a project* | *Gate-keepers are not clearly assigned and cannot change* | (Cooper & Edgett, 2012) (Tidd & Bessant, 2014) |
| **16** | *Gate-keepers have cross-functional experience* | *Gate-keepers do not have cross-functional experience* | (Cooper, 2009) (Tidd & Bessant, 2014) |
| **17** | *Gate – keepers attend meetings and contribute effectively to the decision-making* | *Gate – keepers do not attend meetings or contribute effectively to the decision-making* | (Cooper & Edgett, 2012) (Cooper, 2009) |

| | | | |
|---|---|---|---|
| **18** | *Inputs to all Gates are clearly defined with templates/ scorecards* | *Inputs to all Gates are not clearly defined* | (Cooper & Edgett, 2012) (Cooper, 2009) |
| **19** | *Optimal Project portfolio* | | (Cooper, 2000) (Dougerthy & Hardy, 1996) |
| **20** | *Capturing of possible ideas* | | (Cooper, 2000) (Cooper & Edgett, 2012) (Cooper, et al., 2002) |
| **21** | | *Mature organizations with history of stable operations* | (Dougerthy & Hardy, 1996) (Schaubroeck, et al., 2016) (Kanter, 1983) (Henderson & Clark, 1990) (Day, 1994) |
| **22** | *Less bureaucracy* | *Increased bureaucracy* | (Högman & Johannesson, 2013) (Campbell & Szulanski, 2016) |
| **23** | | *Hierarchal differences of responsible employees in the process* | (Chao, et al., 2014) |
| **24** | *Risk-Management* | | (Tidd & Bessant, 2014) (Cooper& Kleinschmidt, 1993) (Hopkin, 2014) |

Table 3.3: Summary of challenges and enablers implementing a Stage-Gate process

# 4 EMPIRICAL STUDY

*The empirical study consists of two parts. First, PaperCo and their specific Stage-Gate process is described. For further description on responsibilities of the roles mentioned, see Appendix 3. The second part presents the results from interviews and observations of the workshops. The interview- and observation guides can be found in Appendix 1 and 2.*

## 4.1 PAPERCO

PaperCo is a global pulp and paper company consisting of five Divisions. The Paper Division is built up in by nine Networks, each with different focus competence areas. All projects are assigned to the most suitable Network. In December 2015, PaperCo first implemented a customized Stage-Gate Model to support their project process and new product development. All R&D and innovation projects are supposed to be able to fit into the Stage-Gate model. Initially at PaperCo, all R&D and innovation projects need to be managed with reference to some key criteria:

- The objective needs to be defined and lead to a targeted result which is preferably measured by a Key Performance Indicator (KPI). KPI´s are selected for each different project with the objective to measure the project performance with preferably numerical figures
- Last a predefined period of time in a temporary project organization
- Use the Stage-Gate model and have a determined input of resources
- Have efficient result reporting
- Have the aim to create value as payback

The Stage-Gate model has been introduced to all project managers and involved employees and is expected to be fully in use in all new projects during the second quarter of 2016. Most of PaperCo´s projects are initiated by their internal partners or by their employees. Projects could, for example, involve improvement work, cost-savings and can be both short- and long-term.

## 4.2 STAGE-GATE PROCESS AT PAPERCO

The Stage-Gate was first implemented at PaperCo in December 2015. PaperCo top-management wished to have a better overview of the current projects process and be able to compare projects between, and within, different Divisions. Thus, an internal

project process language was needed and a structure where the position of a specific project clearly could be defined. Each Division got the framework of the Stage-Gate model developed by PaperCo but could within the Division define their Division-specific requirements and criteria for the different Stages and Gates. PaperCo's Stage Gate is described below, see figure 4.1.


Figure 4.1 PaperCo Stage-Gate process for R&D and Innovation Projects

### IDEATION

The ideas for a new project are most often either received from an partner or collected from PaperCo's *Idea Collector*, where an Ideator has posted a suggestion. During the Ideation Stage, the initial project proposal goes through three stages: Idea Collector, Idea Development, and Idea Evaluation. To be able to continue to Gate 0, the output requirement from the Ideation Stage is: a project title, project objectives and plan for concept shaping stage and a description of the business potential of the project. The project objective needs to answers to: "What", "Why", "How" and "for Whom" this project will run. In this initial stage, the business potential can be described both by numbers or words, depending on the information available. A prepared PowerPoint template is available with required input to Gate 0. If an idea continues to Gate 0, the Ideator will receive feedback on the idea from either the relevant Network, by Paper Division Productivity and R&D Steering Group or by the Innovation board.

### GATE 0

When an idea has defined all the required output from the Ideation Stage it moves forward to Gate 0. Involved in the first Gate 0, are Gate-keepers from either Productivity and R&D Steering Group or Innovation Board. The mission for the Gate-keepers is to decide if the idea will get a Go/Stop for continuing to the Concept Shaping Stage. If the decision is Go, the Gate-keepers will define the Project Title, KPI´s, Project Owner, Project Manager, Project Objectives as Total and Concept Shaping Budget, Budget Allocation and Project Timeline. Gate-keepers will as well decide the group that will act as Gate-keepers for the next Gate. This decision is considered important since it

defines for the Project Manager and the Project Owner who has the decision power in the project. It is expected that most Gate-decisions for all Network projects are taken by the Network, in fact, by the Project Manager, Project Owner and Network Chairman.

### CONCEPT SHAPING

If passing Gate 0, the project continues to the Concept Shaping Stage which implies initiating of the project. The project manager, project owner, project team and representatives from the responsible network, work with the project in this Stage. The required output from the Concept Shaping Stage is a filled out Concept Shaping Report, a plan for the Concept Validation Stage, a draft business plan, and an intellectual property (IP) landscaping. The patent landscaping is done in cooperation with the PaperCo Group Intellectual Property team. After the work in the Concept Shaping Stage, the project will now have a shaped concept, for example, produce a new product, deliver a new service, change a production process or how to solve a problem.

### GATE 1

The input for Gate 1 is the required output from the Concept Shaping Stage. Gate-keepers, formulated in Gate 0 have the power to decide if the project will continue or not and will also make decisions regarding revision or updating of Project Title, Project Owner, and Project Manager. The Project objectives are reviewed and updated and decisions are taken regarding Total and Concept Validation Budget, Budget allocation and Time-line. The Gate-keepers, often representatives from a Network, the Project Manager and Project Owner, will also decide who will manage the role as Gate-keepers for the next Gate.

### CONCEPT VALIDATION

If the project is given a Go from Gate 1 it continues to the Concept Validation Stage. The required output from Concept Validation Stage is a filled in Concept Validation report, a plan for the upcoming Option Development Stage, a business plan and a revised IP-landscaping. The team working in the Concept Validation Stage is in most cases the same as for Concept Shaping but also includes a representative from the Product Segment. The objective during the Concept Validation Stage is to validate the shaped concept and the Project Manager and Project Owner confirm the criteria needed to be fulfilled in order to approach Gate 2 and summarize this in the Concept Validation report.

### GATE 2

The defined Gate-Keepers from Gate 1 are responsible for making the decision to allow the project to continue to the Option Development Stage. If the project will require a major investment from PaperCo, the Investment Committee will be involved in the Gate-decision. Again the Gate-keepers will review and update if needed the Project Title, Project Owner, Project Manager and Project Objectives regarding Total and Option Development budget, Budget allocation and Timeline.

### OPTION DEVELOPMENT

The objective with the Option Development Stage is to review alternative options to produce a new product, deliver a new service, change a production process or to solve a problem. The result will be: a fulfillment of the Option Development Report, a developed plan for the Implementation Stage, and certainty there is "Freedom To Operate" (FTO). Tools for efficient FTO will be delivered to the project team, FTO is an ultimate prerequisite for any new product, process or service implementation. Involved in the Option Development Stage is similar to the Concept Validation Stage. If a project involves products not included in the most suitable PaperCo Division, the project will instead be handed over to the appropriate Division.

### GATE 3

The required output from the Option Development Stage is revised by the pre-defined Gate-keepers from Gate 2. The Gate-keepers make the Go/Stop decision and define and update in necessary the: Project Manager, Project Owner, Business Owner, Project Objectives, KPI´s, Total and Implementation budget, Budget allocation and Time-line. The Gate-keepers will also make the decision who will be Gate-keepers for Gate 4. If the project is investment-heavy the Gate 3 decision will be forwarded to the Investment Committee.

### IMPLEMENTATION

The input for the Implementation Stage is the work done in the Option Development Stage. Involved in the work are the Project Manager, Project Owner, responsible Network, Product Segment and either the Innovation Board or the Productivity and R&D Steering Group. The result after the Implementation Stage is a basis for the upcoming Market Launch Stage, the option to develop a product, service or change of a production process is implemented. The required output after the Implementation Stage is: a summary of the work in the Implementation Template, defined Production,

Product or Service, Customer Contracts, a Communication and Marketing plan and a Utilization and Business plan. The Project Manager and the Project Owner will define the criteria needed to reach Gate 4 and will include requirements for the Communication and Marketing plans and the utilization and Business Plan.

### GATE 4

The input for Gate 4 is the output from the Implementation Stage, and the final point where the Gate-keepers can decide to terminate a project. The Gate-keepers also define the Business Owner, Project Objectives, Total and Market Launch budget, Budget allocation and Timeline. A time-plan for the upcoming Project Review Stage is defined. Involved as Gate-keepers can be representatives such as Project Manager, Project Owner, Product Segment, Business Owner, Innovation Board or R&D Steering Group and the Network responsible. If needed the result of their decision will be forwarded to the Investment Committee.

### MARKET LAUNCH

During Market Launch, the implemented option is launched. The output from the Market launch is revenue and profit and involved in the work is the Project Manager, Project Owner, Business Owner, Product Segment and Innovation Board or R&D Steering group. During the Market Launch Stage, the responsibility of the Project work shifts from Project Manager and Project Owner to the Business Owner and Product Segment.

### REVIEW

The time frame of the Review is defined in Gate 4. The Review is the final Stage and is done after a project is ended even if it ends before the Market Launch Stage. The intended results from the Review Stage are learnings from the project work and the implementation result including customer feedback. Learnings such as: “What could have been done better in the project?” is forwarded in order to help future project teams. Other inputs are market and business results and value created by the project. The review is done by all drivers in the project process: Project Manager, Project Owner, Product Segment, Investment Committee, Innovation Board or Productivity and R&D Steering Group. Finally, the result of the Review Stage is revised by the Project Manager.

