Agata Sankala

EXPECTED BENEFITS OF TRANSITIONING TO AGILE PROJECT MANAGEMENT IN MANUFACTURING INDUSTRY
– case study
Agata Sankala

EXPECTED BENEFITS OF TRANSITIONING TO AGILE PROJECT MANAGEMENT IN MANUFACTURING INDUSTRY

- case study

Since early 2000’s Agile has been gaining increasing popularity in software developing companies. Due to its innovative character and enhanced results it allows to yield, Agile has quickly became adjusted for environments other than software and its applicability is becoming more widespread with every year. Recently, also the manufacturing industry has taken its interest in becoming more agile, not only in production process but throughout all the operations as well.

There are significant differences between software and hardware manufacturing environments, and for that reason it is not always possible to apply same methodologies or same methodologies in unchanged form. Choosing and introducing proper Agile framework to manufacturing industry requires careful analysis of concerned organization, its specific character, and methods of operations. For purpose of this thesis, the researcher has further explored Scrum, Kanban, Scrumban, and Agile Pulse – frameworks considered by her the most probable to succeed in manufacturing environment of company X.

Company X, a globally renowned player who has been successfully operating on high-technology engineering market for over a century, is gradually starting its own transition to Agile, and for that reason its consecutive branches are seeking best solutions to implement the new framework. The purpose of this thesis is to conduct analysis of current project management practices for Company X’s branch located in Turku, Finland, and identify appropriate Agile framework that will not only allow to improve organizational results but also be the most suitable for the branch’s character and functioning.

The main findings of the research are focused on recognizing main benefits that Agile can offer to Company X and identifying most suitable framework for Turku branch, as well as identifying advantages and challenges of current project management methodology used at Turku branch. Evaluating and reflexing upon organizational practices is a key factor in ensuring continuous success for every company.

To complete the research, exploratory study was chosen as a main methodology for literature review and data collection. It was completed by descriptive studies that allowed to provide comprehensive overview of current project management practices at company X. Primary data was collected in 2 stages: observation and informal interviews, and through formal interviews.

KEYWORDS:

Project Management, Agile, Agile framework, Scrum, Kanban, Agile Pulse, Waterfall, Manufacturing Industry
CONTENT

LIST OF ABBREVIATIONS (OR) SYMBOLS 5

1 INTRODUCTION 6
1.1 Research motivation 7
1.2 Purpose and research objectives 7
1.3 Introduction to the Case Company 8
1.4 Structure of the thesis 9

2 LITERATURE REVIEW 10
2.1 Waterfall Project Management 10
2.2 Agile Project Management 12
2.3 Different ways of Agile 14
   2.3.1 Scrum 14
   2.3.2 Kanban 17
   2.3.3 Scrumban 20
   2.3.4 Agile Pulse 21
2.4 Transitioning to Agile Project Management 23
2.5 Agile Project Management in Manufacturing 24
   2.5.1 Differences between Hardware Manufacturing and Software Development 25
   2.5.2 Case studies 26

3 RESEARCH METHODOLOGY 29

4 CASE ANALYSIS 33
4.1 Company Structure 33
4.2 Current Project Management process at company X 34
   4.2.1 Project completion KPI’s 35
   4.2.2 Benefits of existing Project Management Model 36
   4.2.3 Challenges of existing Project Management Model 37
4.3 Agile Framework perception and transition to Agile in company X 43
   4.3.1 Perception of Agile at company X 43
   4.3.2 Transitioning to Agile at company X 44

5 CONCLUSIONS 46
5.1 Research findings 46
5.2 Recommendations for further research

REFERENCES

APPENDICES

Appendix 1. Interview questions chart

FIGURES

Figure 1. Application of different project management practices across organizations surveyed for PMI’s 9th Global Project Management Survey (Project Management Institute, 2017) ................................................................. 6
Figure 2. Waterfall Model (Tech Republic, 2006) ............................................................... 11
Figure 3. Scrum Framework (Agile For All, 2018) ............................................................... 16
Figure 4. Kanban board (EPA Developers Guidance, 2017) .................................................. 19
Figure 5. Scrumban diagram (Peddisetty, 2015) .................................................................. 21
Figure 6. Structure of Company X, Turku Branch (Sankala, 2018) ....................................... 33
Figure 7. Waterfall model at company X ............................................................................ 34

PICTURES

Picture 1. Agile Manifesto (Beedle, et al., 2001) ................................................................. 12
Picture 2. Incremental and iterative character of Scrum vs. traditional project management model (Viguié, 2016) ............................................................................. 13
Picture 3. Agile Pulse room where different groups meet to discuss projects (Parmatur, 2014) ...................................................................................................................... 22
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMI</td>
<td>Project Management Institute</td>
</tr>
<tr>
<td>APM</td>
<td>Agile Project Management</td>
</tr>
<tr>
<td>ROI</td>
<td>Return on Investment</td>
</tr>
<tr>
<td>LeSS</td>
<td>Large Scale Scrum</td>
</tr>
<tr>
<td>WIP</td>
<td>Work in Progress</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
</tbody>
</table>
1 INTRODUCTION

Project management engulfs the concepts of project, program and portfolio management. From organizational perspective it ensures benefits such as: cost reduction, improved efficiency, better customer and stakeholder involvement and satisfaction, and gaining, as well as maintaining, a competitive edge. Well organized and implemented project management allows for better planning, setting clear and realistic objectives, and following the process which makes it possible to conduct analysis and implement improvements for further operations. In addition, successful project management provides tools for increased quality control and enhances risk management practices. (Project Management Institute, 2010)

There are multiple project management frameworks applied in organizations across the world, often they are customised or mixed as to better suit individual companies’ needs. The most popular approaches are Waterfall, Lean and Agile. Although all the frameworks have their advantages, it is the latter that is gaining increasing popularity with every year. According to PMI’s 9th Global Project Management Survey (2017, p. 4), 71% of organizations worldwide are applying agile practices in their project management sometimes, often, or always. (Project Management Institute, 2017)

![Figure 1. Application of different project management practices across organizations surveyed for PMI’s 9th Global Project Management Survey (Project Management Institute, 2017)](image)

Although not all frameworks under Agile umbrella are suitable for all environments, choosing the right model or its elements has been continuously reported to bring improved results for organizations. The largest improvements concern: faster time-to-market (increase by 37%), higher productivity rate (increase by 22%) and quality (increase by 29%), enhanced stakeholder satisfaction (increase by 31%). Additionally,
introducing agile within an organization boosts employees’ satisfaction and engagement. (Cook, 2015)

1.1 Research motivation

The researcher has threefold motivation for writing this thesis. Firstly, Project Management is an area of genuine personal interest as well as hitherto professional experience of the researcher. Secondly, because of interest and experience in the field, the researcher is hoping to find employment in a project management office upon graduation and develop her career in related areas. Thirdly, writing this thesis is aimed at providing a practical solution for company X whose representative is motivated eager to aid with the completion of the research. The researcher has been granted company X’s support in form of guidance and access to relevant information. Primary data collection has been completed through interviews and observation, as the researcher had access to chosen documentation and opportunity to discuss current project management processes in depth. Data collection methods are further discussed in chapter 3, Research Methodology.

1.2 Purpose and research objectives

The purpose of the thesis is to discover what benefits transitioning to Agile Project Management can bring to company X and whether it is a suitable management strategy in the first place. The topic will be explored with the following questions:

▪ What is Waterfall Project Management and how is it implemented at company X?
▪ In what ways Agile Project Management can satisfy the company X’s needs and improve its effectiveness?
▪ What are the challenges of implementing the Agile Project Management?
▪ Which Agile framework is likely to be the most compatible with company X operations?

The main objective of the thesis is to help identify in what ways Agile Project Management (hereafter APM) can enhance organizational performance of company X, especially with regards to the Project Office, and which model (or elements) of APM is
the most suitable choice for a manufacturing environment of company X. The topic of Agile Management and process of transitioning to APM has been explored in many books and theses, many of which are very recent. The researcher is hopeful to provide company X with comprehensive and relevant study which will constitute a practical tool in the possible change of the project management processes. Company X is present worldwide in more than 150 countries. In Finland, among other locations, they have branches in Tampere, Capital Region and Turku. This thesis is written for purposes of Turku branch of Company X solely.

1.3 Introduction to the Case Company

Company X is a global high-technology engineering enterprise. It is a leader in its industry and has a long standing on the international market. Company X has established its position as a front-runner thanks to, among other, focusing on exploring future solutions and making significant investments in area of Research and Development. Currently, in blooming era of Artificial Intelligence development, company X is producing vehicles, machinery and equipment that require building an and developing solution specific software. In consequence, significant part of the projects is de facto focused on building software systems, or inextricably related to the software innovation.

