Software Development Efficiency
A Case Study in a Mobil Payment Company

Noman Kakakhel & Shah Hassan

Department of Industrial Engineering and Management
Project Management and Operational Development
Degree project: Master
Supervisor: Sven Antvik
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Abstract

Due to Internet, the IT industry have seen rapid changes and to compete in the digital work, the organizations need more vigilance than ever before to respond to market changes and customer needs. Some organizations have opted to go agile to be more efficient in their software development but still deploying agile methodology and reaping its fruits further needs more research and empirical evidence.

This research is a case study to evaluate the deployment of agile methodology in Easypark and explore its efficiency focusing on their structure and organization. Certain criterions are chosen to evaluate software development efficiency against that and to analyse what the deployment in the organization has led to.

The method chosen for this study is a case study, where the empirical data is gathered through semi structured, and qualitative interviews from five senior employees in Easypark. The responses were analysed and reviewed under the light of theoretical background to elaborate the research question.

The results of this case study revealed that efficiency in general have greatly been improved after adopting agile methods in Easypark and the core contributor is the permanent teams for different projects. There have been quite a few complications to deploy agile and that must be taken into consideration when other organizations plan to adopt agile methodologies.

Keyword
Agile, Software Development Efficiency, Agile Software Development.
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1. Introduction

In this chapter we will be discussing agile software development and the purpose of our study highlighting research question and problem discussion to clarify to our readers what exactly we are aiming to achieve and how this will help us understand agile software development.

1.1 Background

In today’s business world a number of companies are facing new scenarios due to change in demands and global setups. This makes it vital for companies to be flexible and have the ability to adapt to market changes to be a relevant player. The situation in IT industry is more complex than others as the changes are rapid and innovative and therefore, it is vital to implement an appropriate software development method for projects (Klarke, et al., 2012). To deliver project on time and meet the customer needs, many IT organizations opted to use agile methods for developing software (Mishra, et al., 2012). This allows them to adjust to market changes and respond to the customer request in good time. The agile methods can simply describe a process of “flexibility and responsiveness to changes” (Papadopoulos, 2015).

Traditionally software development was mostly executed through a method known as waterfall. As the name indicates, the process had a concrete beginning and end and the requirements from customers were needed to be clear to proceed with development (Kisielnicki, et al, 2016). This kind of setup needed a cohesive and stable work environment, which generally doesn’t exist in the real-world work places. The drawback of this process was that the products delivered to the market would usually be out dated and it is difficult to adopt changes in the middle of an ongoing project. However, there are some advantages of using traditional methods i.e. it emphasis on scope of a project in terms of budget and schedules, it can be useful where projects need to be well managed and results are rather predictable, in projects where a structured way of control is required (Kisielnicki, et al, 2016). To tackle this scenario, the IT industry started to develop a working method that are agile and have the flexibility to adjust to customer requirements while developing the product as well as have the capacity to deliver the product in a much fast pace to the market.
Agile methods got very popular with emergence of internet as the market conditions changed to a huge extent as the companies were in huge competition to produce efficient and reliable software with the least possible time to market on scarce resources (Stankovic, et al. 2013).

**What is agile software development and development efficiency?**

Agile software development is defined as “An iterative and incremental (evolutionary) approach to software development which is performed in a highly collaborative manner by self-organizing teams within an effective governance framework with "just enough" ceremony that produces high quality solutions in a cost effective and timely manner which meets the changing needs of its stakeholder” (Beck et al. 2001). Moreover, “efficiency means accomplishing objectives quickly and with minimal resource usage” (Fabian et al., 2015) which in general means efforts put up by business and results obtained by business.

Agile methods were first introduced in the 1990s but the industry was skeptical of its use till recently when they started to use it commercially (Korkala, 2014). Even though, many organizations have started to use agile but the process have been highly challenging. In the mobile payment industry Easypark has been one of the first few who have started to use agile methods recently.

There are different processes in agile development but “scrum” is the most popular software development process to introduce agility in your product development. Easypark is using Scrum as well to have agile software development. The core concept is that there are permanent teams of employees instead of projects. The software development is done in “sprints” which are short iterations and they are expected to deliver the “user stories” which are the requested functionalities.

Requirements gathering and elaboration process is done by the Product owner, who describe user story to request the development of a particular functionality. The Product owner while elaborating make sure that the main stakeholders which is a customer gets the product that suits his needs. Further, each team also has a scrum master who ensures the product delivery
in time. The developed product needs to meet the requirements of the stakeholder otherwise it will be rejected in “acceptance testing” (Kniberg, 2007).

1.2 Problem Statement

It’s very subjective if agile methodology will actually help the organizations software development process or otherwise. Many organizations have started to use agile processes, which have helped them achieve competency and efficiency as well as they have managed to reduce cost. Many other organizations kept a skeptical approach to agile and believed that this would make processes more complex and less advantageous (Behel, et al., 2015). Many of agile critics believe that the process is hard to implement practically and the cost benefit analysis will always be negative. Further, the business needs changes so rapidly that not many organizations can respond to markets, which results in huge financial loss (Klarke, 2012).

Implementation of agile methodology is the toughest part when it comes to software development processes. The organizational culture plays a huge role in its interpretation and deployment. The process adoption will be viewed as a big organizational change and the research suggest that it’s the most challenging situation in terms of performance (Gandomani, et al, 2015). Further, with well-established organizations, there are already concrete processes and standards where people are used to it working in the same for decades and the change will be seen negatively. It is vital that the new process implementation compliment the old standards as this can result in misunderstandings and would ultimately affect the efficiency of employees. Moreover, it’s relatively much easier to implement agile methodology in a flat organization structure. Achieving the same in big corporations will be comparatively really hard due to its centralized hierarchical setup (Daneva, et al. 2013).

Some studies have suggested that those who have worked with agile methods have a positive opinion about the process while those who haven’t generally hold bias towards the process change. This attitude bias may lead to less efficient work environment where employees won’t feel the energy to utilize their full potential resulting in loss for the organization (Gandomani, et al, 2015).