## 4.3 CASE-STUDY RESULTS

### 4.3.1 RESULTS FROM OBSERVATIONS

*During the case-study at PaperCo two observations took place during workshops with the agenda to discuss the upcoming implementation of the Stage-Gate model. Participating in the workshops were 14 representatives from different Networks within the Paper Division and one Moderator, see table 4.1. The observation guide can be found in appendix 2. Following is a summary of the discussions divided into two chapters, first challenges with the Stage-Gate process and second, enablers with the Stage-Gate process.*

| Participant | Role/Position |
|---|---|
| **Moderator** | R&D Director |
| **1** | Team Leader |
| **2** | Project Manager |
| **3** | Team Leader, new products |
| **4** | Project Manager |
| **5** | Project Manager |
| **6** | Project Manager |
| **7** | Project Manager |
| **8** | Project Manager |
| **9** | Project Manager |
| **10** | Project Manager |
| **11** | Project Manager |
| **12** | Project Manager |
| **13** | Project Manager |
| **14** | Project Manager |

Table 4.1: Participants in workshop 1 and 2

#### 4.3.1.1 WORKSHOPS

During the first workshop, the goal was to discuss: How to best integrate the new Stage-Gate approach and develop a finished approach? The group went through the whole

Stage-Gate process and discussed each Gate and Stage separately. During the second workshop, new comments were discussed and the final decisions made. Moderator of the workshops was the manager responsible for implementing the Stage-Gate at the PaperCo Paper Division.

### CHALLENGES WITH THE STAGE-GATE MODEL

A challenge discussed was how financial approximations should be included in the process. The moderator raised the issue: how thorough should the monetary requirements be evaluated in Gate 0. The first analysis of an initial idea, cannot solely be only a Go/Stop decision. Participant 13, questioned if there will be a task, in the beginning, to make sure there not will be requirements of any major investment in the end. The answer from the moderator to this question was that past experience has shown that it is important to allow projects to begin on a small scale, without full financial plans, otherwise many projects will not have the possibility to proceed from the initial gate.

The managerial issue was discussed and challenges regarding shifts of power were lifted. One issue, raised by participant 8, was if the Networks would receive more power instead of top-management, which might imply a decreased bureaucracy. However, a risk with this suggestion, according to participant 13 was that only a few of the members in Networks would be interested in participating the decision making. Concerns regarding who will have the decision power for different Gates were raised by the moderator, as well as who will have the final budget authority.

Cross-functional involvement in projects and an increased need to focus on market and sales was discussed. According to participant 10, the aim with Stage-Gate Process is to be able to work parallel with tasks, implying the project time will decrease. Since a marketing plan and a business plan is included in Stage 1, this will be sorted was an answer from participant 8. Another problem regarding the cross-functional experience is, according to the moderator, that today the role “Product Manager” for new products does not exist. Therefore, no one has the task to collect customer feedback and sales info.

Participant 1 argued that implementing the Stage-Gate work into the regular work method for Network members will not be an issue, however the challenge will lay in making the process more visible and transparent. Another issue raised was if the Option Development Stage would be obligatory for all projects, Participant 9 argued that the

Option Development Stage would be required since it has proven successful at another Division within PaperCo. The moderator agreed and added that the Option Development Stage is important to cover all possible project options and the necessary FTO analysis.

A challenge with the implementation will according to participant 1 be phasing out the usage of all old project templates. The moderator agreed and said that it would be appropriate if it is finished in March 2016.

The first workshop finished with a practical task. All participants were asked, by the moderator, to think of a project which they had/are in contact with, and evaluate whether it would fit with the Stage-Gate? After asking each participant in the room, no one had examples of projects that would not fit into the Stage-Gate. According to participant 12, who has previous experience of the Stage-Gate, unsuccessful results with a Stage-Gate Process has depended on misuse or confusion in the application of a Stage-Gate, rather than the Stage-Gate Process itself.

### ENABLERS WITH IMPLEMENTING THE STAGE-GATE

The first question raised by the moderator in the first workshop was; Who should be involved in the Gate 0 decision? Participant 9 suggested an involvement of top-management to decrease the possibility of introducing projects which will be stopped further on in the process. Other opinions were however raised. Participant 10 argued that in order to have a low amount of bureaucracy, an involvement of top-management or Steering Group/Innovation Board could be informed at a later stage. The moderator agreed, decreasing the number of projects for the Innovation Board will reduce the bureaucracy. Participant 13 suggested, that top-management could be informed after some stages. Mainly responsible should be the Project Owner, who should take the lead regarding the decisions after Gate-decisions, according to participant 2. The moderator summarized the discussion and concluded that all Gate-decisions, except Gate 0 can be made by a group consisting of the Network Chairman, Project Owner and Project Manager. However, if a project involves budget questions the Steering Group or Investment Board needs to be involved.

Participant 2, raised the question: if filled in templates would be required for all projects? A comment from participant 13 was that it would not require much more different work compared to what is being done today. Gate-keepers will need the information in order to make a sufficient decision. Participant 8 agreed, and commented that the templates could be seen as a checklist, before proceeding to the next step.

The moderator suggested that it could be stated in Gate 0, how many Stages and Gates a project will need. The workshop group had different opinions regarding the number of Stages and Gates. According to participant 13, all projects do not have to cover the whole process, for some projects the implementation phase will imply, Go or Stop for an investment.

Using the information in reviews can be a learning for future projects according to the moderator. It will present which parts of projects that were effective, and had good or bad results. Participant 13 agreed, and added that it would be interesting to receive customer feedback after a finished project. Participant 8 raised the question; If not finished projects would be required to perform a review? Participant 9 argued, that it would be, since some projects might not have the objective to continue through the whole process. The group also discussed if there should be a time-frame for the reviews and where they should be collected and stored.

An important aspect of the Stage-Gate, according to participant 2, is to make the process visible and transparent for top-management. Participant 13 agreed, it is important to present how the schedule is progressing, why there is no work done or how the project work is progressing.

Participant 4 commented that support activities, projects not connected to R&D or innovation, will not be suitable for the Stage-Gate approach. The moderator agreed, and also suggested, that some of the projects today, could be seen as support activities, instead of applicable in the Stage-Gate

### 4.3.2 RESULTS FROM INTERVIEWS

*Following is the result from interviews explained and described. As the case-company wishes to be anonymous, the interviewees are only described by their role in the organization. Dates of the interviews and each interviewee's number can be seen in table 4.2. The interview guide can be found in appendix 1. Summaries from the interviews will follow and the result are divided into five subchapters.*

| Interviewee | Role | Interview date |
|---|---|---|
| **1** | Sustainability Manager | 24/2-2016 |

| | | |
|---|---|---|
| **2** | Group R&D | 17/2-2016 |
| **3** | Other PaperCo Division | 7/3-2016 |
| **4** | Project manager | 7/3-2016 |
| **5** | Team leader | 8/3-2016 |
| **6** | Project manager | 9/3-2016 |
| **7** | Project manager | 10/3-2016 |
| **8** | Project manager | 17-3-2016 |
| **9** | Innovation Project manager, | 31/3-2016 |

Table 4.2: Participants in Interviews

### FIRST IMPRESSION ON IMPLEMENTATION OF A STAGE-GATE PROCESS MODEL AT PAPERCO

Five of the nine respondents had past experience of the Stage-Gate and for the remaining four was the model a completely new tool. All interviewed could see positive aspects with the implementation of Stage-Gate at PaperCo. However, some negative opinions regarding their first impression of implementing the Stage-Gate at PaperCo were discussed during interviews. Interviewee 9, who had no previous knowledge of the model, felt that the concept was a bit difficult to grasp and could see problems defining the position of current projects in the process. Interviewee 9, understands how the Stage-Gate process can help monitor projects, but is still a bit unsure how it will work in practice. However, projects with unclear timeframes will most likely be easier monitored with the Stage-Gate. Interviewee 6, were on the other hand, well familiar with the tool but was disappointed with the level of the presented Stage-Gate process and had wished for a more elaborated process. Interviewee 5 was positive to the Stage-Gate however, a bit skeptic to another new tool since he had been involved in changed working methods each third or fourth years at PaperCo. According to interviewee 7, the first impression was somewhat negative as the implementation could lead to to increased bureaucracy. However, the respondent thought in the long term, time-consuming bureaucracy could decrease and instead lead to better reporting.

A common theme among the interviewees was the positive aspects of the Stage-Gate model. The most mentioned positive comments regarding their first impression were the: increased transparency, logical structure, investment control, and better project overview.

### IMPORTANT CHARACTERISTICS FOR A SUCCESSFUL IMPLEMENTATION AT PAPERCO

The characteristic most mentioned among the interviews for a successful implementation of the Stage-Gate at PaperCo was employee acceptance. Eight of the nine interviewees mentioned the need. Interviewee 1, argues that the only way for the model to gain power and increase its credibility is if employees follow the rules and use the templates. Interviewee 5, adds on the importance of active work among top-management to make employees have a positive approach to the Stage-Gate. Additionally, is it important to implement the process in the whole organization including Mills, Technical Sales, Marketing and R&D etc. Interviewee 7, discussed how acceptance is connected to clear definitions of the rules in the process. In addition to clear rules, interviewee 7 stresses the factor that employees "needs to implement the process personally and by the heart". All employees should feel responsible for PaperCo's results.

Another important characteristic mentioned among five of the nine interviewees were clearly defined Gate-keepers. According to Interviewee 2, the Gate-decisions need to be decision-oriented and bad projects need to be stopped early in the process. By sorting out the bad projects early, the risk of a bad project portfolio is decreasing. In Gate 0, it is important to have proper technology-, market- and financial assessments and the output from a Gate should according to Interviewee 3 only be a Go/Stop/Back decision. According to interviewee 6, Gate-keepers need to be independent of the project work, their decisions should be based on unaffected views of arguments and concepts. The most important aspect according to interviewee 3 is to have an early business approach. All innovation projects need to have a business case as a background with a value proposition including figures such as technology- and market assessment, market share, potential volume, and profitability. Interviewee 9, adds on the importance to have clear guidelines for the Gates, with defined templates of what is expected for a project to continue. All employees involved need to know the required input and their own role in the process.

Other aspects mentioned are the need for the Stage-Gate to be flexible, include customers and Mills and have strong top-management support. Flexibility needs to be possible within the process, according to interviewee 1, who also argues for the importance of a close customer contact throughout the project. The size/length of the whole process should according to interviewee 3 depend on the risk-level of a project, more advanced projects need a more excessive Stage-Gate process while less advanced projects can have a leaner process. In order not to use the Stage-Gate for unsuitable projects, interviewee 4 suggests using thresholds for implementing projects in the Stage-Gate. Thresholds could, for example be, investment requirements or time. Interviewee 2 believes it needs to be possible to define objectives, for the upcoming Gate, in the previous Gate. Top-management needs to provide clear guidelines, according to interviewee 8 and interviewee 3 stresses the importance for top-management to work proactive and be ready to rethink and change the process or Stage/Gate templates.

### CHALLENGES WITH IMPLEMENTING THE STAGE-GATE PROCESS MODEL AT PAPERCO

As mentioned in the previous section, the acceptance and usage of the Stage-Gate process will according to most interviewed be a challenge. According to interviewee 9, the model is somewhat formal and without very clear guidelines, it will be difficult for employees to get an overview and gain an understanding of each stage. Interviewee 5 agrees and mentions that a very structured and transparent approach can have a deterrent influence on the creativity. According to interviewee 7, the range of different sizes of projects will make the usage of Stage-Gate problematic.