Based on that, an inherent need of adjusting internal processes and strategy has emerged. With successful application of Agile Methodologies to software development, the company is currently looking for the most effective solutions to lead its remaining operations. Currently, projects are managed in Waterfall (also known as Stage-gate or Phase-gate) framework which brings along issues such as low flexibility, bureaucracy, and low repeatability. Company X is thus searching for options that will allow to update its operations and improve the functioning of the Project Management Office in Turku whose main focus concerns hardware manufacturing.

Agile Project Management is a framework that has been consistently developed and popularized since 2001. It is a model that emerged initially in relation to software development, however due to its innovativeness and effectiveness it has been adapted in other areas of business as well. Because of its lightness, flexibility and focus on enhanced communication, it is a strategy that company X is currently looking at as a possible option to upgrade its operations. (Beedle, et al., 2001)
1.4 Structure of the thesis

The thesis consists of several chapters in which the researcher aims to present coverage of areas vital for the successful completion of the research. Due to the thesis' volume limitations, the priority is to provide as precise and concise information as possible with particular regards to its relevancy for company X.

The thesis starts with the introduction that covers researcher’s motivation and background for the thesis, as well as an introduction to the case company. Next chapter presents literature review that will deliver: a) a brief description of what is Waterfall Project Management model; b) a brief history and description of Agile Project Management model; c) description of chosen models under Agile umbrella, namely: Scrum, Kanban, Scrumban, and Agile Pulse; d) coverage of main benefits and disadvantages of implementing Agile Project Management; e) presentation of known case studies where Agile methodology has been applied in manufacturing (or similar) environment.

Following the literature review, the researcher introduces the research methodology applied in the thesis and the methods for data collection. Next, the case analysis is presented covering the company X’s structure and functioning of the current Project Management model in practice along with the synthesis of interviews completed for the purpose of the thesis. The thesis is concluded with presentation of the research findings and possible suggestions regarding further research and the case company.
2 LITERATURE REVIEW

Skilled project managers are the force behind successful completion of projects. However, even the most talented manager must be provided with tools and techniques that will allow him or her to apply best practices for specific endeavors. With continuously growing competition and technology, businesses must be able to follow the trends and adapt the most successful strategies to stay competitive.

2.1 Waterfall Project Management

According to Campbell (2014, p. 5), Project Management Institute outlines project “as a temporary endeavor undertaken to create a unique product, service, or result. This means that a project produces something that has never existed before, has a deadline (...); and has a budget that limits the amount of people, supplies, and money that can be used to complete the project.” There are usually three to seven stages in each traditional project management approach (Campbell, 2014, p. 6) which include outlining scope, plan, launch, monitoring and closing up a project (Wysocki, 2013, p. 101).

Waterfall Framework is one of the traditional strategies of project management which has been developed from 1970 (Tech Republic, 2006). It has gained noteworthy popularity due to its simplicity and perspicuity however, as Leszczynski et al. (2014) have stated, “Waterfall is somewhat outdated. The market is certainly demanding faster, more flexible development approaches than Waterfall has traditionally been able to support.”.

The Waterfall Model, which is currently in use at company X, consist of five to six stages that include: Requirement analysis, Design, Implementation, Testing, Installation, and Maintenance. Requirement analysis is focused on understanding the customer’s needs and what is expected from the project, what resources are available and the general background of the project. Design Stage refers to planning of how the project will be executed in context of technical requirements and resources. Implementation is a phase during which the project team is creating the actual product, followed by Testing Stage when the product is finalized and put to trial, validating its quality and performance. Installation refers to the process of preparing the final product for implementation by its final user, issuing required certifications if necessary and delivering the product. Finally, Maintenance refers to any adjustments that are applied to the product during this phase.
The changes may be necessitated due to customer demands or simply to improve delivered solution. (Tech Republic, 2006)

Figure 2. Waterfall Model (Tech Republic, 2006)

The methodology has its advantages such as a) clear structure, as it strictly follows subsequent steps of a project, b) defining the final goal at the first stage of the project, and striving towards it throughout the whole project duration, c) precise and certain transfer of information, as it requires preparing documentation for every phase and maintaining it up to date. (Lucidchart Content Team, 2017). Working within this framework is methodical, which makes it easy for team members to stay oriented and up to date at all times. Similarly, with clearly defined goals, there is a lower risk of side tracking and losing time during specific segments of a project. Easy information transfer ensures saving the time and also avoidance of possible misunderstandings and conflicts. For those reasons, the framework may be very comfortable, especially for individuals reluctant to change, as it gives precise guidelines and expectations, thus providing a sense of stability and security.

At the same time the Waterfall Project Management has its disadvantages which often slow down work progress and disable companies from gaining competitive advantage. Firstly, the framework is stiff and allows very little flexibility, in addition every occurring change may cause a serious disruption of the project progress and cause the so-far work to become irrelevant and not applicable in the final result. In addition, the testing of project’s outcome takes place only after the completion of the project. This may cause major setbacks, or in worst case scenario the whole project may become a failure with
significant amount of wasted resources such as time and money, and no usable solution. Finally, in Waterfall Model the communication between project team and the customer and/or final user is very limited. This of course causes the team work to be more effective and faster as there are less disruptions to the project outline however, in effect the final result may turn out to be irrelevant and unsatisfactory to stakeholders’ expectations. (Lucidchart Content Team, 2017)

2.2 Agile Project Management

“Agile Software Development is an umbrella term for a set of methods and practices based on the values and principles expressed in the Agile Manifesto” (Agile Alliance, 2017). The manifesto has been published in Utah, USA on February 11-13, 2001 by a gathering of software developers (Beedle, et al., 2001) and it is a collection of project management principles that aims at providing most effective and efficient ways of project completion with minimum of paperwork, bureaucracy, and communication hindrance, and maximum focus on the project team, customer needs, and adaptability.

Picture 1. Agile Manifesto (Beedle, et al., 2001)

The Agile Framework differs from the traditional project management strategies which are heavy in planning, processes, and documentation, and usually very constricted
leaving little space for improvisation and implementing sudden but necessary adjustments. Instead, Agile Project Management focuses on values and adaptability that allow for most accurate and up to date results that not only safeguard delivery of utmost satisfying results for the customer but also take maximum advantage of team members’ capabilities and talents. That in effect has significant influence on the team work style and above all, the motivation and energy. (Wysoki, 2013, pp. 313-315)

The Agile framework is both incremental and iterative. By incremental it is meant that as the project progresses, solution delivered at each milestone is usable and functional and the following stages are built upon the existing ones. The iterative character of Agile model means that particular sections of the project are repeatable and can be applied multiple times at projects’ different stages. Agile projects focus heavily on their teams and communication. Usually there is a team of fully dedicated professionals working on a project, and only seldom teams are built from specialists working on part-time bases. Communication is open and typically there is a meeting called in every day of the project duration during which team members share the progress they have made. Possible difficulties are reported and discussed, and everyone is being brought up to date with the project progress. Another important element of Agile Framework is Milestone Retrospective, it is a process executed at certain stages of a project or at the end of it, during which the team spends time on analyzing crucial moments of the project. (Agile Alliance, 2017). To a great degree, success of Agile Project Management depends on the maturity of a team as there is usually no supervisor and the teams themselves take responsibility for their own work and results.

![Picture 2](image1.png)

Picture 2. Incremental and iterative character of Scrum vs. traditional project management model (Viguié, 2016)
The communication with customers and project owner is conducted with use of so called user stories, use cases and usage scenarios. They are implemented to ensure the stakeholders’ requirements are met and at the same time allow for continuous development. User stories are usually short, simple statements that convey what is demanded of the project (or project’s stage). Use cases provide an understanding of how the end users (real-world actors) will interact with a system, and usage scenarios are sequences of short statements that aim to describe an interaction of people or organizations with a system. (Ambler, 2003-2014). Additionally, in order to ensure that project outcome will be operational and applicable for the end user the team may create so called personas, fictional silhouettes that represent the potential final user of the product (Agile Alliance, 2017). It is a tactic similar to what marketing teams are doing when identifying their target audience.

2.3 Different ways of Agile

There is a multitude of models hiding under the term Agile Umbrella, with Scrum and Kanban being the most commonly known. For the purpose of this thesis, the researcher has explored models that can find application in hardware manufacturing, such as done at company X, thus omitting typically software related approaches, such as Extreme Programming (XP).