Agile methodology comparatively doesn’t have sufficient documentation which can lead to a challenging situation when it comes to defining requirements for a certain functionality
especially in some organizations who have interdependencies in their products (Claudia, et al, 2013). It’s a lot cheaper to communicate when you already have standard processes in placed. In bigger IT organizations, it is not easy to adjust to changing business requirements as the IT applications are developed through interdependent events which are not flexible for big changes. This situation can be tackled with Scrum methodology. It is vital for efficient software development to have good communication and collaboration but there are no particular standards for it rather Scrum lacks good documentation and this can result in loss of knowledge, experience and organized history. A successful implementation not only need agile methods but also need good documentation and history.

There is still quite some research needed to see the effectiveness of agile methodology and the use in organizations is more of a trend. Quite a few organizations are still skeptical with benefits of agile in the long term and as the software development is a very practical process. Prioritizing requirements regularly is a key component in agile software development method, but still it is not very clear how this process is performed (Al-Taani, 2013). There is need of further empirical evidence to ensure that it will deliver the promised benefits not just in the short term but long term as well. This study is an effort to help close the gap in literature.

1.3 Research Question

This study seeks to address the following question:

How can the agile software process improve development efficiency?

The research question is very important to understand scrum and how creativity and productivity is achieved through agile processes. The research will somewhat help businesses to understand the core of agile and the motivation and reasons behind going agile for software development.
1.4 Study Purpose
The purpose of our research study is to have a deep understanding of agile approach through investigating software development process by literature study and a case study at EasyPark to examine if implementation of the agile approach has enhanced software development efficiency.

1.5 Limitation
There are number of software development methods i.e. waterfall, prototyping, iterative and spiral development approaches used by the organizations for software development but this study is focused only on agile software development methodology.

The scope of this study is limited to software development process at Easypark. Due to the time constrains and resources availability, the problem domain of this research will focus only agile software development processes, other organizational development processes will not be investigated in this study.
2. Methodology

*In the methodology chapter, we will be focusing on the methodology we choose for this research “How can the agile software process improve development efficiency?” and the justification of it for the purpose of study. Moreover, we will elaborate which research strategy is selected, how the data collection will be handled and then how data is analyzed to proceed to the next section.*

2.1 Search of literature

Search of literature is a key component while conducting a research study. To have a good understanding of a research topic, it is essential to know about related work done previously as well as current work on a particular topic. Therefore, search of literature can be considered as foundation for a research study and it can improve the current research or generates new research (Haraldstad, A.B, 2015). In this study we have used different sources for literature search, i.e. book, journals, Science Direct, AMC library, IEEE explorer, and Google scholar. The key words used for literature search are software development efficiency, agile development method, and software development processes. Then, picked most relevant literatures, which were authorized publications, recently published, containing in-depth and required information about the topic. Moreover, searched for most relevant articles within the problem domain i.e. regarding agile software development processes and factors affecting its efficiency.

2.2 Why EasyPark

The case study is performed at Easypark, which is a registered organization and develop mobile payment solution for parking payments as well as electrical vehicle charging solution and residential permits for parking. The solution is highly technical and it needs to be updated and tailored according to the user needs as well be integrated with latest research and solutions in market related to parking payments, parking guidance and location services. Easypark is a perfect size organization to evaluate how agile have improved their software development as it’s highly technical as well as have direct impact on customers which can
immediately report if something has gone good or bad. We will have to investigate the empirical evidence that agile can improve software development process.

Easypark is using scrum as a method for agile software development and there are 8 teams, which are working in scrum. The teams are a mix of both software developers and business product owners. The organization culture is very strong and the solution is complex which makes it difficult to introduce new ways of working.

2.3 Research Strategies
The most commonly used research strategies in conducting a research study are experiments, survey, action research and case studies (Dawson, 2009).

2.3.1 Surveys
Survey is used for acquiring significant and deeper information about a problem in a research study (Dawson, 2009). This method helps to produce information, which might be hidden or not clearly available in written form. Data/information can be obtained through expert groups might include people (individuals, target group, expert in a specific field or depending on the objectives of a survey), could be organizations or it could be some systems. According to Cottrell (2014), “Questionnaires and surveys are popular methods for gathering evidence for projects”. Data is collected through conducting questionnaires, which contains questions regarding a specific subject and circulated among people and then feedback is analyzed for problem solution. Survey is useful in collecting data in large amount through asking different types of questions on a subject, and previous research can be replicated easily with the help of additional participant or expert group to compare the results.

2.3.2 Experiments
As the name suggested, examining a specific research problem by doing some experimental tests is called experimental research (Dawson, 2009). The data collected from the tests is then analyzed to investigate the problem. It is a common method used for research studies in various fields of science, mainly practiced in social sciences but can also be adopted in any discipline associated to the subject. Experiments are useful in a research where quantitative
methods are used; measuring situations, samples are selected, testing hypothesis and calculation are required (Cottrell, 2014).

2.3.3 Action Research

Action research method can be used to bring some changes in an existent situation. This could be introducing of a new information system, which modify a specific scenario or creation of a method for solving a research problem (Dawnson, 2009). Conducting action research, we should keep strong focus on the research i.e. not to be much infatuated to complete a task without concentrating on the actual research problem.

The goal of this research is to investigate, if agile methodologies has improved the software development efficiency, which means it does not modify any real environment rather it seeks to figure out if performance of software development process has been improved. Therefore, action research cannot be considered a suitable approach in this research.

2.3.4 Case Study

To answer our research question, we have chosen the case study methodology as an approach. This methodology is more suitable to get a clear understanding to know the organization and how the processes work. According to Cottrell (2014) “A case study is an in-depth study of an entity or phenomenon”. This method can be used to produce valuable qualitative data, which is important for making critical analysis and proper solution of a case.

The case study method is special as it has the ability to put in focus the toughest and complex problems in the organization and can give more concrete answer to the questions raised (Cottrell, 2014). Moreover, according to Orlikowski (1991), a case study is more appropriate for research design especially when the focus is on information systems as the interpretation generated is much more valid in comparison to the same done with other research methods.