Several of the interviewees discussed managerial challenges. Interviewee 1 can see a challenge in defining who has the budget authority. A key issue during Gate-meetings is that the Gate-keepers have the authority to provide the required budget. Interviewee 1 can also see a challenge in changing the budget planning mindset. Previously, project teams yearly applied for a project budget, the Stage-Gate model is not built up with the same yearly approach and it can therefore, be challenging for project teams to know how far in the process each project will proceed and how much money to apply for. Interviewee 2 mentioned managerial difficulties with project portfolio decisions, who will have the authority to choose between larger and smaller investments? Interviewee 2, described a risk for stopping smaller projects in favor of the larger more investment heavy projects. Today, it is difficult for managers to balance the budget between different projects. Interviewee 1 discusses how the Stage-Gate might not be suitable for all projects, especially smaller projects without a clear timeframe. Interviewee 5 raises

an issue of changed strategic approach for managers. Implementing the Stage-Gate will require managers to be more patient and have a long-term strategic approach instead of the today, more short-term approach. Interview 4 agrees, the Top-Management need to be patient and allow time for full implementation of the Stage-Gate process.

Financial approximations are already today a challenge. Interviewee 9 describes that today, since it is difficult to get access to all numbers needed, in many cases the financial approximations are made by past experience. Interviewee 6 argues especially how financial approximations are difficult for the employees working with R&D. Most of the researchers have no previous experience of economic figures and calculations, as for example, how to approximate: future costs, market share, and possible benefits. Interviewee 3 agrees on the challenge with researchers at PaperCo. They need to understand and accept the Stage-Gate process and PaperCo must to enhance more of a learning culture and value failure and learning. According to Interviewee 3, PaperCo today lacks the experience of failure and how to retrieve the value from mistakes. Interviewee 7 discusses that the Mills, which are self-controlled, can have resistance to create value for PaperCo and therefore not fully accept the Stage-Gate. The Mills, as an issue is also discussed by interviewee 4, who as well argues the challenge of making the Mills understand the benefits of implementing the Stage-Gate. In addition, employees at the Mills working with technical improvements and incremental innovations are often very busy and might therefore not prioritize to gain a deep knowledge and understanding of the Stage-Gate process.

Another challenge can according to Interviewee 8 be increased bureaucracy, especially in the beginning the time spent on administrative work instead of project work will increase. Interviewee 9 also stresses the factor that the Gate-decisions will require clear time frames. It is important that projects are not kept on hold or are stuck waiting for a Gate-meeting. The need to continuously present, discuss and decide in each Gate can according to interviewee 5 be time consuming and bureaucratic. According to interviewee 9, the work with the Stage-Gate process will initially be difficult and time-consuming for employees until they are familiar with the process.

### ENABLERS WHEN IMPLEMENTING THE STAGE-GATE PROCESS AT PAPERCO

The enablers most mentioned among the interviewees were how the Stage-Gate model will provide increased clarity, transparency and an improved overview of all projects. The simplified overview can be a help for employees working in the projects, top-

management and for the Investment Committee. Additional enablers, connected with the increased transparency, is the possibility for improved communication within PaperCo and a better knowledge and understanding of other colleague's work.

The communication between projects can be enhanced when all involved speaks the same "Stage-Gate language". Interviewee 2 discusses how the open environment and employee sharing of knowledge can increase the employee's vision of responsibility to PaperCo, since more and more employees will analyze the current situations and work proactively for improvements. In the past, there has according to interviewee 2, been low-quality in the project reporting, which could be improved with more structured templates and project guidelines. Interviewee 1, can see an enabler in more clear and structured decision paths. The Stage-Gate will make it easier to describe the position of a project to managers and colleagues. Thus, it is very important that Gate-keepers listen to the project group, whom will have a better insight in the project. Interviewees 7 and 5, both agree the structured process can increase the acceptance of projects. If a project passes a Gate, its background is valid and the desired results have been achieved. Additionally, all interested will be able to find information regarding past investments and future needs. Interviewee 8, as well discusses the importance of having a structured and controlled overview of the money invested in projects, especially if customers are involved. The Stage-Gate can help to present exactly how invested money has been spent. According to interviewees 4 and 9, structure within projects has often lacked in the past, some projects have been structured and some not.

According to interviewee 3, the Stage-Gate is a tool for risk management. A way to decrease the risk is to accept risk adjustments for each financial statement at each Gate. In Gate 0 the risk adjustment can be 30-40 %, in Gate 1 10-20 %, in Gate 2 5-10 % and so on. Correct financial approximations are important since, according to interviewee 3, PaperCo have had 10 years of overpromising costs. Interviewee 6, as well discusses the importance of core financial approximations, new ways of thinking needs to be developed with market and customer focus.

Interviewees 4, 6 and 9 all agree that one enabler will be the possibility to easier stop projects and a fairer process since all projects will be judged on the same base. According to interviewee 6, this will involve less wasted time and money. Both interview 4 and 9, additionally mentions an increased awareness of required input for projects among employees. Interviewee 9, can also see value in working towards a clear Gate-decision. Status reports had previously not had the same clear objective according

to both interviewee 5 and 8. With increased demand to report each invested euro, the step-wise approach in the Stage-Gate is according to interviewee 5 a suitable approach.

Going through the whole process will according to interviewee 3 support risk-taking and also improve the working conditions for researches. If researchers are more structurally given feedback, on all their work, they can easier improve their work and be more motivated to learn to involve a business mindset. Interviewee 4 thinks continuous structured feedback will work as a motivational carrot for all members of project teams. Interviewee 6 believes the Stage-Gate can enhance the project portfolio and imply a more goal-directed project selection process. Additional enablers are better support for Project Manager, who before often was rather alone with projects, according to interviewee 5. The Project Owner role was in the past unclear according to interviewees 8 and 9. Therefore, the Project Owner often was not aware of its obligations such as, management and resource control. With more clear guidelines, the Project Owner will be able to take a higher responsibility and increase its thoughtfulness in projects.

### CHARACTERISTICS OF A SUCCESSFUL PROJECT

The question of important characteristics for a successful project was deliberately put as an open question, this to allow the interviewees to discuss their own first associations. Interviewee 1 and 4 argued for well-functioning communication and a contributing project group. In addition, interviewee 1 also mentions the importance of a supportive and objective Project Owner. Interviewee 9 values an active Project Owner, Customer, and Mill in the project but also characterize effective Gates and a well-distributed work-flow as successful factors.

Interviewee 6, 7 and 8 all characterize benefits to PaperCo, as the most important characteristic for a successful project. Interviewee 6 considers this as earned money, interviewee 7 as closed projects were all involved are satisfied with the result. Finally, interviewee 8, considers it beneficial if a first idea leads to improvements, for example, a new product development, cost reductions or new R&D clusters.

Interviewee 9 discusses how a project can be successful even if it does not go through the whole process. The most important aspect can be that a project is closed at the most suitable Gate. For interviewee 3 the characteristics of a successful project is an appropriate risk level, a slim and lean process which does not hinder the speed and appropriate deliverables for all Gates.

### MEASUREMENT OF THE IMPLEMENTATION

All interviewed considered measuring the success of the implementation of the Stage-Gate a difficult question, interviewee 7 considered it impossible. However, all agreed that the implementation must be allowed to take some time and the first measurements should not begin until earliest in the end of 2016. Interviewees 1, 3, 5 and 9 all considered the amount of projects that has gone through the whole Stage-Gate as an appropriate measurement. Additional figures can according to these also be the amount of Gate-decisions, the number of ideas, the number of stopped projects or the number of projects entering stage 1. According to Interviewee 8, the success rate of the implementation can be measured by required cost-related assets for projects, both for investment heavy projects and for smaller projects. Interviewee 3 can see speed to market, time in each Gate and length in stages as other possible measurement figures. Interviewee 9 discussed financial figures such as budgets, KPIs and time-frames as possible measurement tools.

### ADDITIONAL INPUT FROM INTERVIEWS

An overall conclusion from the interviews was that no one thought their work would be majorly affected by implementing the Stage-Gate.

The most important phases of the project process were according to most either Gate 0 or the Implementation Stage. According to interviewee 1, a thorough work is important in Gate 0, due to two reasons. Firstly, it is needed to prevent employees or researches to be overexcited with projects and rely on their "gut feeling" instead of analyzing facts and the current situation. Secondly, it is important to be able to present an estimation of a total project budget. If an estimated project budget will not be possible for PaperCo to execute in the close future, it is unnecessary to continue. Interviewee 6 agrees with the importance to reduce useless optimism in project teams. In the past, Project Managers have kept running projects without being positive that they will succeed.

Another important aspect, when analyzing a project is according to interviewee 8 to understand the unknown factors, otherwise, there is a high risk for wasted resources. According to interviewee 5, it is very important that the beginning of a process is being done by a suitable person, otherwise, the project will most likely fail. In addition to Gate 0, interviewee 5 also discusses the importance of the Implementation Stage. Especially, new product development projects, have failed in the past due to several reasons: lacking of customer contracts, bad market assessments and no field tests or prototyping. Interviewee 5 discusses, how products sometimes has been developed based on what

employees at PaperCo knows best, rather than what the customer wants. The implementation is according to interviewee 4 the face where success of a project is proved

A system for reviews is very important according to Interviewee 3 and 4. The reviews should consist of an analysis both of pre-launch and post-launch activities and will be a support for the future project. Figures such as ROI (Return on Investment) can be used to compare the initial plan with the final reality for each Stage.

A solution to decrease the resistance and unfamiliarity with the Stage-Gate could according to interviewee 9 be, a trial period. Each Network/project team can be allowed to try the Stage-Gate in a slow and iterative pace, and without the objectives of a perfect result. Afterwards, good and bad aspects of the templates, guidelines and process could be discussed and analyzed.

According to interviewee 8, it is important to have a clear structure regarding involving employees working with the practical aspects of projects.