2.3.1 Scrum

According to the model’s creators, “Scrum is a framework for developing, delivering, and sustaining complex products… A framework within which people can address complex adaptive problems, while productively and creatively delivering products of the highest possible value.” (Shwaber & Sutherland, 2018). Scrum has been in use since the beginning of 1990’s and although it can be applied within various strategies, the framework requires that its exact rules must be strictly followed. There are roles, events and artefacts specified in detail, thus learning and mastering the methodology frequently requires not only extensive training but time as well. (Shwaber & Sutherland, 2018)

Projects completed within Scrum framework are done in iterations called Sprints. A Sprint typically lasts from one to four weeks however, a two-week period is most commonly applied. Typically for Agile, after each iteration team presents a shippable product. By
that it is understood that although the final result is not delivered, product at a current state is ready for use. (James, 2011-2012). During each Sprint the relevant meetings and development work is done. Scope of a Sprint maybe further clarified and adjusted in agreement with Product Owner however, no changes should be done that could negatively affect Sprint’s goal or quality of Sprint’s results. (Shwaber & Sutherland, 2018)

There are three roles in Scrum, namely Product Owner, Scrum Master and Development Team. Product Owner takes responsibility for ROI, final product vision, project’s requirements, and focuses on what needs to be done rather than how. Scrum Master is a very explicit role of a facilitator and mediator between Development Team and Product Owner, his or her role is also to help “everyone understand Scrum theory, practices, rules, and values.” (Shwaber & Sutherland, 2018, p. 7). It is important to remember that Scrum Master is not synonymous with Project Manager, he or she does not hold any authority over Development Team and their task is mainly to ensure undisturbed work of the team and fluent communication between Development Team and Project Owner. Development Team is a small, ideally 3 to 9 people (Shwaber & Sutherland, 2018), cross-functional and collaborating group of professionals who organize themselves and their own work. The artefacts in Scrum are the two types of Backlog: product, and Sprint Backlog. First is a list of all the items necessary to be done during a project, the latter is limited solely to given Sprint and as such has a due date compatible with the Sprint duration. (James, 2011-2012)

The Scrum events relate to the meetings that are inseparable element of the framework. There are typically five kinds of meetings done within the team or between the team and the Product Owner. The team meetings are daily stand-ups and Sprint retrospective meeting, the meetings where Product Owner is included are: Sprint planning, Sprint review meeting and “Backlog refinement” meeting (which can assume different names depending on a team or organization). Daily stand-ups or daily Scrum meetings are short, approximately 15-20-minute meetings happening at the same time and place every day. The main idea is for the team members to report to each other on their progress and possible challenges, review what has been done and what remains to be done before the end of given Sprint. Sprint retrospective meetings, during which a Sprint is reviewed, and feedback is shared among the team members, happen at the end of every Sprint. The Sprint planning meeting happens at the beginning of every iteration, when the Team and Product Owner agree on Sprint goals and choose Sprint Backlog items from the product Backlog. Sprint review meetings happen at the end of every
Sprint, during these meetings Product Owner assesses team’s results and decides, according to agreed definition, which tasks are completed and what remains to be done. The definition of what does “done” mean is usually established by the team, Product Owner and Scrum Master at the beginning of a project. Finally, “Backlog refinement” meeting takes place every Sprint; it is the time for Product Owner and Development Team to review product Backlog, prioritize tasks to be done in the following Sprint and break down bigger tasks into similar-sized tasks to be distributed and done within the next Sprint. (James, 2011-2012)

Figure 3. Scrum Framework (Agile For All, 2018)

Scrum can also be applied for multiple teams. In case there are 2 to 8 teams (10-50 people) within the framework, it is called Large Scale Scrum (LeSS), with more than 8 teams (over 50 people) the model functions as LeSS Huge. The concept of the framework remains the same, it is to be light, flexible, wholesome and customer centric approach. (James, 2017). With multiple teams there is still one Product Owner and one Backlog, and the focus is to release a shippable product at every increment. In LeSS, Sprint planning meeting happens in two phases. During the first phase, tasks from Backlog are distributed among the teams; phase two is time for teams to prioritize and distribute given Sprint tasks internally. With many teams, the cooperation and coordination happen both inside a team and across all of the teams as well, and it is the teams’ responsibility to maintain good communication. Sprint review meeting is a shared
experience however, the retrospective meetings are done for each team separately. Similarly, to Scrum, implementing LeSS requires change of attitudes and thinking within an organization but on a much larger scale. (LeSS, 2017)

Although currently it is mainly associated with software development, “Scrum has been used to develop software, hardware, embedded software, networks of interacting function, autonomous vehicles, schools, government, marketing, managing the operation of organizations and almost everything we use in our daily lives, as individuals and societies." (Shwaber & Sutherland, 2018). There is a great number of benefits to the framework. Among the most considerable ones are: transparency, flexibility and simplicity, improved quality, reduced time for project completion, decreased risks, higher ROI, better control of a budget, increased customer satisfaction, and overall higher morale and satisfaction in the workplace. Transparency in Scrum is guaranteed due to the involvement of all the stakeholders throughout the project. Similarly, the involvement of stakeholders allows to deliver as accurate product as possible which significantly increases customer satisfaction. The framework is flexible, its main assumption is to maintain an open-minded attitude and expect constant adjustments in order to deliver the best fitting results. Thanks to testing done at every Sprint and constant monitoring of the work progress the quality is delivered at a higher rate. Incremental character of Scrum makes it possible for a Product Owner to notice possible threats ahead, evaluate them and plan their management in advance. Budget-wise, Scrum allows for better cost control and use of resources, more efficient and thus faster work enables final product to be released earlier granting an organization benefits of being one of the first on the market. Lastly, team members working within the Scrum model have better sense of engagement and being appreciated, each professional has an opportunity to speak out and affect their own and team work causing motivation and overall team spirit to rise. (Kneafsey, 2016)

2.3.2 Kanban

Kanban came to life as early as in 1940’s in Japanese Toyota manufacturing plants. Kanbans (Eng. “signboard”) were perfected by Taiichi Onho and allowed him to “minimize the work in process (or WIP) between processes and reduced the cost associated with holding inventory” (Gross & McInnis, 2003, p. 2). Kanban methodology is continuously applied in Toyota “to manage cost and flow, but also to identify
impediments to flow and opportunities for continuous improvement” (Gross & McInnis, 2003, p. 2).

Kanbans operate based on a visual aid in form of physical or virtual boards. The use of boards allows for constant and effective monitoring of the work flow, and quick identification of any factors that might delay or block further progress. Opposite to Scrum, Kanban uses no “Sprints” or time limitation, instead there is a limited number of “work in progress” at each stage of the process and the main KPI is the Cycle time. As in every Agile methodology, success of Kanban is mostly related to open communication, identifying customer and end user needs, and constant adaptation. (Radigan, 2017)

In Kanban there is no need for specific roles or cross functional teams. Most of the time there is someone in charge of maintaining the board, usually a project manager, however there are no specific requirements for this role and it can be rotated among the team members. The most basic Kanban is a board with three columns: To Do, In Progress, and Done, which can be applied for the most rudimentary tasks and for personal use as well. However, in organizations the boards are significantly more elaborate. Typically, the “To Do” column is labeled as “Backlog” and will contain all the approved tasks waiting for completion. From those tasks a limited amount will be selected at a time, broken down to smaller, similar-sized tasks and prioritized. Prioritization is typically done during team meetings based on team capacity and preferences, as well as external stakeholder demands and needs. As work progresses, given item is consequently pulled to the following columns freeing up space for the next tasks from Backlog. For a Kanban to be successful, it is crucial to establish rules that specify when certain items can be qualified as completed. The completion rules are usually decided by the team or a project manager. The number and names of columns will depend on specific organizations and should always be adapted to their individual requirements and needs. Each column, with exception for Backlog and the “done” column, may contain a limited number of tasks called “Work in Progress” (WIP). What it means in practice is that a Kanban team cannot take upon itself more tasks at one time until current tasks are completed and moved to the next column. The WIP number can be established according to individual team policy however, most often it depends on the amount of team members, duration of a task completion and the work load. Identifying and respecting WIP is one of the key factors in successful Kanban operations. (Brechner, 2016)
Kanban has been used over the years in different fields of business with notable success. As with every change, it takes time for a team and other involved parties to adjust to a new method, but once the team has established its style and pace of working, and all the involved parties have familiarized themselves with the functioning of the model in practice, Kanban offers a plethora of benefits. Among method’s most noteworthy advantages are: simplicity, fast pace of working, reliability of time and quality of delivered results, higher quality at a higher rate, constant improvement and work on product value, reduction of irrelevant meetings, documentation and planning, and higher efficiency of the team allowing to do more with fewer resources. Kanban has very simple rules to it and they can be further adjusted according to organization and team needs, this entices clarity of the process and increased satisfaction among team members. A mature Kanban team is reliable in terms of time and quality of result delivery. Planning, dividing tasks and doing them at limited amount at a time results in better use of resources and thus improved budget management. WIP and constant possibility to monitor the work flow allows to eliminate unnecessary efforts and bottlenecks that could affect work speed and quality. (Brechner, 2016). Similarly to Scrum, Kanban allows to achieve better revenue thanks to earlier release of a final product. The quality of the product is maintained at high levels, and project team is driven by need of constant improvement.
Finally, ownership and thus better control of their work ensures higher morale and increased motivation within a team. (Bishop, 2017)

Kanban methodology can be introduced in an organization independently or with help of consultants or specialized company. The decision should be made depending on the complexity of planned Kanbans, available resources and employees with sufficient expertise to implement and lead the changes, and scope of the implementation. (Gross & McInnis, 2003, p. 13)

In addition, there are multiple tools available for smooth Kanban application, from free of charge online applications such as Trello\(^1\) or more developed systems for professional users, for example Jira\(^2\), which can be adjusted according to specific needs and connected with other organizational tools.