2.3.5 Why Case Study

The aim of this study is to find if implementing agile methods has improved software development efficiency, and to answer this problem case study strategy is used. It provides in-depth investigation of a case, and therefore by using case study we have obtained deep
knowledge about the most important factors in software development process i.e. communication and collaboration, time-to-market, learning progression, customer’s and employee’s satisfaction. Case study is a suitable approach that helps to examine this particular case i.e. to study agile software development processes at EasyPark and then come up with reasonable solution. Further, through case studies qualitative data can be acquired, which is useful to analyse these factors critically and answer the research question. As stated by Cottrell (2014) case study has the capability to emphasize on some complicated issues of an organization and aims to find proper solution. So, this method has been chosen to focus on the research problem by analysing the identified factors and seek answer if software development efficiency has been improved at EasyPark.

2.3.6 Alternative Method

Survey can be used an alternative strategy in this study. However, according to Cottrell (2014) there might be some difficulties while conducting surveys i.e. response form the participant can take long time, feedback from significant amount of participant is required, it can be complicated to find participant having relevant expertise and questions can be misinterpreted. Therefore, survey is not considered a suitable strategy in this study. Due to the time constrains and study scope; it is not possible to find large number of people having expertise in the relevant fields and get responses within the required time. Therefore, survey is not considered an appropriate method to answer the research problem and hence not selected for this study.

2.4 Data Collection

In conducting a research study, the main factor is to adopt a proper data collection methodology. Different methods can be used for data collection; some of the mostly used methods are interviews, observation studies, documents studies (i.e. books and articles etc.) and questionnaires (Dawson, 2009). Data used in this study is gathered through different sources, i.e. book, journals, AMC library, IEEE explorer, Science Direct, and Google scholar within the problem domain.
2.4.1 Documentation

Documentation study is based on observations where existed data is investigated in a research (Denscobme, 2010). Documentation may include books, websites, reports, journals, system logs, user manuals as well as recording materials etc. By adopting only documentation method is not sufficient to collect all the data we need in this study. Therefore, documentation method is used in combination with interviews in order to answer the research question. Literature review is used to have a in depth understanding of agile software development processes and interviews with the relevant people who works in agile software development teams would help in analyzing how agile development method improved team working efficiency.

2.4.2 Questionnaire

Questionnaire is a useful and commonly used method for collecting data in a research study (Cottrell, 2014). This technique is used by writing relevant questions regarding a particular problem and circulated among number of individuals in order to acquire data required for analyzing a problem. In questionnaire, different kind of questions can be asked form the participants’ i.e. multiple-choice question, true false and open/close ended questions (Dawnson, 2009).

2.4.4 Interviews

Interviews are widely used in different research areas, these could be business, healthcare, social sciences, arts, media and communications (Cottrell, 2014). This technique can be considered a prime source for data collection in a research study. In interviews, questions are asked from respondents regarding a particular problem and analysis can be performed based on collected data. The interviews can be either direct or indirect, in direct interviews a researcher meets respondents face-to-face and ask questions about a problem, while indirect interviews can be performed using telephone/skype services etc. (Denscobme, 2010). Further, interviews can be done in structured and/or unstructured manner. A structured interview contains predefined questions asked by a researcher regarding a specific problem,
while in unstructured interview respondent can take initiative and provide personal opinion about a subject.

2.4.4 Why Interviews

Data collection is a key factor in a research study and therefore high attention should be given to choose an appropriate method, and it should be in accordance with research requirements (Denscobme, 2010). If an appropriate data collection method can be chosen in a research, it is beneficial for investigation a problem and effective results can be produced from it. Interviews method is used for data collection by asking questions from the participants about the identified factors (learning progression, employee’s satisfaction, time-to-market, customer’s satisfaction communication and collaboration) and how these can affect software development efficiency. Before the interviews, each question is described clearly, so that participants can easily understand questions and context of the problem. Further, questions have been categorized for each of the factors separately, so that it is easy to understand and avoid any confusion during the interviews. This method has been chosen because we can acquire in-depth information by asking multiple related questions about a particular case.

Semi-structured interviews are conducted to collect data from the participants. In these types of interviews both the structured and unstructured are used in combination (Cottrell, 2014), where follow up questions can be possibly asked and respondent can also tell something that might be useful for a problem solution. Furthermore, interviewing those who already have knowledge and experience in the relevant filed i.e. agile software development is very useful to acquired concrete answers, which helps to generate good results.

For data collection, conducting unstructured interviews could also be used as alternative ways but we have not used in this study, because this could lead the interviews beyond our research scope i.e. most relevant questions could mix up with some unnecessary one’s and could make it hard to focus on actual problem. There is also a chance to obtain irrelevant information which might not be suitable for analyzing our problem and produce efficient result.
2.4.5 Alternative Method

Questionnaires can be used as an alternative method for data collection in this type of research. But, it is difficult to find required number of people with relevant expertise and experiences to answer the questions, as well as to get responses within the limited amount of time. Therefore, survey has not been considered as an appropriate method and hence not used. This study focused on one organization who is using agile software development methods and participants were selected who have expertise in the problem domain. Therefore, survey is not considered a best option, because due to the study scope and limited time frame there was very less chance to find many participants having expertise in the relevant field and get feedback on time.

2.5 Why Qualitative Data

Data analysis can be performed either by following qualitative and/or quantitative techniques. According to Anderson (2006) “Quantitative research seeks explanatory laws; qualitative research aims at in-depth description”. In quantitative research, data analysis and results obtained are numeric and statistical conclusions can be derived from that (Cottrell, 2014). Data is collected through interview by asking questions about the five identified factors (explained in section 3) to get deep insight of how agile software development works and to enquire if it has improved the software efficiency at the company.

It can be very complex to define what exactly efficiency is, because the term efficiency can have different meanings in different circumstances. In the same manner, to measure software development efficiency may vary from organization to organization i.e. depending on an organization business strategy, goals, products, services and customers’ requirements etc. The purpose of interviews was to measure software development efficiency by asking questions about the five factors and acquire as much information as possible and based on those information, generate results. The data acquired from the interviews are in non-numeric format and therefore, qualitative data analyses method is used.
As this study aims to investigate, if agile method has improved software development efficiency in Easypark where we have to analyse qualitative interview data and make deductions based on that.

2.6 Limitations

1. Due to the scope of the thesis and the limited time frame, we only could focus on a single organization who have started using agile and were identified as a good candidate for a case study based on the criteria we set for our research, which mainly include a mid-size mobile payment company with good growth in the last 3 years.