# 5 DISCUSSION

*Chapter five is initiated with a discussion comparing three types of innovation processes. The discussion headline continues with a comparison between results from the empirical analyzes and theory. Challenges and enablers at PaperCo are discussed with a focus on the main similarities and diffrencies between empiric results and theory. The discussion chapter is finished with two summarizing tables, one for challenges and one for enablers with solvent suggestions as found in theory.*

## 5.1 COMPARISON OF TIDD'S AND BESSANT'S 4-STAGE, COOPER'S AND PAPERCO'S STAGE-GATE PROCESS

*In this chapter, a comparison will be made between Tidd and Bessant (2014) 4-stage innovation process, Cooper's (1990) "Original Stage-Gate process" and PaperCo Stage-Gate process. See figure 5.1 below for an overview of how the three processes are connected.*

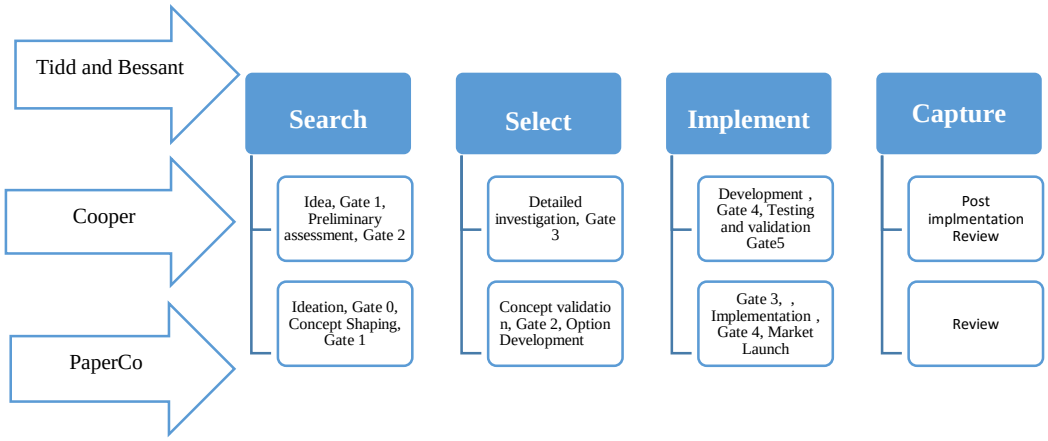


Figure 5.1: Comparison between Tidd and Bessant, Cooper and PaperCo innovation processes

The aim of Search, the first Stage in Tidd's and Bessant's (2014) 4-Stage process is to ensure an efficient strategy for gathering of new ideas and to understand possibilities and threats in the current environment (Tidd & Bessant, 2014). Both Cooper's (1990) and PaperCo's process begin when a new idea is submitted to the ideation phase. Thereafter, in Cooper's (1990) model the idea is evaluated on predefined must-meet and

should-meet criteria. At PaperCo a new idea must answer questions as: what, why, how and for whom the project will run. Thus, neither Coopers' or PaperCo's structure enhance external input. In order for a project to continue further in Coopers (1990) process, additional should-meet criteria regarding salesforce and customer reaction to the new product is added to the evaluate the project. At PaperCo a project is evaluated on the result from the Concept Shaping template, consisting of a draft business plan and an IP-landscaping. Both Cooper (1990) and PaperCo highlight the importance of market and technical analysis, however, the approach in the Gates are different. Coopers model highlight future salesforce or customer reaction and evaluate projects on must-meet and should-meet criteria. Whereas PaperCo base their Gate-decisions on developed reports, in previous stages and has not as specific focus on salesforce or customer reactions.

In Tidd's and Bessant's (2014) second stage, the Select Stage, the aim is to evaluate new ideas regarding strategic questions. A new idea is judged on, how well it will fit into the organizations project portfolio. In Cooper's (1990) process, before larger investments, market-, technical-, IP- and operational assessment is further developed in order to verify the attractiveness of a project. PaperCo does not, in contrast to Cooper (1990), further evaluate market- and technical attractiveness. Instead at PaperCo, a Concept Validation report is produced which involves a plan for the upcoming Stage, a full business plan, and a revised IP-landscaping. In Cooper's (1990) model the aim is to defend the financial engagement in a project, but also to ensure the project needs are visible and clear. PaperCo additionally, evaluate alternative options to produce a new product. Both Cooper (1990) and PaperCo answer strategic questions in their process, however, they choose different paths. Neither Cooper (1990) nor PaperCo has the objective, in this part of the process, to evaluate if the current project is suitable in the organization's project portfolio.

During the third Stage, of Tidd's and Bessant's (2014) process, the Implementation Stage, the objective is to combine inputs from market, technology, research and competitors in order to develop a new product. Development in Cooper's (1990) process consists of further development of product-, market-, operational- and financial plans and during the Gate-decision the Gate-keepers analyze the products progress and attractiveness-, financial-, operational- and marketing plans are reviewed as a preparation for market launch. Thereafter the finished concept is tested and validated by a number of activities, as for example pilot production, user tests and pre-testing of the market, to ensure viability of the entire project. At PaperCo a summary of the work is described in an implementation report. The report involves product definitions,

customer contracts, a communication and marketing plan and a utilization and business plan. PaperCo does, in contrast to Cooper include customer contract as an obligatory for market launch. However, PaperCo has no specified Stage for testing and validation of the new product.

The challenge in the fourth and final stage, the Capture Stage, of Tidd and Bessant (2014) model, when a new product has been launched on the market, is to capture the value. Value capturing can be both financial rewards and social change. Even if a project fails, organizations can learn from the process. After commercialization in Cooper's (1990) process, the product development will be reviewed, both with a critical audit and with a summary of the learnings in the project team. At PaperCo a review will be made even if a project is not launched on the market. Included in the review is learnings from the project work, market, and business results, customer feedback and a summary of the value created in the project. Cooper (1990) does in contrast to PaperCo not enhance the need to evaluate unfinished projects. Both Cooper (1990) and PaperCo has the objective to capture both financial and social benefits.

## 5.2 CHALLENGES IMPLEMENTING A STAGE-GATE PROCESS

*Following is a discussion of gathered theoretical facts in comparison with empirical results from workshops and interviews. For a summary of all found challenges referred to in this text see Table 3.3.*

### EMPLOYEE ACCEPTANCE

The challenge discussed by most of the interviewed were, how to get all employees to accept and use the Stage-Gate process in their project work routine. Resistance to accept a new project process model can have several reasons and includes many of the major challenges with implementing the Stage-Gate Process. The main issues adduced were fear of increased bureaucracy, time-consuming adopting process, inflexibility and managerial- and financial ambiguities. Additional motives for resistance to acceptance can be own satisfaction with the current project process work, thus resistance to change it. Implying lack of trust in the Stage-Gate process or failure of understanding of why top-management decided to implement this specific process model.

Gaining employee acceptance and involvement in is a challenge when implementing a project process model. To understand the need for change, Kotter's research (2007) emphasized the importance of involving employees in the implementation process and

increase transparency on the need for change. The vision of the change needs to be clearly articulated and all employees should share the sense of purpose (Tidd & Bessant, 2014; Graham, 2006). Top-management or the guiding-team who provide the new tool to the organization, are key-figures during the implementation phase and consistency in their behavior is of high importance. Their behavior is of high importance to avoid obstructive communication pattern, therefore, the communicator of news need to be reliable, and ensure that information is extensively spread and understood (Kotter, 2007; Tidd & Bessant, 2014). Innovative organizations need to enhance a "learning organization", an organization with high involvement, knowledge sharing and collaborative problem-solving (Tidd & Bessant, 2014).

Mature organizations more often have issues combining innovative processes with their routine work, established structure and routines can reinforce existing work instead of promoting change and innovation (Schaubroeck, et al., 2016; Dougerthy & Hardy, 1996). Graham (2006) notes, as well the importance of introducing organizational change through active top-management. Particularly, for hierarchical organizations where change is supposed to be valid for the whole organization, transformation needs to come from the top (Graham, 2006). To avoid resistance to change among employees, organizations can present clear guidelines and plans with creative objectives. The aim with the plans would be to help employees understand the change and resist the influence to follow old familiar process method (Hunter, et al., 2012).

### CROSS-FUNCTIONAL WORK

Cross-functional involvement in projects, as one participant mentioned in a workshop, is one of the objectives with the Stage-Gate process. Thus, this can be a challenge for PaperCo. Results from the interviews present issues with including project members with experience of financial approximations, market assessments, customer feedback and sales information. Budget and cost planning are today, according to one interviewee, often based on past experience and estimations. In most cases the reason is lack of accessibility to required financial input or lack of knowledge within the project team. The introduction position and extent of financial approximations throughout the process were discussed during the workshops. Participants had conflicting opinions regarding to which extent top-management should be involved to approve total budgets early in the process.

Cross-functional work and its benefits in project processes is a theme widely researched and many organizations struggle with the challenge of coordinating cross-functional

involvement in project processes (Mitchell & van Ark, 2012). In order to achieve a sustainable innovation process, organizations need a structure where project-level issues can be solved simultaneously for multiple projects at multiple Stages. (Dougerthy & Hardy, 1996).

According to Tidd and Bessant (2014) effective team work consists of cross-functional, local and inter-organizational teams. If developing new products, cross-functional work between technical developers, sales, marketing, and manufacturing will enhance the likelihood of product success (Dougherty, 1992). Moreover, sharing knowledge between functions can decrease the risk for a one-sided focus, as for example, too much concentration on strong R&D capability can lead to developed technology which fails to meet customer needs. As well, if innovation is only associated with key-individuals, organizations can lose creativity from remaining employees and therefore not utilize their inputs to improve innovations (Tidd & Bessant, 2014). Cross-functional Gate-keepers and project-teams can prevent the risk of overlapping work, information asymmetry and time-consuming misunderstandings (Chao, et al., 2014; Cooper, 2009; Tidd & Bessant, 2014). Additional objective with cross-functional teams is to keep the project process leaner and move at a higher pace (Cooper & Edgett, 2012). Successful product development rest on three fundamentals according to Schaubroeck, et al. (2016) whereas the first fundamental is stretch goals. This first fundamental implies the importance of team work instead of individual performance and making cross-functional teams responsible for all results. Since product innovation is complex and consists of elements as market assessments, technical investigations, and market launch, it requires of cross-functional involvement (Dougherty, et al., 2013).

### GATE-KEEPERS AND GATE-DECISIONS

Definition of and guidelines for the Gate-keepers and Gate-decisions was discussed as challenges when implementing the Stage-Gate Process. Issues for Gate-keepers were also raised in terms of distribution of the budget authority and importance of independence from the project team. Regarding Gate-decisions, one interviewee discusses the importance that they are obliged to be only decision-oriented, to secure only projects with positive benefits will continue in the process.

Results from the literature analysis for this thesis emphasize the importance of clearly assigned Gate-keepers, guidelines for Gate-keepers and Gate-decisions and pre-defined templates and scorecards for Gate-decisions. Gate-keepers are key-individuals in an innovative organization (Tidd & Bessant, 2014). Thus, their behavior is of high

importance and key-factors are: good team work, ability to make high-quality and fact-based decisions without emotional involvement and to follow guidelines (Cooper, 2009). One rule, in order to avoid uncertainty in the definition of Gate-keepers, is to only assign the position to senior-managers, with cross-functional experience and with authority over the resources the project requires (Cooper & Kleinschmidt, 1993; Cooper & Edgett, 2012). Cross-functional experience within the Gate-keeper group serves multiple purposes; cross-function alignment, access to resources and multifaceted opinions (Cooper, 2009).