2.3.3 Scrumban

Scrumban is a mixture of Scrum and Kanban practices usually implemented in environments where Scrum proved to be too problematic to function in its purest form, as Scrum requires precise compliance to its rules and that often causes great adjustment issues for teams and whole organizations. After Kanban, Scrumban is more of an evolutionary process and allows for gradual implementation and upgrade of current practices however, the method merges practices from both frameworks. (Wolski, 2014)

There are significant differences between Kanban and Scrumban, and Scrum and Scrumban. Some of the main dissimilarities are the function of teams and roles, work flow, and meetings. In Scrumban there are assigned roles however, there is no requirement for cross-functional teams; in addition, the roles can be established according to needs of given project or organization. Although the work can be done in iterations it is not an obligatory feature, instead the work is often done continuously, and the working pace is evaluated afterwards. Daily meetings are necessary to ensure work continuity. Similarly, use of Scrumban requires that review and retrospective meetings take place however, the meetings are organized according to current needs and not on regular bases. (Pahuja, 2012)

\(^1\) [https://trello.com](https://trello.com)
\(^2\) [https://www.atlassian.com/software/jira](https://www.atlassian.com/software/jira)
Scrumban is said to be a combination of the best practices of Kanban and Scrum, joining continuous pursuance of improvement with top most agility. Focus on product value and process enhancement, short lead time, efficient decision making based on facts, and attention to customer needs are most commonly mentioned among framework’s main advantages. (Pahuja, 2012). Using Scrumban is recommended especially for maintenance projects, and projects that entice frequent changes and high flexibility requirements. (Wolski, 2014)

2.3.4 Agile Pulse

Agile Pulse Model is a framework using agile methods to manage multiple product development projects, and it is presented as a model that allows for smooth and steady adaptation of Agile in an organization. The idea of Pulse has been developed by
Sweden-based Parmatur³ and has been perfected since the first guide release in 2005. (Parmatur, 2014)

In Agile Pulse there is a project portfolio managed by a portfolio team who decides about projects’ prioritization and launch, and strategic teams who take responsibility for business, market, and product development; all teams meet daily at minimum for planning, decision making and resolving emerging issues. All the decisions made during Pulse meetings are written down in a “Decision log” by a project manager. It is crucial that resources are managed appropriately, and individuals and equipment are not overburdened with too many tasks. Project tasks are managed by dividing them into smaller assignments that can be handled by 1 or 2 individuals. Assignments are gathered in a queue containing items “in progress” and “to do”. To perform smaller chunks of workload an “Activity plan” is kept by project manager who can then follow what has been completed and what remains to be done. Everything is managed at a Pulse room where all the projects have their boards containing related information, such as long-term strategy, development work, product, and resource management. Additionally, organizations may customize their boards to ideally suit their needs, for example by adding customer orders or purchasing demands. Thanks to visual control, involving communication with use of post-it notes and colorful magnets, Pulse team meetings are faster and more effective, and the teams may easily track project goals, plans and current status. (Parmatur, 2014)

![Agile Pulse room where different groups meet to discuss projects](https://parmatur.com)

Picture 3. Agile Pulse room where different groups meet to discuss projects (Parmatur, 2014)

Agile Pulse has already been implemented in Tampere branch of company X, and for that reason it is considered as an option for Turku branch as well. Since the implementation has been completed very recently, it is difficult to unambiguously

³ [https://parmatur.com](https://parmatur.com)
estimate its success however, substantial improvements have been already reported. Firstly, the methodology has been well received by the team which in itself is a measure of model's functioning. Among positives the company mentions:

- Lean way of working, and improved communication with weekly and daily meetings;
- Fast and simple way of identifying and solving problems;
- Active participation of everyone involved in a project;
- Clear goals and priorities visible for everyone;
- Better management of resources;
- Better engagement of stakeholders.\(^4\)

As the methodology functions in Tampere branch, it may occur to be the simplest solution of Agile implementation in Turku due to proximity and possibility of learning about the framework directly.

2.4 Transitioning to Agile Project Management

Because Agile framework is interlaced with automation, introducing this strategy requires reviewing and making possible investments in software and processes changes. This is to ensure time efficiency and repeatability of created solutions. Next step is training the staff, not only must they learn new tools and adapt to the new framework as a whole, but foremost the team members must change their working habits and be taught how to be flexible as the Agile Project Management calls for high and constant adaptability. Often individuals working on a project will have to forget the so-far methods they are accustomed to and this may cause reluctance and lowered motivation if not dealt with properly. The team members must be able to communicate openly and with ease and thus, project manager should make effort to build a trusting team, able to collaborate and exchange information freely. Besides their own team, the specialists working on a project must also be capable of interacting with the customers, understanding their needs, and communicating how will they be taken care of. Finally, the project team must learn how to see the big picture and be able to focus on the end result while at the same time they must be able to deliver subsequent, usable elements of the following project stages. (Ray, 2017)

\(^4\) Based on Company X internal materials.
Challenges of transitioning to Agile Project Management

As Agile Project Management is based and dependent on excellent information flow and focuses on the customer needs and the end result, the greatest challenges in transitioning to Agile Model are communication and appropriate mindset.

Open communication may constitute a problem especially for specialists who are used to working independently and reporting only and directly to their project manager. In addition, in companies such as company X, there is a factor of multiculturalism which brings risk related to the language itself, usually English is used as a common language and seldom it is the native language for the project members. In addition to language, there may be significant differences originating in culture. Usually different societies have dissimilar 1. Relation to authority, 2. Conception of self, 3. Ways of dealing with conflicts (Hofstede, Jan, & Minkov, 2010, pp. 10-20). The dissimilarities occur especially among people from entirely different geographical regions, but even within one continent there may be nations with significantly diverse communication styles. Next to the company philosophy and policy, a good countermeasure to prevent possible misunderstandings and unnecessary conflicts would be to implement cross-cultural and team building trainings and encouraging employees to explore each other’s cultures.

Working within Agile Model requires from the involved individuals the ability to adapt quickly, and flexibility as the project progresses and its requirements change. In case of transitioning to Agile Framework the reluctance may occur at the time of transitioning itself, as well as after the strategy has been adapted. Many people associate change with hindrances, it may cause distress, insecurity, fear, and result in diminished motivation. Problems with handling change can be best avoided with good leadership, and if possible with change management trainings.

2.5 Agile Project Management in Manufacturing

In this part of the thesis, the researcher is reviewing known case studies regarding application of Agile methodology to hardware manufacturing environment in opposition to software development. The purpose is to establish whether APM can be introduced successfully for machinery manufacturing and what methods and adjustments are necessary in order to ensure that success. The selection of case studies was done based
on its relevancy to company X, as well as similarity in the field of industry or method of operation.

Having succeeded in software development, Lean and Agile methodologies are increasingly looked towards in relation to hardware development and manufacturing. There are certainly great benefits to be sought in those frameworks however, Agile principles should be applied with deliberation and caution as there are substantial differences between software and hardware development processes. Inappropriately and inconsiderately applied practices may result in more harm than benefits and cause significant setbacks for an organization. (Graves, 2016)

2.5.1 Differences between Hardware Manufacturing and Software Development

There are many differences between Hardware Manufacturing and Software Development, and since they affect working style and enforce choice of Project Management approach, the researcher deems it necessary to mention main dissimilarities and their consequences for organizational processes.