2. The results of this study can’t be generalized as the study is conducted in one organization and generalization won’t be very reliable.

2.7 Delimitations:

1. There can be a number of factors, which can be identified for the measuring software development efficiency but we will be only focusing on the five factors selected for this study.

2.8 Validity and Reliability

Validity concept can be defined with number of terms differently in qualitative research. There is not a fixed, specific or common concept but it is more dependent on the nature of a particular project and study methods. Researchers have used different notions of validity and adopted most suitable term accordingly like “rigor, quality and trustworthiness” (Golafshani, 2003).

Generally, the concept of reliability can be used to assess or test quantitative research study, however this can be considered in all types of research studies (Golafshani, 2003). If we apply testing notion in the same way and consider it as a method of extracting information, then testing of a qualitative research can be its quality. “The reliability is a concept to evaluate quality in quantitative study with a purpose of explaining, while qualitative study has the purpose of generating understanding” (Golafshani, 2003).
Conducting a qualitative research, it is important to consider validity and reliability aspects of the data collection and its use in a research study. According to Nastasi (2005) it is prerequisite to ensure validity and reliability of findings in qualitative research. All the necessities have been taken into consideration in this study. The respondents have been asked if they want to be anonymous, so that they feel comfortable in answering the questions and to avoid any confusion. Purpose of the study has been clearly explained and respondents were informed that the obtained answered will be analysed to answer the research question. In order to avoid any ambiguity, all the questions have been sent to the respondents before interviews, so they can read and understand the context clearly.

In order to obtain consistent and quality results, the respondents were chosen based on their working experiences and have sufficient knowledge in the problem domain. Further, made it sure that the answers received from the respondents are clearly understandable and analyzed in such a way that can produce useful outcomes.

### 2.9 Ethical Consideration

In a research, it is vital to consider ethical values and conduct interviews in a responsible manner. Further, all the respondents should be provided sufficient amount of protection they needed i.e. to take care their integrity, protect form any physical damages and/or do not compromise their privacy. The data used in this report is collected through literature review and interviews. The data gathered from the literature research papers; journals, websites and books are cited and referenced properly. To protect the entire interview respondents against the above stated essentials, purpose of the research study is clearly explained and inquired if they want to be kept anonymous.
3. Literature Review

In this chapter we will be explaining efficient software development to help our readers understand how it’s going to be measured in this study. Moreover, we will further review the classic software development process waterfall and get an overview of agile methodology to give a deeper empirical understanding of both to our readers for analysis.

3.1 Efficiency as a concept in software development

Efficiency can be described in many ways in different contexts. In terms of software development, we can call it software development efficiency, which we will be analyzing in this study. It’s not something concrete and there is no highly reliable way to measure this efficiency due to the fact that it’s a human activity with very low reliability from its inception. This makes it hard to give a reliable definition to software efficiency (Claudia, et al. 2012). According to Fabian et al. (2015)” Efficiency means accomplishing objectives quickly and with minimal resource usage”. Simply, efficiency can be termed as efforts put up by a business and results obtained by business.

There might be number of factors that can be used to measure efficiency, but we have chosen five most important factors that can affect the software development efficiency based on literature review. We identify these five factors as the most affecting reasons for efficient teams and organizations from literature we have studied. If these are taken seriously into consideration and implemented according to the organization business needs, it can improve software development efficiency and deliver quality products to the customers. Further, in this case study at Easypark we will be measuring efficiency in terms of NPS score (Net Promoter Score is an index ranging from -100 to 100 where you survey the customers and ask how likely they would recommend the product to others which shows the loyalty of those customers with a certain brand) which is their standard measure for customer satisfaction. Further, we will also be measuring the increase in number of customers, revenue increase, number of customers, number of transactions, number of errands per customer set while project execution timeline.
The five factors identified based on the literature as referenced include; learning progression (Rafaela, et al, 2015), employee’s satisfaction (Donmez, et al, 2016), (Bass, 2016), customer satisfaction (Shrivastava, 2017) time-to-market (Torgier, 2016) and communication and collaboration (Bass, 2016), (Rafaela, et al, 2015) and are described below with details. According to GAO, there are five key activities in project management, which can be used as a yardstick for efficient software development process i.e. strategic planning, collaboration from organization, preparation, evaluation and execution. (GAO, 2012). Based on the criteria mentioned we have to evaluate and measure efficiency in software development process.

3.1.1 Learning Progression

Advanced learning procedures need to be adopted among people/groups in order to create a quality-learning environment. In software development, advanced learning methods are critical in order to increase working efficiency, i.e. to use proper guidance documentation, software, appropriate working techniques and right working tools (Jeffry, 2014). Through learning process organizations is able to adopt changes in working environment that is useful in efficient productive work. A suitable learning environment at work provides opportunities to employees in order to improve their skills and increases their working capabilities (Alahyari, et al, 2017).

3.1.2 Employee’s Satisfaction

In software development team working competencies and skills are the key components that influence the efficiency during product development (Junaidah et al, 2016). Similarly, in agile software development method a high attention has been given to the people and employees (team members) can be considered as main asset in the entire software development phase. It is very important to work with people having appropriate skills in software development and empower employees according to the requirements will increase efficiency (Dingsoyr at el. 2012). So, if employees are satisfied in a development team, it makes a productive and efficient working environment.
3.1.3 Customer Satisfaction

Customer satisfaction can be defined as the measuring the services or products produced by an organization meets the customer expectations (Andrea et al, 2015). The term customer satisfaction in this study is considered as employees’ general perceptions and experiences about the newly implemented agile approach. If we have efficient working environment in a company, it will produce quality product, which will fulfill customer satisfaction level (Mandar, 2008). Agile development method objective is to obtain customer satisfaction by implementing and delivering results on time, as the process is completed within short cycles (Moniruzaman, et al, 2013). In Information Technology industry, it is a complex task to fulfill customer requirements, because these are changing regularly with time and with the rapid development in technology.