Gate-keepers as well have an important responsibility to decrease the risk in organizations project portfolio. Thus, they need to have knowledge of how to; be aware of unexpected events, protect their resources and be ready for future activities. Gate-keepers have the power of resources and assets, one of Hopkin's (2014) five R´s of resilience. Their objective should be to have well-dilated resources and assets, which seize beneficial opportunities, as different project is associated to different level of risks. In order to assist Gate-keepers, both in ranking projects during the first Gate and to evaluate projects further on in the process, scorecards of important criteria can be developed in advanced. The checklists can consist of both must-meet criteria and should-meet criteria (Cooper, 1990; Cooper & Edgett, 2012). The templates for input to Gate-decisions should not be overelaborated and bureaucratic, as the project team must be well aware of the input needed. Input templates need to be well prepared and can if needed have page restrictions (Cooper, 2009). Successful product development, as previously mentioned, rests on three fundamentals. The second fundamental is about radical simplicity, always working towards making the whole process as simple as possible. It includes job descriptions, capability definitions, and templates (Schaubroeck, et al., 2016). Effective Gate-decisions require prepared and attending Gate-keepers with the focus on decision-making. The result decisions need to be objective and fact-based and supported by all present Gate-keepers (Cooper & Edgett, 2012).

### FLEXIBILITY AND SCALABILITY

The flexibility of the Stage-Gate at PaperCo is a challenge both regarding which projects to apply the process on and to which extent the process can be modified depending on characteristics of a project. During the workshop the final conclusion was to keep the shape, the five-stage approach of the Stage-Gate fixed for all projects. However,

opinions were raised during interviews on how the shape of the process could be modified depending on the risk associated with a project.

Adaptability and scalability can be an enabler with Stage-Gate processes. Moreover, an appropriate organizational structure for innovation will enable creativity, learning, and interaction. The objective is to find the organizational appropriate balance between structure and flexibility (Tidd & Bessant, 2014). The process-oriented view of project processes emphasizes the cognitive view when realizing projects and the need of a flexible approach when developing innovations (Hunter, et al., 2012). Since each organization is unique and have their own preconditions, organizations need to develop their own innovation process and find their specific process. Time needs to define routines and organizations must accept iterations and rehearse until "the way we do it here" is established (Tidd & Bessant, 2014). One of Hopkins (2014) five R´s of resilience is Review and adapt, i.e. the capability to use experiences and constantly improve strategy, tactics, processes and capabilities. The larger the organization the longer will the adjustment period be.

A structured approach with decision gates is effective when developing new product or services (Tidd & Bessant, 2014). However, a conflicting opinion is that structures, bureaucracy, and organizational structure will decrease innovation possibilities. The aim with Stage-Gate processes is to divide the project development process into a predetermined set of Stages. As the project continues through the process, the amount of information will increase and therefore decrease the risk (Cooper & Kleinschmidt, 1993). In order to handle projects of different risk, the Stage-Gate needs to be flexible and scalable. For high-risk projects, a 5-7 stage approach can be suitable whereas for smaller low-risk project a 3-stage approach can be appropriate, see figure 3.6. In order to stay flexible, the Stage-Gate process needs additionally to be able to work with both radical and incremental product development (Sethi & Iqbal, 2008). The flexibility and bureaucracy of the Stage-Gate process is a challenge that organization has reported (Högman & Johannesson, 2013). Mature organizations which aims to combine their core-business with innovation projects needs additionally to certify that their resource channels, support new ideas as well as the routine work (Kanter, 1983).

## 5.3 ENABLERS IMPLEMENTING A STAGE-GATE PROCESS

*Following is a discussion of gathered theoretical facts in comparison with empirical results from workshops and interviews. For a summary of all found enablers referred to in this text see Table 3.3.*

### STRUCTURED APPROACH WITH TRANSPARENT OVERVIEW

Enablers most mentioned among employees during both interviews and observations were how the Stage-Gate process is a structured process providing a transparent overview of projects. An improved overview will be helpful both for top-management and for project team's members. The structured approach can increase the acceptance of projects since projects will be backed up by each passed Gate. In addition, the structure and simplified overview can help project teams to display more accurate, the financial investment in projects. Nevertheless, some of the interviewees mentioned that structuring of projects has not been an issue for all past projects. A comment from the workshop was the importance to be able to present the current schedule of a project and how it is progressing. The roles of involved in the project process, such as the Project Manager and the Project Owner will according to interviewees be clearer and thus, improve their project work. A comment from one of the interviewed was the importance of involving employees working with the practical aspects of project work.

A structured development process does at the minimum consist of three strategic phases; searching, choosing, and implementation. The innovation management of an organization is depending on the behavior in these three phases. A well-structured approach can act as a support for organizations to enhance their innovation capabilities (Tidd & Bessant, 2014). The first result of Coopers and Edgetts (2012) research on best-practice methods for an idea-to-launch process, is the importance of a visible and documented process at the operational level. In addition, a sustainable innovation process is crucial for organizations in order to stay competitive on the global market. A planned process can provide an overview, that supports resource allocation and alignment of the process within the whole organization (Hunter, et al., 2012). However, the amount of structure can, according to Tidd and Bessant (2014), be difficult to decide, while it needs to foster creativity, learning, and interaction.

In order to certify the success, of an idea-to-launch process, organizations can incorporate compliance checks to understand how well the process is used but also to verify the improvements of the changed efforts and use the new experiences to

continuously improve strategy, tactics, processes and capabilities (Graham, 2006; Tidd & Bessant, 2014; Hopkin, 2014). The aim with the structural part of innovation management is to increase efficiency in project work and make action happen (Tidd & Bessant, 2014). One of Bevin's and De Smet´s (2013) five remedies is "Refine the master calendar", implying the importance of organizations being aware of what management and their project teams need to focus their work time on. Thereafter, shape their project process out of that perspective. Another remedy is "Radical Simplicity", implying the benefits of aiming for a simple process, involving job descriptions, capability definitions, and cultural values (Bevins & De Smet, 2013).

A standardized project approach can decrease the number of different operating models within an organization and instead highlight opportunities for cross-functional teams and cross-business teams (Schaubroeck, et al., 2016).

### COMMUNICATION

Speaking the same project language within PaperCo, both at project team level and at division level, can according to an interviewee simplify the organizational communication. Colleagues will more easily find information regarding past investments, future needs and understand each other's work. The same interviewee adds on, that with a common language, employee sharing of knowledge can be increased and imply a higher feeling of responsibility to PaperCo among employees. One interviewee highlighted that position descriptions of projects to colleagues and top-management will be easier communicated with a structured approach.

Clear and extensive communication can if correctly used be an enabler for organizations. According to Kotter (2007), communication is a key success factor for implementing change within an organization. The vision and idea of the change need to be spread in all internal organizational communication channels such as newsletters, speeches, meetings etc. (Kotter, 2007). Extensive communication is a component of the innovative organization and involves internal communication in three directions: up, down and horizontal (Tidd & Bessant, 2014). Therefore, access to market information, customer information, and expertise from all units should be distributed across the firm (Dougerthy & Hardy, 1996). A well-developed relationship between employees working with innovation is proven a success factor both regarding successful development and implementation of new ideas (Dunne & Dougherty, 2012). Good relationships between colleagues can enhance a creative environment, implying employees are able to share ideas and knowledge. It can also decrease risk, since

information of current situation and issues are transparent throughout the organization (Hopkin, 2014). Communication with external partners is as well a success factor for innovation processes, since all involved partners in the process can have valuable insights (Tidd & Bessant, 2014). Bevin's and De Smet's (2013) research on what satisfied executives spend their time on presents that 73% of management time is spent on interaction with stakeholders and internal meetings and 24% on working alone. Thus, the level of communication among colleagues and stakeholders are of high importance.

### RISK-MANAGEMENT TOOL

According to one of the Interviewees, PaperCo has a history of overpromising future costs within projects. The Stage-Gate approach can therefore, be a help to decrease risk-taking in projects. One alternative according to this interviewee is to accept different risk adjustments for each Stage. Several interviewed discussed the benefits of more effective termination of bad projects. Stopping bad projects will save both time and money and by implementing the Stage-Gate process all projects will be judged on the same base. Many of the interviewed considered Gate 0 as the most important Gate in the process and with thorough and fair Gate-decisions, projects based solely on project managers "gut-feeling" can be blocked.

Inevitably, innovation processes will involve risk-taking and a common mission for organizations is to strive to decrease risk and ensure future success. Development of a product or service from initial idea to final launch is a gradual process and throughout the process risks and uncertainties need to be decreased as much as possible (Tidd & Bessant, 2014). The objective with a Stage-Gate process is to divide project development into sets of Stages and Gates (Cooper, 1990). The resource investment needed will increase as the information possession will increase, therefore, risk is managed (Cooper & Kleinschmidt, 1993). A solution to handle projects of different risk-levels is a flexible Stage-Gate where the process can take different shapes depending on the risk association with a project (Cooper & Edgett, 2012).

In order to decrease the risk of non-beneficial projects slipping through the project process, guidelines for Gate-effectiveness and Gate-keepers needs to be clearly stated. Gate-keepers need to be exchangeable depending on their experience and the risk-level of a project. During Gate-meetings the Go and Kill/Stop criteria needs to be clearly defined and well distributed throughout the organization, the Gate-keepers need to have defined scorecards and the final Gate-decisions are objective and based on facts. The Gates must have "teeth" and not let projects continue in the process on a wrong basis

(Cooper & Edgett, 2012). According to Hopkin (2014), successful organizations in risk management all have a well-developed routine for: Risk Radar, Resource and Assets, Relationships and Networks, Rapid response and Review and Adapt.

There will constantly be new competitors, markets, technology and regulatory conditions etc. (Tidd & Bessant, 2014) and by building a risk-balancing project portfolio, organizations can increase the possibility for future profit. Moreover, in order to stay alert of changed external environment organizations can develop back-up plans in order to reduce future risk (Hunter, et al., 2012). A portfolio management can be integrated with the Stage-Gate system and there exists several tools for top-management to achieve a risk-reducing project portfolio. For example, organizations can in their Gate-scorecards involve a number of key-criteria for success, and when evaluating several projects or comparing projects, the total scores can be compared (Cooper, 2009). Additional solutions in theory to find the best ideas and develop a risk-reducing project portfolio, organizations can, for example implement a discovery plan, work more closely with customers, use value-scenario methods or organize Major Revenue Generator Events (Cooper, et al., 2002).

### FEEDBACK- MOTIVATION

Implementation of the Stage-Gate process can by its structured feedback enhance motivation both to researchers and project members. One interviewee argues that by providing researchers with more continuous and structured feedback, their work and business mindset can be improved.

Key individuals such as promoters, champions, Gate-keepers or other roles which energize or facilitate innovation are important components of the innovative organization. Additionally, does commitment and contribution from managers make a great impact on the success of innovations (Tidd & Bessant, 2014). Employees need to be motivated to share their ideas and creativity. In order to implement an idea-to-launch process organizations need to certify they provide their project teams with access to all the resources they need to succeed (Cooper & Edgett, 2012).

### REPORTING AND FINAL REVIEW OF PROJECTS

A past challenge has been, according to some of the interviews, less qualitative reporting and reviews of projects. Thus, by implementing the Stage-Gate process this could be improved. A well-functioning system for reviews is important and should consist of a

comparison of predicted and real results. A review system can be an enabler for future success in projects according to one interviewed.