Firstly, hardware is less flexible than software and application of any change generates greater costs. Often changes cannot be implemented mid-process and if they are, it may require them to be redone from the beginning, and as the components are physical, they cannot be easily transformed and readjusted. In addition, quite commonly materials necessary for product manufacturing have to be ordered in advance which imposes further restrictions. Hardware must be well designed before the product is built so that all components, their placing, and function make sense in the final result. It requires more architectural decisions and often involves incorporating standard parts that are hard or impossible to substitute. Manufacturing hardware often yields greater financial expenditures due to human resources, tools, and space requirements. Finally, testing for hardware is usually more complicated than for software. Final product needs to be tested in the field, in conditions similar to where it is supposed to function, and the testing is most commonly executed by specialist who worked on product’s development, before it can be launched even for trial use. (Trapani, 2018). Testing on physical objects usually means that they cannot be repurposed and sold to customers which generates further costs, both in terms of loss of materials and inability to yield revenue for a tested unit.
2.5.2 Case studies

The case studies presented in the thesis are those of companies of similar size and reach to company X and working in related fields. Because the transition to Agile framework in most manufacturing companies has started only within last 3-5 years, the researcher predicts that complete studies covering entire outcome of Agile adaptation will be available no earlier than within next 5 to 10 years. At this time the transitions will have been completed and in use for minimum several years, allowing to gather and analyze reliable data.

The following case study organizations have started their Agile transformation with software and expanded the program to other areas of their operations, and both of them have employed external experts to aid in transition's preparation and implementation. Although, as mentioned above, comprehensive reports are not available as of yet, examining strategies with which the transitions have been approached in those cases may deliver valuable insight and inspiration in preparation of possible transition to Agile at company X.

**Case study: Atlas Copco**

Atlas Copco is a Swedish company established in 1873. Atlas Copco is an industrial manufacturer and their main offer includes: compressors, vacuum solutions, generators, pumps, power tools and assembly systems. The company operates worldwide in approximately 180 countries. (Atlas Copco AB, 2018)

Atlas Copco has applied Agile methodologies in different areas of operations resulting in faster and better-quality outcome, shorter lead times and quicker response to the market.

Atlas Copco’s subdivision, Atlas Copco Airpower located in Belgium, has adapted agile project management tools, and implemented Scrum for their order management process. The solution they use, Project Management Application (PMA) is automatically collecting data from other programs and software used across the organization and alerting professionals when the intervention is needed. The management tool offers a dashboard to the organizational users, as well as to their customers. Dashboard allows for monitoring projects, access documentation, and for the customers to see status of
their order. Thanks to PMA the on-time delivery has been increased by 30% with regular projects and up to 40% with smaller projects. (Gfi, 2011)

The organization has also adapted Lean Manufacturing approach by adjusting their factories which resulted in eliminating waste and tasks that are not bringing in added value to the final product. This has been achieved by adapting lean principles which in practice means providing operators with easy access to all the components for given unit, ensuring standardization, and reducing assembly time and total amount of components, resulting in minimized amount of work stations and quality improvement. (Atlas Copco, 2013)

**Case study: Bosch – Power Tools**

Bosch Power Tools is a division of Robert Bosch GmbH, an international engineering and electronics company founded in Germany in 1886. Bosch has 125 engineering locations worldwide and earned 78.1 billion euros sales revenue in 2017, at the same time spending 7.3 billion euros on research and development. (Bosch, 2018).

According to Howard (2018) it was the company CEO, Volkmar Denner, who has realized that switching to Agile is the solution for keeping the company in the lead of the market and up to date. Bosch has started the transition with the help of external experts, who helped to visualize the transformation and to implement it in practice. The transition started with the top management, and in 2015 the company organized its first Agile team at Bosch Power Tools, Home & Garden subdivision. The team was so successful that the entire Home&Garden business unit has soon adapted the model. The unit has undergone a thorough transformation and was reorganized into several cross-disciplinary teams. The new framework allowed to improve efficiency, increase the work speed rate, and significantly boost the employee’s morale. (Bosch, 2018)

Agile Transition at Bosch has started from the top executives, and from there the updated values were spread across the organization. Bosch has adapted Scrum framework with its cross-functional teams and roles of Product Owner and Agile Master. Using the new model, Bosch has collaborated with Tesla, worked on innovative systems, and developed innovations for their tools. Most noteworthy results of the transition are: minimizing development time by half, organizing cross-functional teams across the organization including product management, brand management, business
development, engineering and other, increase of the speed and efficiency of innovation developments, and improved involvement and motivation of the employees. (Howard, 2018). The transition of the whole organization is continuing today, and, above all, it is considered successful due to engagement of company leaders in the process initiation and execution. (ScrumAtScale, 2018)
3 RESEARCH METHODOLOGY

The main objective of this thesis is to conduct an analysis of chosen models of Agile Project Management and provide company X with tools helpful in making decision about possible transition. Exploratory study was applied to complete the research with an addition of descriptive studies when it comes to introduction of the current project management processes at the case company. The exploratory approach, through literature review and conducting interviews, allowed the researcher to gain exhaustive understanding of the problem. (Saunders, Lewis, & Thornhill, 2009, pp. 138-141)

As the researcher approached to explore a specific problem within the company X, case study has been chosen as the strategy for herein research, completed by the action research as the thesis was planned to explore practical applications and bring applicable solution to the chosen environment. (Saunders, Lewis, & Thornhill, 2009, pp. 145-147). The researcher sought to execute an in-depth investigation of the problem and where possible, provided company X with ideas for further improvement.

Data collection and analysis

As for data collection, the researcher used qualitative data gathered through interviews and observation (Saunders, Lewis, & Thornhill, 2009, pp. 140-153). As an “observer as participant” (Saunders, Lewis, & Thornhill, 2009, p. 293), the researcher had an opportunity to gain in-depth understanding of the functioning of the Project Management Office of the company X. The data was collected in two stages. Firstly, through primary observations and informal interviews to identify existing roles and their functions, and processes and their application. The method was chosen for two reasons; it allowed the researcher to access and gather all relevant information necessary to prepare for later, formal interviews, and its informal character allowed flexibility regarding scheduling and time limitations. The observation and informal interviews were conducted during several visits over a period of approximately one month. Each visit lasted 2 to 4 hours during which the researcher had an opportunity to: a) discuss and ask questions from Project Office Manager and R&D Project Manager, b) explore project management related documentation of the organization, and c) meet future interviewees. All the information was recorded in a diary.
During the second stage of data collection, the researcher met with different departments’ representatives in order to conduct qualitative, semi-structured interviews, each taking approximately 60 minutes. The researcher has conducted the formal interviews over a period of approximately 2 weeks. 8 employees from different departments were interviewed altogether: Vice President of Product Line, Project Office Manager, 2 Project Managers, Project Manager R&D, Engineering Manager - Systems, Unit Sourcing Manager, and Process Excellence Manager – Product Line. Although the thesis has been completed primarily for the Project Office, interviewing individuals from different departments was crucial to obtain the full picture of the project management process at company X as they are all stakeholders in project completion. The formal interviews were audio-recorded and subsequently transcribed, the researcher paid attention to include both verbal and non-verbal communicates as the tone of voice and gesticulation may give important input into data collection (Saunders, Lewis, & Thornhill, 2009, p. 485). Researcher paid particular attention to prepare for the interviews and stayed alerted to possible interviewer and interviewee bias by means of, for example, critical incident technique (Saunders, Lewis, & Thornhill, 2009, p. 332). This allowed not only for the minimalization of the results’ bias but also, it constituted a valuable source of practical information as the technique refers to very specific happenstances leaving little room for misinterpretation. The preparation involved thorough literature review as well as familiarizing oneself with the company’s industry and functioning, and appropriate data recording. In addition, the researcher focused on remaining neutral and ensuring that she demonstrated her active listening skills. The interview consisted mostly of open questions, including probing questions, with a mixture of closed questions when relevant for example, to estimate effectiveness of the current project management strategy of company X.

Although qualitative data are often fuller and richer than quantitative data, analysing them is more complicated and requires planning and choosing a suitable approach. It is advisable to conceptualize the framework of qualitative data analysis already at the stage of planning the data collection as to ensure maximalization and viability of the results. (Saunders, Lewis, & Thornhill, 2009, pp. 482-484). To process the qualitative data gathered, the researcher has summarized the notes from observations and informal interviews, as well as transcriptions of formal interviews, and came up with several key points which were further grouped and presented in chapter 4. (Saunders, Lewis, & Thornhill, 2009, pp. 490-495)
Methods’ reliability and limitations

Data reliability is about ensuring that chosen data collection and analysis methods will provide dependable results. Data is considered reliable when a) obtained results are repeatable in other instances, b) other observers can reach similar conclusions, and c) conclusions from the data are drawn in a transparent manner. There are four main threats to data reliability: subject or participant error, subject or participant bias, observer error and observer bias. Subject or participant error and bias may occur in circumstances that are conducive to affect someone’s opinion, for example respondent’s mood maybe affected by the time of the day or week, or he/she may feel pressure to give specific answers in fear for losing their work. As to observer error and bias, they may occur depending on data collection structure and personal inclinations of the person collecting the data. (Saunders, Lewis, & Thornhill, 2009, pp. 156-157)

To avoid reliability related threats, the researcher has ensured that:

a) the interviewees were informed that all the information collected remained confidential and no personal opinions disclosed during the interviews were associated with specific names or roles within the organization;

b) the data collection process was well structured including preparation of question list for the formal interviews, and preliminary questions and categories for the observation and informal interviews part;

c) personal convictions and views of the researcher were restrained, and the researcher remained focused on information rather than her individual opinions; this was ensured by thorough analysis of available literature during the process of data collection planning.