3.1.4 Time-to-market

The term Time-to-Market (TTM) can be used for measuring the amount of time from placing customer demand for a service/product till its functionally completed and delivered (Highsmith, 2002). Time-to-market is an important factor in software development process and needs to be reduced with the same pace technology is growing. In software development, completion of assignments within short amount of time can be considered an indication of an efficient working process. When assignments in a project are completed on time, it produces positive results and leads the project delivery on time and customers are satisfied (Alahyari, et al., 2017).

3.1.5 Communication and Collaboration

Appropriate communication is a key to be successful in the entire software development process. Particularly, in agile development method strong collaboration is required between all the stakeholders related to the project from the initial phase to product delivery (Yague, 2016). Communication is very critical within development process, so that each member is well aware about what exactly needs to be done and what procedure should be followed. However, in IT projects, it is a complex task to keep coordination among team members
according to the project needs (Turk, et al. 2005). In agile method, collaboration among group members, suppliers, customers and all other groups associated to the project can directly influence the overall working efficiency. Therefore, adopting quality communication can produce satisfactory results in agile development method. While, if there are communication gaps among the relevant people or groups in a project can effect the working environment negatively and product delivery can run out of time (Eckstein, 2004). In other words, we can say that proper communication is directly proportional to team working efficiency.

3.2 Waterfall Method
Waterfall is a traditional software development approach; it works in a sequential manner where each process is completed before starting next process (Ritika, et al, 2016). It was introduced in 1970’s for process modeling in software development projects. There is no iteration among the processes and each process is completed separately in sequence i.e. next one begins after the previous one is finalized (Royce, 1970). Further, each process is defined with clear goals as well as time frame it should be delivered.

Waterfall method is appropriate where a project description regarding final product is well defined. This approach is suitable to implement in large size projects, where process functionality has high priority compare to short time deliverables (Kisielnicki, et al, 2016). Though, waterfall development method has some potential challenges. The main disadvantage of the model is assumption about known reality and stability, which is almost impossible in reality. Therefore, management could be the main point of concern, as managing requirements is a difficult task and this can be considered as a prime reason for the model failure. In waterfall model, customer’s requirements are unable to be addressed unless the project is completed, and consequence could be that most of functionalities have difficulties during implementation (Balaji, et al, 2012). Moreover, integration and testing of the entire system is complicated. According to some studies, just small amount of functionalities have been deployed in real time in the development phases. This is because of variation in requirements and the method does not provide opportunity to explain any misunderstanding (Ritika, et al, 2016). Most of the time it happens due to inefficient feedback during the processes, because customers are unable to provide proper feedback and it can lead to functionality failure.
3.3 Agile Method

Agile uses iterative methodologies in software development process to resolve issues by collaboration among the team members (Rafaela, et al, 2015). In agile development, processes are performed in short rotations, which allows implementing functionalities within small pieces of steps (Turk, et al, 2002). The main objective of using this methodology is to achieve quality software development solution in terms of cost and time effectiveness. Agile software development makes it possible for the stockholders to implement changes according to the business needs (Alahyari, et al. 2017). To measure the quality of process functionality can be examined by its efficiency i.e. to meet the customer requirements according to the business strategy. Product quality can be measured by its functionality and customer satisfaction level (Scott, 2003).

3.3.1 Agile Manifesto

According to “The Agile Alliance” (Beck et al. 2001), we are revealing best approaches of software development by practicing and proposing others to practice it. Agile manifesto proposed the values stated below, where the values described in the left has been considered more valuable over the values written on right side.

“Individuals and interactions over processes and tools”
“Working software over comprehensive documentation”
“Customer collaboration over contract negotiation”
“Responding to change over following a plan”

To formulate these practices of agile manifesto key principle stated below are proposed (Beck et al. 2001). In software development, a process is to be called agile if it fulfils these principles.

1. “Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.”
2. “Business people and developers must work together daily throughout the project.”
3. “Welcome changing requirements, even late in development.”
4. “Deliver working software frequently.”
5. “Working software is the primary measure of progress.”
6. “Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.”

7. “The best architectures, requirements, and designs emerge from self-organizing teams.”

8. “The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.”


10. “Continuous attention to technical excellence and good design enhances agility.”

11. “Simplicity is essential.”

12. “Project teams evaluate their effectiveness at regular intervals and adjust their behavior accordingly.”

3.3.2 An overview of Agile Development

In the current business environments, companies are adjusting their software requirements with the local and global trends. Due to the Internet boom and world becoming more global, customer requirements constantly change. It is vital for any organization that wants to be in the game to be flexible enough to adapt to the changes needed by the customer (Kupiainen, et al., 2015). Agile methodology is one flexible way of software development that can ensure quick and rapid development of solutions (Julian, 2016). Agile is an efficient method to be relevant in the global market to have the capacity to deliver the product with rapid speed and meet the changing requirements from the customer. (Shrivastava, et al, 2017). This method currently fulfills the promise of delivering to customer quality products at a good pace. The classic software development models have failed to fulfill the gap created by the fast paced market and agile methodologies have proven it more facilitating and extensive to be able to adapt with the current market situation (Fontana, et al, 2014).

The big process change in agile development is that it’s more focused on direct meetings then documenting all the activities. The quick interaction, openness and idea sharing makes it more feasible for problem solving (Donmez, 2016). Further, transparency and good communication result on good teamwork and collaboration. The communication and interaction makes it possible to detect any misconfiguration and defects earlier as the tasks are done in smaller iterations (Yague, 2016).
There are number of positives of agile methodologies. According to Salinas (2015) the time to market is the best yield of agile methodology. Moreover, collaboration motivates team members result in productivity and is a big positive of agile methodologies (Bjornar, 2014). The customer satisfaction level through agile methodologies have proven to be way higher than any other methods along with lower number of defects and flexibility in terms of product changes. Further, the research shows products developed in agile have good quality, less waste, early detection of problems and time to market is very efficient (Torgier, 2016). The interaction and team communication make it a lot easier for the members to come up with new ideas and listen to others, which ultimately help them to grow and mature.