Clearly defined templates for Gates, both for project groups and Gate-keepers are an enabler when implementing a Stage-Gate process. In order not to increase the bureaucracy and make employees become "online junkies", spending unnecessary time on back and forth emailing and phone calls. Organizations need to be active in analyzing the time required of implementing a change and be aware the most important work in each process. Thereafter, the organization can divide time for the important aspects. A useful tool is to clearly state characteristics of each kind of meeting in advance such as information, decision or discussion (Bevins & De Smet, 2013). Each Gate is supposed to serve as a quality checkpoint and the input template should include must-meet characteristics and should-meet characteristics (Cooper & Kleinschmidt, 1993). The project teams need to be well aware of the required input and therefore, not need to overelaborate their reporting and make the decision for Gate-keepers unnecessary bureaucratic (Cooper & Edgett, 2012). To prevent overelaborating, organizations need to have well-designed guides and develop pre-defined templates with page restrictions (Cooper, 2009). Gate-keepers as well need to have pre-defined scorecards to support them to make quick and objective decisions. An alternative to financial projections is having key-criteria for success as decision base (Cooper, 2009). Key-criteria can, for example, be expected profitability, launch date or expected sales.

The aim with reviews is to make root-analysis of projects in order to learn from success and mistakes (Cooper, 2009). Continuous learning is a component of innovative organization and is depending on involvement of internal and external partners to an organization (Tidd & Bessant, 2014). At some point, a project will be decided finished and both the project and the product development will be reviewed (Cooper, 2009). Even if innovation projects fail, an organization can benefit from learnings throughout the process and use the new insights in future projects (Tidd & Bessant, 2014). A review can consist of both a critical audit and a summit or the project learnings. A critical audit can include financial results and learnings such as strengths and weaknesses of the project teams and possible improvement areas for future projects (Cooper, 2009). Cooper (2009) distinguished three superior insights for organizations aiming for effective review methods: correct positioned performance metrics, such as reached profit or market launch date; project team which takes responsibility for their results and a learning focus instead of blaming.

## 5.4 MEASURING THE IMPLEMENTATION

One of the questions raised during the interviews was "How do you think the success of implementing the Stage-Gate can be measured?" All interviewed considered this a difficult question, some even impossible. A common opinion was to let the processes run for a period of time before beginning to measure the success at PaperCo. Interviewees indicated they would appreciate a trial-period. During this time, the Stage-Gate process would be tested in different project teams and thereafter they would deliver suggestions on possible improvement areas. Measurement figures could according to interviewees be the amount of Gate-decisions, the number of new ideas, the amount of stopped projects, the amount of projects entering Stage 1, the required cost-related assets for projects, the speed to market, the time in each Gate, the length of Stages or financial figures such as budget, KPIs, and lasting time-frames.

Graham (2006) developed a list of five important lessons for organizations going through organizational change. The first lesson is to have a long perspective, the larger the organization the longer time will the installment of new procedures take. The third lesson is to measure the progress. It can help to motivate employees and management can use normed instruments to verify improvements due to the change. The final lesson is to keep up the good hope, even if the change might take some time. The skill of innovation management is to let time define the new routines and be open for practice rounds and iterations (Tidd & Bessant, 2014). Dougherty and Bowman (1995) distinguished three domains of activities to analyze in order to measure an implementation of product innovation. Measurement activities can thus according to Dougherty and Bowman (1995) be: How quick do innovators develop possible projects from the initial idea? How quick are issues solved between cross-functional teams? How quick can innovators connect the final product to the organization's resources, structure, and strategy?

## 5.5 DISCUSSION SUMMARY- CHALLENGES IMPLEMENTING A STAGE-GATE PROCESS

*Below is Table 5.1 summarizing challenges, when implementing a Stage-Gate process. Each challenge is additionally described if applicable for PaperCo and has a suggested solution as found in theory. Subsequent Table 5.1 is a discussion chapter containing analysis on; challenges not experienced at PaperCo and reasons for not finding challenges at PaperCo mentioned in theory.*

| Number | General Challenge | Authors | PaperCo | Solutions suggested in theory |
|---|---|---|---|---|
| 2 | *Conservative management* | (Tidd & Bessant, 2014) (Hopkin, 2014) (Cooper, et al., 2002) | Not found in the empirical research | Articulate clearly the vision and strategy. Aim for a cross-functional management. |
| 3 | *Uncreative environment* | (Tidd & Bessant, 2014) (Cooper, et al., 2002) (Hlavacek & Thompson, 1973) | Not found in the empirical research | Prevent the "Not invented here effect" and do not let creativity be connected only to key-individuals |
| 4 | *Let time define new routines and the "way we do it here"* | (Tidd & Bessant, 2014) (Graham, 2006) (Kotter, 2007) | Employees wishes to have trial periods | Allow iterative trial-periods with feedback sessions between employees and management |
| 5 | *Less involvement of Top-Management* | (Graham, 2006) (Tidd & Bessant, 2014) (Kotter, 2007) (Cooper, 2009) | Employees are not fully under-standing of the changed situation | Increase communication, devotion and support from Top-management |
| 6 | *Measurements of the progress* | (Graham, 2006) (Dougherty & Bowman, 1995) (Hopkin, 2014) (Cooper & Edgett, | No clear strategy for how the progress will be measured | Involve participants in a workshop to discuss how the progress best |

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| | | 2012) (Cooper, 2009) | | should be measured |
| 7 | *Choose the correct time-consuming activities* | (Graham, 2006) (Bevins & De Smet, 2013) | Not found in the empirical research | Refine the Master Calendar in order to be aware of critical prioritizing for managers and employees |
| 8 | *Dynamic approach to changed external aspects* | (Tidd & Bessant, 2014) (Dougherty & Hardy, 1996) (Hopkin, 2014) (Schaubroeck, et al., 2016) | Struggle positioning all projects in the Stage- Gate Process | Allow a flexible structure with different amount of stages |
| 9 | *To loose organic environment* | (Tidd & Bessant, 2014) (Schaubroeck, et al., 2016) (Dougerthy & Hardy, 1996) | Not found in the empirical research | Certify that employees do not resist creativity because of the lack of structure. |
| 10 | *Employee acceptance and involvement in the process* | (Tidd & Bessant, 2014) (Kotter, 2007) (Cooper & Edgett, 2012) | Employee acceptance will be the main issue according to the empirical findings | Involve employees in the implementation. Communicate benefits and organize workshops to increase the acceptance |

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| 11 | *Clear and extensive communication* | (Kotter, 2007) (Tidd & Bessant, 2014) | Communication within project teams have in the past been an issue | Describe clear roles with responsibilities. Learn from project reviews. |
| 12 | *No cross-functional work exists* | (Dougherty, 1992) (Dougherty & Bowman, 1995) (Dougherty, et al., 2013) (Cooper & Kleinschmidt, 1993) (Högman & Johannesson, 2013) (Schaubroeck, et al., 2016) (Dougherty & Hardy, 1996) (Mitchell & van Ark, 2012) | Cross-functional teams or Gate-keepers do not exist | Aim for suitable cross-functional teams. For example, enhance collaboration between marketing, sales, R&D and technical specialists |
| 13 | *Project teams have access to the resource they need* | (Cooper & Edgett, 2012) (Dougerthy & Hardy, 1996) | Employees have budget concerns | Gate-keepers need to be able to allow project budgets and investments |
| 14 | *Inflexibility* | (Cooper & Edgett, 2012) (Cooper, 2009) (Högman & Johannesson, 2013) (Högman & Johannesson, 2013) | Struggle positioning all projects in the Stage- Gate Process | Allow a flexible structure with different amount of stages |

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|---|---|---|---|---|
| 15 | *Gate-keepers are not clearly assigned and can change depending on the risk-level of a project* | (Cooper & Edgett, 2012) (Tidd & Bessant, 2014) | Not found in the empirical research | Have clear guidelines for selecting Gate-keepers |
| 16 | *Gate-keepers do not have cross-functional experience* | (Cooper, 2009) (Tidd & Bessant, 2014) | No experience of cross-functional work | Aim towards cross-functional groups in order to decrease the risks of one-sided focus and to optimize the project portfolio. |
| 17 | *Gate – keepers do not attend meetings and contribute effectively to the decision-making* | (Cooper & Edgett, 2012) (Cooper, 2009) | Has been a problem in past projects | Develop clear guidelines for Gate-keepers |
| 18 | *Inputs to all Gates are not clearly defined with templates/ scorecards* | (Cooper & Edgett, 2012) (Cooper, 2009) | Input templates to all Gates are designed, however have concerns been raised. | Allow a trial period and modify the templates to best-practice for PaperCo |
| 21 | *Mature organizations with history of stable operations* | (Dougherty & Hardy, 1996) (Schaubroeck, et al., 2016) (Kanter, 1983) (Henderson & Clark, 1990) (Day, 1994) | Fear of change and "Not invented here effect" | Allow the implementation to take some time. Make employees involved. |

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| 22 | *Increased bureaucracy* | (Högman & Johannesson, 2013) (Campbell & Szulanski, 2016) | One part of the employee skepticism is fear of increased bureaucracy | Communicate with employees, make the templates easy and beneficial |
| 23 | *Hierarchal differences of responsible employees in the process* | (Chao, et al., 2014) | Fear of information differences between project teams and Gate-keepers | Develop clear and transparent guidelines and make all involved understand the requirements. Provide feedback to all projects. |

Table 5.1 Challenges and suggested solutions when implementing a Stage-Gate Process

Five challenges found in theory were not applicable with PaperCo. First, conservative management. Even if the challenge was not found in the empirical research, PaperCo is a mature organization. Thus it can risk to fall into conservative patterns. As suggested in the above table 5.1, organizations can win if aiming for a cross-functional management with clearly articulated vision strategies. Second, was uncreative environment. As number two this challenge can be a risk for mature organizations and it can therefore be important to iteratively analyze and observe the current environment. The third challenge was to choose the right time-consuming activities. Employees at PaperCo did not mention this as a challenge, however they have had issues with spending time and investment on bad projects. Thus, it can be rewarding to analyze how management and project groups spend their time and certify that rewarding work is prioritized. The forth challenge, was to loose organic environment. Increased structure and control was one of the main reasons for PaperCo to implement the Stage-Gate process and one of the main benefits according to the interviewed employees. Thus PaperCo will most likely not have any issue with this challenge. The final challenge not applicable for PaperCo, was that Gate-keepers are not clearly assigned and can change depending on the risk-level of a project. PaperCo has from the beginning been aware of this challenge and formulated guidelines for choosing and changing Gate-keepers and does therefore not consider this an issue. However, a suggestion is to observe the

practical usage of the guidelines and certify that correct Gatekeepers are chosen depending on the risk-level of projects.

The challenges found in the case study at PaperCo were all comparable to challenges found in theory. One reason for this could be the initial Stage which PaperCo is in with implementing their Stage-Gate. If a second case-study would be performed after the Stage-Gate has been further used in the organization, it is possible new challenges would be visible.