As with every method and research, there were certain limitations that restricted the researcher’s investigation into the topic. Firstly, the thesis volume limitation did not allow as thorough a study as desirable, for example interviewing competitors and similar industry organizations in the area was excluded from the research. Although it would bring valuable insights into the study, the process and reporting the findings would result in too detailed and lengthy analysis. Secondly, the restricted sample size, the researcher has been in contact with total of 8 employees for both stages of data collection. The more employees would be interviewed the more reliable and detailed the findings would be however, this was undoable due to limitations of time and availability of possible
participants. However, the researcher in agreement with the company X’s Project Office Manager have decided that the sample size and variety of different departments’ representatives was sufficient to obtain satisfactory conclusions. Thirdly, a significant restriction to the thesis’ findings was caused by limited availability of studies in the research area regarding Agile in manufacturing industry. This is mainly due to the fact that the adaptation of the new methodology in hardware development has started only recently and no complete reports are available yet. Lastly, the researcher is aware that her inexperience in primary data collection might have affected the quality of the findings however, the researcher has made effort to thoroughly prepare herself to conduct the research through extensive exploration of research methods and known case studies.
4 CASE ANALYSIS

In this part of the thesis, the researcher presents findings based on information gathered through observation and informal discussions at company X (stage 1 of data collection), and formal interviews (stage 2 of data collection). The consecutive subchapters focus on answering the following research questions: sub-chapter 4.1 and 4.2 explore how Waterfall Project Management is implemented at company X, what are its strengths and challenges; sub-chapter 4.3 is dedicated to studying the perception and familiarity with Agile frameworks at company X, and what are the challenges of implementing the new methodology. In addition, the researcher attempts to further investigate the question “In what ways Agile Project Management can satisfy the company X’s needs and improve its effectiveness?”.

4.1 Company Structure

The Turku Branch of company X is currently hiring 650 employees, there are 7 departments, most of which are to a different degree involved in Project Management process.

Figure 6. Structure of Company X, Turku Branch (Sankala, 2018)

The Project Office functions as a part of Product Line. Currently the team consists of the Project Office Manager and two team members, and there are plans for expanding the team in the nearest future. Each project is completed with involvement of a Core team – Product Line Manager lead, Project Manager, Lead Engineer – and Supporting Team who provides assistance in finance, product support, testing, safety approval and more.
The functioning of the Project Office is also inseparable from the R&D department who, among other, oversees project budgets and resources.

4.2 Current Project Management process at company X

As read in the Company X’s guidelines “Project Management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements.” Company X has implemented a standardized project management process to ensure cohesive way of working and bringing the outcome. Currently there are two main types of projects handled at Company X: Current Product Engineering (CPE) and New Product Development (NPD).

On average a project completion lasts from 18 to 24 months, and the process includes: planning, concept design, prototype building, production, assembling and testing. Admittedly, project completion often encounters delays (caused, for example, by changes to an order made by a client), thus extending project realization to over 2-year period.

Typically for the Waterfall methodology projects are divided into Gates (main stages) and Mile Stones (“sub-stages” for each Gate), where Gate 0 is when decision to initiate a project is made, and Gate 5 is when all the requirements have been met and the project is closed.

![Figure 7. Waterfall model at company X](image)

The gates separate subsequent phases of a project: Initiating, Planning, Executing and Closing, and typically a project will not move forward before requirements specific for
each gate are met. Initiating phase is a preparation phase before the project has formally started. Planning phase is when a project is outlined and conceptualized. Executing phase: project is conducted according to the plan and its outcome is handed over to the receiving party. In closing phase project documentation is being completed where experiences of the project are gathered, the documentation is then transferred to the organization and the project is closed.

Company X has strict requirements regarding budgeting, project classification, and following the sub-sequential steps of a project management model. In addition, certain project team members must report each project according to their role and to the documentation requirements using existing templates. In order to obtain approval, at a completion of each gate, a range of specified documents must be delivered. Projects are classified according to their budget, and risk factors such as possibility of a delay or cost increase, are used as an additional classifier to determine their priority.

According to information gathered during stage 1 of data collection, in recent years, aware of market's shifting demands, the company has also introduced a so-called Project Lite Model which is to provide a more agile way for completing smaller projects. However, no agile solution has yet been introduced for projects yielding greater investment and risk taking.

4.2.1 Project completion KPI’s

According to Parmenter (2015) "Key performance indicators (KPIs) tell management how the organization is performing in their critical success factors and, by monitoring them, management is able to increase performance dramatically.". KPI’s are success measuring criteria, different for every organization, that allow to follow and estimate the performance within a company. Most often, KPI’s depend on company goals and industry, and commonly they concern finances and overall performance. (Investopedia, 2018)

At company X there are two KPI’s mentioned universally for the project completion, namely staying on or under budget and following schedule successfully throughout the project. Although the KPI’s vary among different departments, as well as in regard to projects themselves and the project portfolio as a whole, there are several performance
metrics specified commonly as crucial for estimating success of a project in addition to schedule and budget, and they are as follows:

- Number of hours dedicated to a project with no safety hazard;
- Managing changes as the project progresses;
- Resource management;
- Evaluation of tasks completed against of what was planned initially;
- Wasted vs. productive time ratio during project completion;
- Accuracy of the final product in comparison to market demands;
- Final cost to the customer;
- Time consumed by repairs, servicing, and maintenance.

A need for having more qualitative KPI’s across the organization has been reported by 3 interviewees. No specific ideas were provided however, the respondents remarked that measuring quality of performance may be problematic to define due to its intangible character, and thus to estimate and track.

4.2.2 Benefits of existing Project Management Model

There are several undeniable advantages to the current methodology applied in Turku Branch of company X which are further discussed within this sub-chapter.

**Corporate risk management**

The Waterfall framework enables a transparent outline of risks and investment requirements needed to obtain organizational approval for every project. This allows continuous control over a budget according to organization’s strict financial regulations, whereas in APM it is not always possible to predict budget demands in advance which ensues greater financial risks. In addition, abundant documentation in gate model enables easier communication among stakeholders and, although time consuming, simplifies the process from corporate perspective. Fixed gates and milestones ensure predictability of the process and clearly outline its limitations in regard to available resources.
Predictability

Gate model as such clarifies targets and timeline and clarifies what tasks have to be completed in order to achieve the goal. At the same time, it gives very precise details to stakeholders as everything is laid out at the beginning of a project, namely the scope and timeline. In general, it is easy to follow subsequent steps of a project realization, and everyone knows where to refer to if in doubt. However, the interviewees reported that in practice communication (7 respondents) and lack of clear role descriptions (3 respondents) prove to be problematic.

Overall, there is a feeling that it is clearly known from the beginning of the project what, when and how needs to be done. Of course, simultaneously there are some unknowns, however, they can be planned out and handled by predicting the application of necessary adjustments at later stages. Additionally, from customer’s perspective, the framework warrants delivery of proven quality products and predictable results that they know and trust.

Having an existing, familiar model in use

Although it may seem obvious for most organizations, having a structured model for project management is not present in every company. In many organizations it is not controlled in any measurable manner or, best case scenario, the practices are passed forward orally. Lack of prescribed methodology leaves plenty of room for miscommunication, lower quality outcome and lowered motivation due to uncertainty. Even an imperfect model provides individuals within an organization with specific guidelines and guarantees predictable results. In addition, the Waterfall model used at company X is familiar to everyone with its recognizable elements such as gates and milestones, thanks to what employees know what to expect and how to behave within the framework.

4.2.3 Challenges of existing Project Management Model

Next to its advantages, there are multiple issues associated with the Waterfall framework used in Company X. Although the importance and prioritization of model’s shortcomings
depend on company role, users (R&D department representatives) and doers (Project Office Team), there are several main elements upon which there has been common agreement.

Majority of the challenges mentioned in this thesis are attributed to the model itself, however in 7 out of 8 of the formal interviews it has been mentioned that the individual attitudes and commonly adapted way of working is at fault as well, this is mainly regarding communication and approach towards time schedules and resource management. At the same time, 4 interviewees have stated that the Project Office Manager has endeavored to better current practices by, for example, conducting a survey regarding Project Office functioning and project completion, and enhancing interdepartmental communication through specifying project related requirements and ensuring they are conveyed in an understandable and specific enough manner. However, current framework and workload do not allow for implementing improvements at a satisfying rate.