![Diagram of Scrum](https://www.valueflowquality.com/blog/scrum-the-diagram/)

The requirements and stories are very open to change during the software development process so the gathering of requirements is not a defined process especially in agile software development. An approach which is predefined for a certain outcome may not be an ideal way to develop in agile as things might turn out to be very different then what a team has anticipated as the variance in product description is very high. The possibility of the whole thing changing is very high which may include the technology used; the whole product
description or even some of the key members of the team may leave. The best way to address
this situation would be to have short development cycles and more frequent sessions between
developers and customer to get more concrete feedback well in time. The short cycles would
definitely help to be in control of the development process and have a good overview of the
changing requirements even with abrupt ambitious request, which can change the whole
project (Georgios, 2015).

The upper management has less control in agile methodology due to which it can face quite
some resistance within the organization as many favor more traditional methods. The cultural
changes associated with agile methodologies are huge as the teams are cross-cultural, self-
governing and more decentralized which is not many organizations work through the world.

3.3.3 Agile Methodology Scrum

Scrum is a process of agile methodology, which includes short iterations and the product
development is incremental. The development tasks are done in short cycles called sprints.
This methodology was mainly used for small teams and ideally located in the same premises
due to the fact that it mainly relies on informal and direct communication. As the process is
mainly a collaborative and depends on brain storming/knowledge creation due to which it
doesn’t need a formal project plan to start working on a task (Guus, et al., 2013).

Scrum is very productive when used for developing in an environment where requirements
are volatile and keeps changing. The key features of it are that it’s flexible, productive and has
the ability to adapt to changes. A market overview of scrum methodology shows that the
customers are more satisfied with the products development in scrum, the defect rates are
much lower compared to traditional methods, it’s easy to be used for production thus
increasing time to market and is very flexible for changing customer requirements (Stankovik,
et al. 2013). The developers are more in control in the process and they have the liberty to
choose what methods are preferred for development. To get the best out of scrum, it is vital
for the management to keep analyzing the process and take care of deficiencies in the process
of software development.

Following are the operational process of Scrum in agile software development (Kniberg,
2007) and (Salinas, 2015).
- **Morning Standups**
  Generally every morning when the whole team arrives in the office, a daily standup is held where the team discusses the progress of their assigned stories and if there are any bottlenecks or impediments, which need attention.

- **Product Backlog**
  As the name indicates, the backlog is the first thing created in a project where all the functionalities, which are requested, are listed and are prioritized in the order they are supposed to be completed. The backlog is not a static list and it can be changed, new features can be added, priorities can be updated, if the requirements from the customer change somehow.

- **Sprint**
  A sprint is a short working cycle generally 2 weeks but can be 4 weeks as well. It’s scheduled tightly with a start and end date and if the tasks supposed to completely in the sprint are not finished, they are put back in the backlog.

- **User Story**
  User story is a generally referred to a requested functionality which the customer has huge value. This is listed in the product backlog. The customer need is put in simple words though it can’t be called a requirement document. It just describes what kind of functionality needs to be developed to go in the right direction. A good user story should always be valuable, independent and it should possible to give an estimated time for development, as well it should be testable.

- **Story point**
  This refers to the estimate put in terms of development work by a developer, which generally in number of hours. It gives us a comparison of how each story would look like in terms of time consumption.
Further, the following are the five identifiable roles in scrum (Schwaber, et al., 2002).

- **Scrum Master**
  The scrum master is the main driver of the scrum process. He needs to ensure that the process is followed in its true spirit and the stories are completed as planned. The scrum master is supposed to interact with the tech team, keep update the customer as well as update the management on how things are working.

- **Product Owner**
  Product owner is the driver of the project. His main duties include to update product backlog, estimation of user stories, turning issues into backlog items to be developed.

- **Scrum Team**
  Scrum team is the technical development team generally, and is supposed to deliver what is requested in each sprint. They are also involved in development estimation, what needs to be prioritized in backlog and take care of impediments, which is delaying the project.

- **Customer**
  Customers participate in the tasks related to product Backlog items for the system being developed or enhanced.

- **Management**
  Management team is responsible for making decisions according to the contract agreements to follow the projects standards procedures. Management is involved in defining goals and identifying project requirement.

### 3.3.4 How scrum looks like in Easypark:

Easypark currently have operations in 11 European countries and the number of employees and consultants are close to 250. There are almost 40 developers, which work in different teams. The team size is very similar as there are four members in each team i.e. backend developers, app developers and other special function developers. Further, they mostly work with different projects but with the same team.
There have been few minor changes in team and some new comers but generally, the teams have remained intact from the last few years. The sprint is of two weeks and scrum practices are followed to the full for development.
4. Case Study

In this chapter, the empirical data from the performed interviews are presented. Since the aim of this survey was to find out if and how agile software development has improved the operational efficiency of easypark, the empirical material in this study is divided into the eight criterions we have chosen to investigate. Therefore, most of the interview questions were asked in a retrospectively manner. At last, the empirical findings are compiled in a table, which summarizes the respondents’ opinions, which facilitate identifying relationships, as well as drawbacks and benefits of agile software development.

4.1 Learning Progression

According to Markus the learning has greatly been improved once the organization went agile. The knowledge transfer is much easier the longer the team member’s work together. Earlier, they had to choose a new team for each project, which was hard in a way that they need to get along with the guys and build working and personal relationships. Johan Thalin explains the situation with the FIRO theory and which was one of the basis to go agile in Easypark. The aim was to have teams that are very collaborative and efficient and earlier the teams changed quite often. In social group or team, it takes a while for each individual to find his or her role and if it keeps changing, the hard it gets for a member to asset positivity. Once you find an efficient combination and a new member joins, the whole process starts again. Johan Thalin argues that it’s important to not break an efficient and a well-functioning team. Further, the permanent team members have overcome the problems the organization faced with waterfall earlier. It’s much easier to have a sustainable setup by having permanent teams and dedicated resources assigned by the business, which results in efficient and quality software. Robert Petersson argues that earlier each project had to strive against each other, which made the team struggle. He further argues that the requirements given by the business developers with expert knowledge on the subject has resulted in better product outcomes. Siim Talvik argues that the daily stand ups and morning meetings have increased their technical knowledge and it’s a good way to share expertise as well discuss the projects in detail. Further, evaluating each sprint give a very concrete analysis and good learning outcomes.
Further, most of the respondents believe that while delegating more responsibility to team members have helped them sharpen their creativity during the software development cycle. Marks Tarmak says the discussion among team members and giving everyone a chance to express themselves has led to enhanced team creativity but he argues that this may not be true on the individual level as he hasn’t experienced a huge difference. Siim Talvik is also unsure if the creativity among the staff has improved somehow. He argues that it’s been there in the organization from the beginning and he doesn’t see a huge change with the change of process. Johan Thalin believes that it has improved to somewhat due to more control on lower level and less bureaucracy. The current team don’t have to wait for long times to get a decision on a certain task which has made it easier for the lower staff to reflect an impact. Anders Bäck thinks creativity has been greatly improved as the solutions and functions after going agile have been more innovative than the earlier work.