## 5.6 DISCUSSION SUMMARY- ENABLERS IMPLEMENTING A STAGE-GATE PROCESS

*Below is table 5.2, summarizing enablers when implementing a Stage-Gate process. Each enabler is additionally described if applicable for PaperCo and has a suggested solution as found in theory. Following is a discussion regarding enablers not experienced at PaperCo, enablers noticed at PaperCo not mentioned in theory and finally which enablers that are central to PaperCo and could help them overcome challenges.*

| Number | Enabler | Authors | PaperCo | Solutions suggested in theory |
|---|---|---|---|---|
| 1 | *Strategic Leadership with a clear Objective* | (Tidd & Bessant, 2014) (Kotter, 2007) (Dougerthy & Hardy, 1996) (Schaubroeck, et al., 2016) | Roles in project teams can be more specific | Aim for Radical Simplicity. Make the process, job descriptions, capability definitions and valueas as simple as possible |
| 2 | *Risk averse and courageous Management* | (Tidd & Bessant, 2014) (Hopkin, 2014) (Cooper, et al., 2002) | The Stage-Gate can help to decrease risk-taking in projects | Focus on Gate-effectiveness and experienced Gate-keepers |

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|---|---|---|---|---|
| 3 | *Creative environment* | (Tidd & Bessant, 2014) (Cooper, et al., 2002) (Hlavacek & Thompson, 1973) | N/A | Support new ideas and provide feedback and incentives for creative work |
| 5 | *High involvement of top-management* | (Graham, 2006) (Tidd & Bessant, 2014) (Kotter, 2007) (Cooper, 2009) | Top-management have discovered the need for change | Top-management needs to display a unified front and communicate the benefits with the Stage-gate process |
| 6 | *Measurements of the progress* | (Graham, 2006) (Dougherty & Bowman, 1995) (Hopkin, 2014) (Cooper & Edgett, 2012) (Cooper, 2009 | By allowing a trial-period the Stage-Gate process can be justified and the applicability measured. | Allow the implementation to take some time. Measure and continously analyze templates and guidelines |
| 9 | *Structured development process* | (Tidd & Bessant, 2014) (Schaubroeck, et al., 2016) (Dougerthy & Hardy, 1996) | Transparent overview of all projects | Adjust the level of structure to foster creativity and learning as well as alignment of the process within the whole organization |
| 10 | *Employee acceptance and involvement in the process* | (Tidd & Bessant, 2014) (Kotter, 2007) (Cooper & Edgett, 2012) | Gaining employee acceptance will increase the power of the Stage-Gate | Extensivele communicate the benefits with the Stage-Gate. Aim for two-way communication by workshops and conferences. |

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| 11 | *Clear and extensive communication* | (Kotter, 2007) (Tidd & Bessant, 2014) | PaperCo will speak the same project language. Thus, the communication can be enhanced | Importance of internal communication in three directions: up down and horizontal |
| 12 | *Cross-functional work and sharing of knowledge within the organization* | (Dougherty, 1992) (Dougherty & Bowman, 1995) (Dougherty, et al., 2013) (Cooper & Kleinschmidt, 1993) (Högman & Johannesson, 2013) (Schaubroeck, et al., 2016) (Dougherty & Hardy, 1996) (Mitchell & van Ark, 2012) | Increased diversity of expertise within project groups and sharing of knowledge | Sharing of knowledge within an organization can decrease the risk of a one-sided focus, information asymmetry and better use of all knowledge within the firm |
| 14 | *The Process is adoptable and scalable* | (Cooper & Edgett, 2012) (Cooper, 2009) (Högman & Johannesson, 2013) (Högman & Johannesson, 2013) | With a flexible approach the risk – associated with projects can be balanced. | Find the organizational specific balance between structure and flexibility. |
| 15 | *Gate-keepers are clearly assigned and can change depending on the risk-level of a project* | (Cooper & Edgett, 2012) (Tidd & Bessant, 2014) | Gate-keepers are decided depending on the risk-level of a project | The behaviour of Gate-keepers are of high importance. Assign the role to managers with authourity to make |

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| | | | | the needed financial decisions. |
| 16 | *Gate-keepers have cross-functional experience* | (Cooper, 2009) (Tidd & Bessant, 2014) | N/A | Create cross-functional Gate-keepers in order to have organizational alignment, resource access and prevent one-sided focus |
| 17 | *Gate – keepers attend meetings and contribute effectively to the decision-making* | (Cooper & Edgett, 2012) (Cooper, 2009) | N/A | The behavior of Gate-keepers is of high importance, key factors are good team work, ability to make high-quality fact-based decisions, without emotional involvement and to follow guidelines |
| 18 | *Inputs to all Gates are clearly defined with templates/ scorecards* | (Cooper & Edgett, 2012) (Cooper, 2009) | Improved reporting | Less bureacracy with well-developed templates. Develop scorecards for Gate-decisions with must-meet characteristics and should-meet characteristics |

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| 19 | *Optimal Project portfolio* | (Cooper, 2000) (Dougerthy & Hardy, 1996) | The project portfolio can be improved by easier termination of bad projects | Include key-criteria for success in Gate-decision scorecards to easier compare projects |
| 20 | *Capturing of possible ideas* | (Cooper, 2000) (Cooper & Edgett, 2012) (Cooper, et al., 2002) | The ideation stage of the Stage-Gate accepts all ideas for a first screening | Motivate all employees to share their ideas. Organize a creative environment. |
| 22 | *Less bureaucracy* | (Högman & Johannesson, 2013) (Campbell & Szulanski, 2016) | More efficient reporting with a clear objective | Let time define the organizational specific templates and guidelines |
| 24 | *Risk-Management* | (Tidd & Bessant, 2014) (Cooper& Kleinschmidt, 1993) (Hopkin, 2014) | Projects need to pass several screening Gates. Thus, bad projects can be terminated earlier | Allow the process to be flexible and scalable to suit projects of different risk-levels |

Table 5.2: Enablers and suggested solutions when implementing a Stage-Gate Process

### 5.6.1 RESULT DISCUSSION – ENABLERS IMPLEMENTING A STAGE-GATE PROCESS

Three enablers found in theory were not applicable with PaperCo. First was, creative environment, as discussed in the previous section. Uncreative environment was not discussed as a challenge either, implying PaperCo employees do not notice the importance of a creative/uncreative environment. Second was, Gate-keepers have cross-functional experience. During the workshop, the importance of cross-functional project

teams was discussed, however the enabler of cross-functional Gate-keepers has not been found in the case-study. Since this could decrease of a one-sided focus it would be a suggestion for PaperCo to consider this as an enabler. The final enabler not found in the case-study was, Gate – keepers attend meetings and contribute effectively to the decision-making. As discussed previously as a challenge, the behavior of Gate-keepers is of high importance. Thus, the way Gate-keepers devote to the Stage-Gate can be an enabler worth measuring in order to certify that Gate-decisions are made on rewarding grounds.

One enabler was found at PaperCo which was not as specified in theory and it was how the Stage-Gate can enable continual feedback to project teams. Hopefully will the feedback after each Gate motivate innovators to continue to deliver new ideas as well as increase learnings from failed/stopped projects. Additionally, most enablers found in theory are connected to the behavior of top-management and Gate-keepers. Top-management needs to be supportive and involved throughout the whole implementation and process. The leadership has to be strategic, risk averse and extensively distribute information to the whole organization. Gate-keepers, the managers of the Gates, needs to have well-defined rules and guidelines to certify that only beneficial projects proceed in the process and that the project team is well aware of their purposed task.

The structured approach can give PaperCo the possibility to focus on the project portfolio, have project budget control and to compare projects. Improved communication can be enabled by the common project language throughout the organization and as will provide a possibility for organizational learning. The Stage-Gate Process can be seen as a risk-management tool, as projects passes through Gates, the information will increase and the associated risk decrease. Thus, enhanced opportunities to stop non-beneficial projects. The Stage-Gate process enables continuous feedback to project teams, which can enable organizational learning and motivation for improving project work. Well-developed templates can improve and simplify the report writing and the highlighted focus on review writing can increase adaptability, usage and be value capturing.

# 6 CONCLUSION

*In this final chapter, the formulated research question is answered. Thereafter, recommendations are presented to PaperCo and lastly, suggestions for further research are discussed and explained.*

## 6.1 ANSWERING THE RESEARCH QUESTION

### 6.1.1 RQ 1. WHAT ARE THE MAIN CHALLENGES AND ENABLERS WHEN IMPLEMENTING A STAGE-GATE PROCESS FOR R&D AND INNOVATION PROJECTS IN A MATURE ORGANIZATION?

The five main challenges when implementing a Stage-Gate Process for R&D and innovation projects in a mature organization are:

- Employee acceptance
- Cross-functional engagement
- Definitions and guidelines for Gate-Keepers
- Flexibility and Scalability
- Allowance for creativity and innovation projects

The five main enablers when implementing a Stage-Gate Process for R&D and innovation projects in a mature organization are:

- A structured approach with a transparent overview
- Enhanced and simplified communication
- Improved risk-management
- Support for feedback and motivation
- More effective reporting and review writing

## 6.2 RECOMMENDATIONS TO PAPERCO

The implementation of the Stage-Gate process at PaperCo was undertaken at the end of 2015, with the purpose to gain a better overview of current projects, improve communication and use a comparable process for all projects. Those purposes are coinciding with the found enablers for PaperCo. Additional enablers for PaperCo are risk-management for new projects, enhanced possibility to motivate employees to be

innovative through feedback and possibly less overelaborate, but rewarding reports and reviews. As suggestions to overcome some of the found challenges with implementing a Stage-Gate, the following paragraphs present some recommendations for PaperCo to consider when deciding how their future strategy with the Stage-Gate process should be determined. The recommendations do not all have to be suitable for PaperCo's future strategy and of course additional challenges and enablers most likely can be found. Nevertheless, the suggestions are based on the empiric study with the objective to view PaperCo's situation from an external perspective.

### INVOLVE EMPLOYEES AND EXTENSIVELY COMMUNICATE THE CHANGE

Based on the interviews, not all employees were fully aware of the need for changed project process and in addition, some expressed concerns regarding the Stage-Gate process. A suggestion is, therefore, to boost the distribution of Stage-Gate information both within PaperCo and to all involved in the process. Mature organizations do more often have issues adjusting to changed processes, thus, the understanding of Stage-Gate benefits for PaperCo, such as improved risk-management, project portfolio and simplified communication and reporting, needs to be well distributed. Much of the resistance towards the Stage-Gate at PaperCo is fear of increased bureaucracy, however, as interviewees mentioned reporting was in the past an issue as well. Employees mindset needs thus, to be changed by extensive communication into viewing the Stage-Gate as a possibility for less overelaborate reporting and instead involve reporting with meaningful content. A key for successful communication is two-way dialogues, where both parts discuss the issue together, for example by workshops or phone-conferences.