Scoping

According to Moustafaev, a project scope item (or business requirement) is “Something the product or service must do or a quality it must have. A requirement exists either because the type of product or service demands certain qualities or functions or because the client wants that requirement to be a part of the delivered product or service.” (2010, p. 83). Insufficient preparation of the scoping affects the execution of the project at later stages and directly affects its quality, timing, and budget. According to 5 interviewees one of the weaknesses pointed out during the discussions is that scoping at company X, which precedes every project, is neglected to a great degree due to time pressure and overburdened task load. The scoping is not written into official Project Management model of the organization, it is however defined in Turku Office specific documentation. In practice, the execution of scoping is dependent on an individual Product Line Manager and limited time dedicated to this phase of project.

Customer involvement

Customer satisfaction after receiving a final product is great at company X, despite common delays in project completion. The customers can trust the quality and
dependability of offered produce which has a special importance given the industry characteristics. At the same time, communication with customers is not written into the model, and the reason for that is that from the beginning projects were done strictly from engineering point of view thus neglecting the customer perspective. It has been pointed out by one of the respondents that there is a greater need for customer involvement, and it should be planned at the very first stages of project preparation. Currently, contact with customers is typically made at the time of customer validation which happens before completing Gate 2, customers are then interviewed for feedback regarding product planned by company X. This practice is yet again defined in Turku Office specific documentation, and not in general organizational recommendations. The issue of customer involvement, although mentioned during an interview, has been at the same time reported by the interviewee as a subject of continuous improvement within existing framework.

**Time & budget**

Keeping projects on schedule and on budget, the two main KPI’s for every project, has been mentioned as an issue during every interview. The realization plans are described as too long and too heavy, and along with addition of delays that happen with almost every project, their execution results in project management process being lengthy and generating additional costs. Ideal project completion period mentioned by one of the employees during stage 1 of data collection would be 6 to 12 months however, in a realistic perspective, a satisfactory outcome would be to keep projects within their current schedules of 18 to 24 months and eliminating delays.

The delays are caused mainly by changes to the project implemented during the process that have not been planned for ahead. For example, it often occurs that engineering designs become more complicated than initially assumed. Additional factor is that projects are rarely linear, and there are many components that need to be considered, for example how does one project interact with other projects and sources or how much physical space is available for building a prototype.
Lack of flexibility

Another commonly reported flaw of Waterfall framework is its low flexibility; introducing any changes to an order means in practice that a project has to be tackled again from scratch, in which case a project completion is severely delayed, or it is not possible to deliver an optimal result in accordance to client’s requirements. Having gates and milestones is beneficial for project predictability however, it disallows conducting reviews and implementing adjustments to earlier stages when necessary.

Not following the process

Although project management process is explained in detail and reinforced by documentation created in accordance to corporate standards, in practice the steps of a project completion are not always followed, for example keeping track of consecutive gates. This primarily complicates communication process and does not allow for effective process tracking and improvement.

The interviewees indicated several reasons for somewhat frivolous following of the process. 5 out of 8 respondents indicated that the model is cumbersome with many checklists and documentation that make it difficult to follow. An example of gate checklists was provided by 2 of the interviewees, in theory they are very useful in practice however, they are often not clear enough and identifying completed tasks can be challenging at times. Secondly, the heavy existing model does not allow for any project specific adjustments (mentioned by 6 respondents), for example in case of smaller projects. 2 respondents mentioned the Lite Model proposed by the organization is helpful but not agile enough, and at times it feels there is more work with following the model and the documentation requirements than with actual project tasks. Another issue mentioned by 6 of the interviewees is that in some cases during project completion there is a need to implement strategic changes from the business perspective, for example when customer requirements change, but that have not been accounted for in the planning phase. Lastly, the human factor has been mentioned by 5 respondents during the second phase of data collection as a reason for not executing the project management process explicitly. In this case, the interviewees are pointing to the time pressure, personal traits, attitudes and acquired habits.
Change management

The Project Office team is aware of the importance that change management has in efficient conducting of a project. However, the project managers are lacking tools to lead changes proficiently as there is no clear process for implementing changes during the project realization. For example, scope of a project which is done at the very beginning should not be subject to modification at later stages. Yet the reality is that it often has to be adjusted and there are no clear guidelines as to how to approach it. Such unexpected modifications affect the morale negatively by inducing feelings of uncertainty and confusion.

Constraints due to testing

It is a company policy to ensure that every produced machine and element has been sufficiently tested as safety is a top priority both at company X and its industry. On one hand, such practice ensures safety and quality maintenance on the other however, testing every single item regardless its significance and scale increases project duration. It has been suggested by 3 of the respondents that prioritization should be applied regarding the duration and need for testing. Another interviewee proposed that testing could be planned, divided and done over the whole duration of a project instead of dedicating a whole, lengthy phase for that process.

Communication

During the interviews, several challenges regarding communication within company X have been revealed which can be divided into two groups: communication among departments and communication among project stakeholders at individual level.

Regarding interdepartmental communication, 5 interviewees have indicated mutual lack of understanding of functions and needs. This generates issues with clear communication regarding what is required for the project completion or in what manner certain project elements should be completed. Same respondents indicated, that the organization should provide clear roles descriptions to avoid possible communicational issues. Another challenge, reported by 2 interviewees, is lack of transparency of project
completion progress which causes insecurity and subsequently decrease in motivation. Using a commonly available Kanban board has been provided as an example of a solution of that problem. Furthermore, since project budgets and resources are controlled by R&D department, outside of the Project Office, it is not always possible to predict what changes project requirements may necessitate. Most commonly the issues emerge because of limited awareness regarding budget capacity, technical requirements or deviations in the scope triggered by changes introduced to a project. Lastly, it has been suggested by 3 respondents during the formal interviews, that involving all stakeholders at an early enough stage would allow for more effective time and resource management resulting in better time management and costs savings. It has also been mentioned by 3 respondents that requirements regarding task prioritization are not communicated well enough between the departments resulting in uncertainty and decrease in effectiveness.

It has been reported by 5 interviewees that at the individual level, problems with communication emerge due to individual personal traits, attitudes, overburden with tasks, and organizational practices. For example, because many projects are not being completed according to the plan, the motivation for good communication and information exchange is lowered as some individuals do not believe that the project goals are realistic. This can be a huge hindrance, especially at the time of scoping of a new project. Due to overload and time pressure, it is often the case that information is passed on a corridor from one person to another, and in such cases, it is not communicated clearly to all involved parties. Even e-mail communication is not efficient enough as many employees point out they have no sufficient time to scan through all the messages hourly or even daily. Furthermore, in Turku Office there is no custom of sharing feedback, positive or negative, or freely flowing communication. A great part of that can be assigned to general character of Finns who highly value individualism, which may conflict with need for group work and cross-team cooperation (Hofstede Insights, 2018).

Additionally, 4 respondents indicated during the interviews that meetings held during project completion process are inefficient; they seem to be lengthy, unorganized, and the participants are not engaged enough. Interviewees suggested that the meetings should have a clear topic, organized agenda which should be followed, and reliable, unified minutes that include information about discussion areas and decisions taken. Furthermore, the minutes should be distributed to all involved parties in a prescribed and timely manner.
4.3 Agile Framework perception and transition to Agile in company X

This part of the thesis is based mainly on the interviews analysis, namely the questions regarding Agile framework and possible project management model change in company X. The researcher has summarized answers in a concise manner with focus on delivering specific information, as relevant as possible for the decision making about project management model change.

4.3.1 Perception of Agile at company X

Based on the interviews, majority of company X employees has not worked in Agile framework at any capacity. Some individuals, mainly in the engineering area, have limited experience with Scrum or Kanban, or they have just started working within a new framework. Most of the respondents however, have at least limited knowledge about Agile main methodologies, several have participated in some workshops or trainings, or sought information individually.

All of the interviewees have positive viewpoint of Agile methodologies and see Agile or its elements as a good tool to introduce improvement to current project management process, and practices of individual departments as well. All of the respondents have particularly stressed the importance of bettering communication and framework flexibility and indicated that a methodology that would require more involvement of individuals and allow them to influence greater part of their work, would have a positive effect on overall motivation.