4.2 Employees Satisfaction
Most of the staff is very happy after the implementation of agile methods and they feel positive regarding the changes. Johan Thalin feels it’s a fruitful method to complete the tasks. Robert Petersson also agrees with above-mentioned facts and adds that it’s a pleasing way of working and it’s easier to support your colleagues by working agile. Further, it’s helpful to focus on the goals and achieve it as a team. Markus thinks with the rapid pace and quick production needed by the industry, agile is the natural way to develop softwares and reach the market at a fast pace with quality product. Siim Talvik says that the involvement in agile is way higher in comparison with waterfall and the results can be seen much earlier which makes it more motivating. Anders Bäck thinks the level of engagement is very high and this can allow the team members to reflect the soulful work in comparison to any other method but Anders Bäck further argues that the way of working is so transparent and the results are so concrete that some people may feel controlled while working in agile. Kari Kappuila is of somewhat the same opinion and calls it as an agile “agile blind spot”. The method itself is very open and transparent and there is a lot of responsibility to deliver what you are supposed to finish, which is a pressure situation. Though, he says the team is a wonderful one with Easypark so they haven’t experienced this by now. Almost all respondents agreed to the fact that team collaboration has gone way higher and is
more concrete now. Johan Thalin and Anders Bäck think the main reason is easy communication and closeness between the IT management and product owners. The POs needs to be there when the priorities are set which involve them in the process much more then historically how they have been doing it in the water fall method. Johan Thalin also highlighted that the permanent teams having different skills set have resulted in the better collaboration and this surely has resulted in more engagement among team members and has increased the value of deliverables. Robert Pettersson agrees with Johan Thalin and argues that that the agile working methods needs all team members to work from an idea to a concrete deliverable which require strong collaboration from all the team members with different competencies. Robert Pettersson also mentioned that it’s much easier to collaborate with the business departments and it has resulted in strategically more right products and functions. Further, this was elaborated that it’s very crucial for the tech team to understand the business goals as in the long term that vision will be focused on increasing the revenue for Easypark. Markus, however, thinks that level of engagement can be increased more to help the tech team understand business strategies.

Siim Talvik agrees team collaboration has been much better since they have started using agile and a good example for that is they show demos of work every week. It is mainly because each team members understand that they need to produce concrete deliverables by end of the sprint and every developer try to help each other to finalize the sprint with good results. Further, having cross-functional teams have further improved the collaboration but he is of the opinion that it will be more beneficial to have agile coaches which can help further in how to improve collaboration in agile. Both Markus and Siim thinks that “scrum of scrum” where teams leads of every team meet every week to discuss the progress and deadlocks in each team has lead other to know what each team is working with but also to get some really comments which helps a lot in their daily tasks and have greatly improved collaboration.

The deployment of agile as a process in Easypark has been tricky. Johan Thalin thinks that there is still more room to adopt agile in its true spirit. There is still some resistance to completely handover control to the teams. Robert thinks this was the case in the beginning but a lot has changed recently and it’s been a tough decision for upper management to let go
control. The core reasons mentioned for the resistance have been financial as it creates difficulties for the management.

4.3 Customer Satisfaction
The customer satisfaction has greatly been improved after the deployment of agile processes. It’s measured by the NPS “Net promoter Score” index which is the measurement of customers willingness to recommend a service or product of a company to others. It’s also used to identify and gauge the level of satisfaction among its customers and their loyalty with the brand. Since the adoption of agile methodology that have significantly gone higher. Kari Kaupilla believes that main reason for the higher NPS score is that it’s a lot easier to fix a functionality and remove obstacles on a much higher pace than the earlier water fall method as the projects very slow in pace and it would take a long time to fix something small. According to Robert customer satisfactions are very high compare to the old days when we were using tradition methods. Easypark is one of the bench mark solutions in Nordics and they need to keep their reputation by listening to customer needs and providing value at a much faster pace than any other else in the industry. It’s more natural for agile as the customer is the main stakeholder and it’s easy to hear them and take action accordingly. Further, he says that there is still a good chance that we release things which the customer may not like even though it’s released for the purpose of improving the service. Markus says it’s easier to fix it at a very early stage as the releases are almost every week and there can be fix release the next day to roll back something, which we feel that it shouldn’t have been released. Anders Bäck is of the opinion that as time to market is the key when it comes to customer satisfaction and he believe Easypark is doing a good job but still there is room for improvement. The business developers must identify new functionalities, which can add value to Easypark services and can increase sales and number of transactions. Markus Tarmak further said that sometimes more iteration for a functionality are requested by the product owners as it’s easier to improve the quality of the functionalities.
4.4 Time to Market

All the respondents were unanimous in this opinion that time to market has greatly improved after going agile. Kari thinks that the products he is working fine, which are developed by following more concrete steps. Johan Thalin believes that Time to Market have improved for sure as it’s much easier to build a functionality in shorter iterations and fix it well in time if something is wrong as well adjust to market changes. Robert Petersson believes that the teams they are working with are competent and very efficient which one of the main reasons is for improved TTM. The earlier waterfall method had a long approval process and the decisions would take quite some time, which was reflected in lead-time inefficiency. According to Markus any changes in the development process needed can be done quickly. Hence, new releases and product delivery can be done much faster which is not possible in traditional development. The decentralized structure in agile has moved the decision process down to operational level which has helped to get a shorter time to market. Moreover, Johan Thalin argues that the knowledge and competence of product owners is the key for to assign right priority and the developers based on that can work on the functionality much quicker to be delivered to the market. However, Anders Bäck believes that he would like to see more improved time in terms of releases and ideally would see the best form of continuous delivery.