Top-management has the major power and responsibility during the implementation. By continuous encouragement and involvement in the process, their support and feedback to remaining employees can increase their acceptance and motivation. Communication of news is in most cases, rather too limited than overdone. Especially, during the implementation phase, managers need to be open for questions and present a unified front with a clear and transparent plan for the future. To avoid resistance using the Stage-Gate, material, guidelines and templates need to be easily accessible for all employees and involved partners in the process.

### AIM FOR CROSS-FUNCTIONAL TEAMS AND ORGANIZATIONAL LEARNING

One of the strengths of Stage-Gate processes is how it highlights benefits with cross-functional teams. Depending on the size of a project, cross-functional involvement can make the process leaner and faster. Therefore, one suggestion for PaperCo is to evaluate important roles for successful projects and aim towards connecting different expertise in project teams. Another option is to further investigate which knowledge might be lacking in project teams and educate project members within these areas. Cross-functional Gate-keepers can be another beneficial idea in order to decrease the risks of one-sided focus and optimize the project portfolio. By combining employees with different background and expertise the understanding of colleagues' roles and organizational learning can increase.

### CONSIDER THE STAGE-GATE PROCESS EFFECT ON CREATIVITY AND INNOVATION PROJECTS

The linear Stage-Gate process approach will contribute to increased control and overview over projects. However, it might not add value to innovation projects and stimulate employee's creativity. As found in theory, a creative environment needs to allow a flexible approach, where project groups are allowed to fail and try again. Additionally, external input can be of value throughout the process both to certify the customer demand and the competitor's actions. Suggestions to PaperCo are therefore, firstly to expand the phase before the Ideation Phase. Aim for an ongoing systemized external analysis to find external possibilities and get inspiration. The analysis could involve continuous communication with external actors, customers, partners and suppliers. Secondly, allow innovation projects to have an initial fail rate. Encourage employees to try their new ideas within appropriate frames but not in a strict linear process such as the Stage-Gate.

### DEVELOP CLEAR GUIDELINES FOR GATES AND GATE-KEEPERS

To prevent increased bureaucracy and overdoing work in Stages or Gates, clear templates for all Gates is important. As the Stage-Gate is rather newly implemented at PaperCo with templates and guidelines, a suggestion is to keep the templates and project work under observation and let time and employee suggestions define the most suitable templates. Another proposition is to develop scorecards for Gate-decisions. These templates could, for example, include must-meet and should-meet criteria and help the Gate-keepers both to judge and compare current projects and to position projects in the

organization project portfolio. Examples of criteria can be the strategic fit, an expected financial return or whether the project leverages the organization's core competencies. Gate-keepers need to be aware of their responsibility and their role during Gate-decisions. A suggestion to PaperCo is to develop "rules of engagement" for example, the need for meetings to only focus on decision making and not information sharing.

### ALLOW THE STAGE-GATE TO BE FLEXIBLE AND SCALABLE

In order to prevent the Stage-Gate process to be overly extensive for small less risky projects or not fully manage the risk in large projects, the process can be allowed to include different amount of Stages. A proposition to PaperCo is to begin with the introduced 5-Stage process developed, thus be open for modification and extending/decreasing if needed further on. By having multiple paths within the Stage-Gate process, the benefits of a unified process will be kept as well as the flexible structure of the process will accept different types of projects.

A proposition to assimilate the possibility to develop both radical and incremental new products is to design different Gate-requirements for these projects. Thus, the risk of stopping possible beneficial projects can decrease.

### ALLOW A PILOT PERIOD AND MEASURE THE CHANGE

As mentioned in previous paragraphs, the implementation will most likely take some time before it is fully accepted in the organization. However, to make this period as productive as possible, one suggestion to PaperCo is to encourage project teams to test the Stage-Gate with some projects and give the templates and structure some constructive feedback. Hopefully, the result will be that PaperCo sooner can find "the way we do it here" and gain employee acceptance. Top-management can also continuously measure the process and projects and communicate positive progress, successful finished projects and learnings to the rest of the organization to motivate all to keep up good hope. Using the material in reviews after finished or stopped projects, can be a way to increase organizational learning and learn both from failure and success. By encouraging employees to fill in review templates and continuously discuss the results, hopefully, both the success rate and the learnings from failure can increase.

## 6.3 RECOMMENDATIONS FOR FURTHER RESEARCH

In order to certify the trustworthiness and authenticity of the results presented in this report, it would be rewarding to conduct a case study at multiple mature organizations implementing a Stage-Gate process. This would increase the transferability of the study and contribute to a wider use of this report. A wider study could determine the importance of the enablers and challenges presented in this report.

Since, most of the available research regarding Stage-Gate processes is conducted by the founder Robert J, Cooper, it would be beneficial to make further research done by unbiased researchers, measuring both positive and negative aspects with implementing a Stage-Gate process. It would also be beneficial to find further research on which organizations and project type that are most appropriate for Stage-Gate processes.

Implementing an organizational change does in most cases, require a long time perspective. Thus, an interesting research topic would be to follow several organizations implementing a Stage-Gate and observe how they modify the process over time. The long-time perspective is a perspective not been found in current research. Additional interesting topics regarding Stage-Gate processes would be: “How Stage-Gate processes can adjust to dynamic environments?” and “How the linear structure affects innovation capabilities?”.

## 6.4 REFLECTIONS AND LEARNINGS

Performing this master thesis has been very rewarding and beneficial in many ways. The author has gained great insights in challenges facing mature organizations when implementing organizational change. Moreover, it has been very interesting to receive a deeper insight in the area of innovation management and especially the area of application for the Stage-Gate process. The author is very grateful to PaperCo for allowing her to observe their situation and, therefore, get a first-hand impression on a common situation. From the authors opinion the challenges most protruding when implementing organization change is employee acceptance and to correctly define objectives with the change and timeframes.

The authors personal opinion is that the Stage-Gate process can be a suitable model if an organization aspires for an increased control and structure for their project work. The process can as well help the risk-management and allow organizations to try more high-risk projects. However, if an organization is aiming towards increasing their innovation capabilities the Stage-Gate model can be to linear and restrict learning opportunities.

Thus, the authors suggestions to any organization considering to implement a Stage-gate process is to consider their: objectives with the process, needs and current situation. If their objectives are structure and risk-management, a wish to streamline their project development process and to not have the major focus on creativity and innovative projects, the Stage-Gate process can be a suitable model.

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## APPENDIX 1 – INTERVIEW GUIDE

1. Can you describe your role at PaperCo?
    a. Main tasks?
    b. Responsibilities?
    c. Involvements?

2. Why do you think PaperCo developed the Stage-Gate Process?
    a. Who is it supposed to serve?
    b. Who/whom was the founder of the idea?
    c. What did not work with the previous way of working?

3. Have you past experience of working with a similar process, either at PaperCo or at another workplace?
    a. Good/bad experience?

4. How do you think your daily work will be affected by working with the Stage–Gate model?
    a. Can you think of any situations where your need to change your way of working?
    b. Positive/Negative changes?

5. What are the most important factors/requirements for the Stage-Gate to be successful at PaperCo?
    a. Which, Why, Where in the process?
    b. Do you think the Stage-Gate is a successful choice for PaperCo?

6. What stages/gates in the Stage-Gate Process is the most crucial/important?
    a. Any stage/gate that is more important for project success?
    b. Any stage/gate that might cause a bottleneck for the process?

7. What do you think will be the challenges with implementing the Stage-Gate?

8. What do you think will be the benefits of implementing the Stage-Gate?

9. Who should be involved in the different stages/gates?

   a. Different needs for Stages/Gates?
   b. Different needs for projects?

10. Can you give some examples of projects that could be run through the process as it looks today?
    a. Any projects that will not fit the Stage-Gate today?

11. What are the characteristics of a successful innovation/project process?

12. How do you think the success of implementing the Stage-Gate Process can be measured?

13. Do you have anything connected to this subject you would like to add?

14. Is there any question you think I have missed, can be of value adding?

15. Do you have any suggestion for whom to interview?

## APPENDIX 2 – OBSERVATION GUIDE

1. Describe the environment
    a. Date?
    b. Location?
    c. Who is observed?

2. For how long did the Observation take place?

3. What happened during the Observation?
    a. Describe conversations
    b. Who was active?

4. Did something unexpected happen?

# APPENDIX 3 - DEFINITIONS OF PAPERCO TITLES AND EXPRESSIONS

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| STOP | The project is considered a poor investment and all work/spending on it will stop. Same meaning as Coopers & Edgetts (2012) definition of "Kill". |
| IDEA COLLECTOR | A page at the PaperCo intranet where employees are asked to share their ideas regarding new ideas, improvement possibilities etc. |
| IDEATOR | Idea maker of the new project. The person fulfilling the first idea proposal and posts it in the Idea Collector. |
| NETWORKS | The studied PaperCo Division consists of nine Networks, and all running projects are linked to the most suitable Network. Members of the specific Networks are representatives from the major internal/external partners working within the areas, managers from PaperCo and Research contacts. |
| PAPERCO DIVISION INNOVATION BOARD AND PAPERCO DIVISION PRODUCTIVITY AND R&D STEERING GROUP | Innovation Board or Productivity and R&D Steering Group assign projects to the Stage-Gate process and take the "Gate 0" decision for all projects entering the Stage-Gate Process. Both groups select and support the Project Manager and the Project Owner, decide if a Project Steering Group should be established and will monitor the project performance. |
| PROJECT STEERING GROUP | The Project Steering Group is an optional group which can be set up and contributes to establish acceptance and progress for the project with different stakeholders. This group monitors the project, studies the reports and participates in the Gate decisions. The Project Steering Group participates in resource prioritization and removes obstacles to the project. Members of Project Steering Group are decided by Project Owner and Paper Division Network or Process Owner. |

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| PROJECT MANAGER | Together with the Project Manager and the Project Steering group (If existing) the Project Manager reviews and agrees about the project goals, KPIs, time and budget frames, the project plan, the form of communication and decision making and follow up routines between the Project Manager and Project Owner. The Project Manager is responsible to make sure the project team delivers the required input to each Gate and compiles the status reports and background info before each Gate-decision. The Project Manager continually supports the Project Owner and the Project Steering group (If existing) with updates. |
| PROJECT OWNER | If a Project Steering group does not exist and the Innovation/R&D board is not included in the Gate-decisions together with the Project Manager and the Network Chairman, the Project Owner will act as Gate-keeper. The Project Owner is responsible running the process in the long term and management of the resources. Management of resources includes calculation of project results in comparison to the project goals and KPIs. Preferably the Project Owner is a representative from an internal partner, sales or the sourcing group. |
| PROJECT TEAM | The project team consists of people working actively with the project during the Stages. Members of the project team can come from different units of PaperCo but also from external partners. The constitution of the team is decided by the Project Manager with support from the Project Owner if needed. |
| PRODUCT SEGMENT | PaperCo consist of X different product segments with a specialist within each segment. |
| BUSINESS OWNER | The business owner runs the business after the implementation and is in charge of the Marketing and Sales of the new product. |