As to particular methodologies, 6 out of 8 respondents were enthusiastic about having daily meetings which would allow for quicker revision and reaction if necessary however, at the same time concern has been expressed by all of the interviewees whether having daily team meetings is achievable in practice. Building cross-functional teams has been described as a good idea but difficult in realization. One reason being that many individuals are involved in multiple projects at the same time and could have difficulty with scheduling the meetings and workload within available time frame. In particular, the interviewees have expressed concern about willingness of management and employees to make such change.
Kanban, or similar visual board which would allow for project completion tracking has been unanimously described as a good idea; there were however different notions regarding its implementation. One suggestion, mentioned by 5 respondents, was to have a physical board available commonly or in a project management room; the second option would ensure more security and confidentiality. It has been mentioned that such solution could be problematic in terms of updating the board due to time and workload restrictions. Another option would be to have a virtual Kanban board available on a company platform; the advantages of it would be common accessibility and ease of updating the board also in case of physical absence at the office.

Dividing and prioritizing project tasks is reportedly done currently however, it is not applied to all the projects and the tasks sizes vary. Task size that would require 1 week to complete has been indicated as optimal, detailing tasks further is deemed inefficient and tedious. Interviewees have been enthusiastic about implementing better task prioritization which would allow for better use of time and diminish stress and uncertainty. As to WIP numbers, majority of the respondents consider it an excellent solution for current task overload and continuous time pressure.

4.3.2 Transitioning to Agile at company X

Attitudes towards change and need for improvement are overall very positive. Most respondents, despite remaining doubts, look optimistically towards implementing Agile methodologies in company X. However, some individuals see the need for improvement, in a manner of implementing adjustments to current model rather than replacing it.

Among greatest benefits of introducing improved Project Management model the interviewees mentioned: possibility to implement changes without major disruptions to the process, greater influence on final product shape and its accuracy against customer requirements, and enhanced communication within teams and across organization, and possibility of completing subsequent project stages in iterations. No disadvantages of having Agile model have been mentioned, except for uncertainty regarding budget and schedule planning. Most concerns have been expressed towards whether implementing Agile framework is possible at company X in the first place and if yes, which methodology should be chosen, and how to implement the framework in order for it to succeed.
Interviewees stated that the biggest threats to the implementation process would be the sceptics within the organization who either are opposed to any changes or will not display enough trust in successful implementation of Agile. It has been repeatedly mentioned that showcasing benefits of Agile framework on a real-life example, i.e. pilot project, would be the best manner to convince them otherwise.

Regarding implementation time and method, most respondents answered that switching the entire methodology should take several years as the model should be applied only to new or recently started project, and remaining projects should be completed according to existing model. Project Office team however, considers it possible to apply the changes to all existing and new projects and completing the transition in limited time period. Everyone has stated that in order for the transition to be effective, external consultants experienced in Agile and its application in similar industry should be involved in the process. Furthermore, in later stages, continuance of implementation process should be done under strong leadership within the organization.

All the interviewees have stressed that in case of adapting a new methodology, it is crucial that it will fit the character of the organization and its applicability is realistic.
5 CONCLUSIONS

The objective of the thesis was to analyse the current project management practices at Turku branch of company X and recognize how could implementing a suitable Agile framework improve their operations. Additionally, the researcher endeavoured to identify which of the Agile methods would be most optimal for Turku branch of company X considering the industry and character of the organization, and their hitherto practices. The objectives were met by conducting thorough analysis of Waterfall and Agile methodologies in general, and in relation to company X, analysing relevant case studies and exploring possible challenges of implementing a new methodology.

5.1 Research findings

Based on the completed research, it is clear that the project management framework used at company X must be either amended or replaced by a more agile methodology. The organization should take an advantage of the fact that the employees seem to be ready and welcoming towards organizational processes improvement. All the interviewees admitted that the currently implemented changes, are appreciated however, they are happening at a slow and insufficient rate. The research distinctly indicates that the current model does not allow to satisfy two main KPI’s of project completion – following scheduled budget and time – which cause increased costs and prolongs time to market affecting organization’s competitiveness. Adequate Agile framework or its elements could also provide relief in areas of flexibility, communication and overburdening with tasks, thus improving employees’ engagement and motivation.

Most of the respondents are very cautious about implementing Agile framework rapidly; there is a concern regarding organizational willingness and capabilities, as well as concern about involving all the employees and maintain motivation for the model change. For that reason, the researcher’s recommendation would be to start Agile implementation gradually, for example with one or more pilot projects, as suggested during the interviews. Organizing a pilot program seems like an acceptable method of introducing Agile to the company as it will allow to highlight strengths and effectiveness of the framework, convince sceptics, and kindle enthusiasm and motivation toward changed project management process. Whether all the projects should be switched to Agile
methodology simultaneously over defined period of time, or the process should be done gradually with only new projects tackled within new framework, should be decided after implementation of pilot program(s) and thorough assessment of its success.

For the reasons mentioned above, it would be further recommendation of the researcher to choose Agile Pulse model as most suitable for company X’s requirements. It is a model that ensures steady and gradual implementation of Agile which will allow to avoid rapid and radical changes. In addition, it is adapted for management of individual projects and project portfolio as well and can be customized according to the organization’s needs. Furthermore, the fact that Agile Pulse model has already been successfully implemented in Tampere branch of company X, is a solid argument for choosing this specific approach; it will also allow Turku Branch professionals to learn from Tampere Office experience which will result in time and costs savings.

If the company makes the decision not to change the Project Management model, the implementation of current framework should be significantly and methodically improved and amended version of Project Management Lite model should be developed for small projects.

5.2 Recommendations for further research

Due to volume limitations of the thesis, the researcher was not able to research in depth all the topics associated with the thesis subject that could provide further valuable information for company X. For that reason, suggestions for further research are presented in this sub-chapter.

Additional investigation into methods of Agile framework implementation could be beneficial for company X in decision making process, and in case the organization decides to change Project Management model. Conducting action research (Saunders, Lewis, & Thornhill, 2009, pp. 145-147) would be a good solution to prepare a realistic implementation plan that could be later applied in the transition process.

Because modifying a known Project Management method is a hefty change management process, resistance to change, organizational culture change and motivation techniques are other issues to consider for further examination. In addition, to ensure success of new framework, a closer look should be given into question “How
to ensure employees follow procedures?” so that Agile model will be accepted with enthusiasm and the employees do not return to old habits.

Finally, more thorough research is advisable into whether Agile and Waterfall model can coexist within an organization, and if they can be applied for different types of projects. In 2018, the PMI is planning to release a report regarding tailoring project management frameworks to individual organizations’ and projects’ requirements; additionally, they will analyze how are organizations choosing when to use traditional, agile, hybrid, blended, or customized models (Project Management Institute, 2017). Investigating this issue could occur helpful when making the decision about possible transition, its character and intensity.
REFERENCES


Interview questions chart

THE GOAL OF THIS INTERVIEW IS TO IDENTIFY HOW IMPLEMENTING AGILE PROJECT MANAGEMENT (APM) APPROACH COULD BENEFIT COMPANY X.

THE AIM OF AGILE RELATED QUESTIONS IS TO IDENTIFY WHICH APM APPROACH IS MOST SUITABLE FOR ORGANIZATION’S NEEDS. PLEASE, SEE ATTACHED PRESENTATION FOR FURTHER INFORMATION ON AGILE.

GENERAL

1. Can you shortly describe your role in the organization?

PROJECT MANAGEMENT

2. What are, in your opinion, the strongest features of currently applied PM methodology?
3. What are, in your opinion, the weakest features of currently applied PM methodology?
4. Could you identify KPI’s for the Project Office/R&D department/Product Line/Sourcing?
5. Would you agree with the following statement: with the current PM approach most of the decisions must be made when there’s the least information available?

AGILE

6. Have you ever worked with APM?
7. If yes, which APM approaches are you familiar with?
8. Based on what you read about APM, which of the APM elements do you think would work the best/worst in Company X and why?
   a) More open and direct communication
   b) Increased need for flexibility and applying constant adjustments
9. Which of the Scrum elements do you think would work the best/worst in Company X and why?
   a) Daily meetings
   b) Sprints & cycles instead of milestones & gates
   c) Organizing defined, cross functional teams dedicated to given project
10. Which of the Kanban elements do you think would work the best/worst in Company X and why?
    a) Organizing and following a physical/virtual Kanban board
    b) Dividing and prioritizing the tasks
    c) Limiting and following work in progress (WIP)
TRANSITIONING TO AGILE

11. How do you feel about Turku Office transitioning to APM?
12. In your opinion, what would be the biggest benefits of introducing APM in Company X?
13. In your opinion, what would be the biggest disadvantages of introducing APM in Company X?
14. What would be the biggest threats to transition process from Waterfall PM to APM?
15. What are the main goals of implementing APM for the Project Office/R&D department/Product Line/Sourcing?
16. What would be the best arguments to convince sceptics in Company X to switch to APM?
17. How long would you expect the transitioning process to last?
18. If the management decides to go agile, how would you like to see this change being handled?