4.5 Communication and collaboration

The respondents revealed that communication has improved after they went agile. Johan Thalin believes that one of the main reasons of improved communication is decentralized structure of agile. Robert Peterssson argues that it’s a lot easier now for the IT and business to understand each other in terms of requirements, priority and functionality. However, it could be tricky some times because client really wants to know exactly when a process should be done, and this could be hard some times. Kari Kauppila is of the opinion that sometime there is a conflict of interest between both the departments mainly on the priority of the functionality as the business would push for a something which is quick to be released to the market while IT would focus on more quality products then trying to ship at an early stage.
However, he agrees that since the adoption of agile, such conflicts have been greatly reduced. He further argues that the main reason is good communication and collaboration among team members after going agile as it has daily communication options. He further argues that he feels that many meetings take quite some time and it feels they are spending much more time on communication then actual work, which was not the case in waterfall. He is of the strong opinion that it must be ensured that these meetings are valuable and return something concrete otherwise it will be a waste of time for many people.

Johan Thalin believes that agile has allowed them to be in a friendlier and open culture in which it’s easier to talk to each other. He argues that agile has resolved to a higher extent the conflict of interest between business and IT and the communication is much more fruitful and easy for both to understand each other. Daily stand-ups are one of the biggest step which has eased the communication to express yourself as in water fall it wasn’t the case. Robert Petersson believes that better communication is mainly because of team members need for each other as needed in agile methodology. Moreover, higher responsibility has led to improved communication as the concrete deliverables need each and every one in the team to fully comprehend what’s needed. Markus argues that assessment of each spring and discussion on functionality has made it a lot easier for everyone to be on the same page. Anders Bäck believe the communication is very good in agile but it wasn’t very bad in water fall either as it entirely depends on your personality as well. However, he is in agreement with the point that the agile has more options to communicate and be heard.

4.6 Summary

➤ Learning Progression
Learning among teams have seems to have improved after going agile. Permanent team members are one of the key changes that have helped the learning go concrete and is elaborated by FIRO.

➤ Employees Satisfaction
Employees are much happier working in agile and they feel it’s more motivating where it’s easier to collaborate but still improvements can be made in collaboration. Further, the team feels that as agile working structure is so transparent one feel being controlled due to that which is referred to as agile blind spot. Going agile for a software development process has been a complicated decision and the management still doesn’t feel comfortable with the fact to handover responsibility on operational level.

- **Customer Satisfaction**
  Customer satisfaction has greatly been improved after going agile. They key factor is the frequent validation with customers. The NPS score have reflected the improvement but there can be further improvements.

- **Time to Market**
  Time to Market has improved and the main reason revealed was efficient working groups and decentralized working structure.

- **Communication and Collaboration**
  Communication and collaboration have also improved. One main factor is de-centralized organizational structure and the dependence of different members of the team on each other. A conflict of interest is viewed by some between business and IT organization which is reduced mainly due to agile approach.

This case study identifies some factors which are evaluated to answer the research question regarding “development efficiency”. The factors above give us an insight on how the “development efficiency” have improved and how this can be measured to answer the research question. This can be helpful in further research of the area where the mentioned factors along with other criteria can be evaluated to measure efficiency in agile software development.
5. Analysis

*In this chapter, we will be focusing on to answer the research question in light of the empirical findings during the interviews. The criteria, which we have chosen for the study, will be discussed, as the aim of this research is to analyze how agile development methodology can help improve software development efficiency. Thus, the discussion will be entirely focused on the efficiency perspective. During the discussion, based on empirical data we will discuss our observations.*

5.1 Learning Progression

This study suggest that the learning seems to have improved after the deployment of agile process which is in line with the earlier studies which suggests that team members gain much more knowledge efficiently and quickly while working in agile mainly due to the easy knowledge sharing mechanisms and openness in agile (Rafaela, 2015). This study highlighted that permanent teams share knowledge more easily and there is a level of trust among them due to which the learning process greatly improves. It takes a while for the teams to get along with each other on a comfortable level as explained by the FIRO theory thus we can say agile helps the learning process get more efficient. Furthermore, the short iteration was also one of the key factors in the improvement of the learning process as they get a chance to quickly review what they worked with and get comments from the whole team. We couldn’t find enough evidence that the creativity among employees increased while working agile as their answers differed among our interviewers. The learning an innovation can be elaborated by the rapid expansion in the markets for Easypark where along with four, five competitors Easypark could manage to take 80% of the market share can be given as an explanation for their good solution and innovation.

Based on the statements above, we can argue that the agile processes have positive impact on enhancing learning process among employees.

5.2 Employees Satisfaction

The study suggested that personnel satisfaction was improved with moving to agile methodologies. This can be seen from the BPI (Beta Performance Index) Survey results which
was conducted in the organization and have shown good result from the last 3 years. The interviews with most of the employees revealed that it’s more rewarding and pleasant to work in agile teams. Further, the employees felt that coordination and collaboration excelled and one key factor was working in permanent teams. The analysis is mostly consistent with earlier research in the area (Donmez, et al, 2016) though our empirical research suggested otherwise. Furthermore, agile methodologies makes the employees feel more focused which helps them deliver better results as the motivation gets high with high involvement. This also is as depicted earlier studies.

Interestingly, this was also mentioned that as the working method is very transparent and the deliverables are very concrete, this might not be a good method of working for people who lack technical skills or are less motivated. This can be called the blind spot of agile working and can result in inefficient teams if not hired by professional HR teams. Agile entirely depends on the people who use it and it’s vital that those working are highly satisfied to deliver what is supposed to be delivered. Further, the deployment process was seen as the biggest obstacle in agile pipelines. This is supported by earlier studies and is hard to implement due the organization culture change. As with all changes, this was identified that the resentment from employees was high as they are not sure how this new way of working will function. The main resentment came from managers who were concerned about the finances as they were not sure how things will work but were they only the expected outcome. Furthermore, there were strong arguments in support of the fact that the whole organization shall change their approach to avoid resistance from teams the pressure of delivering and responsibility at entirety. Though, this was found that things improved the more they worked agile thus this can be argued that the major hurdle is the deployment process and once teams work for a while in agile, it gets easier to work with it.

We also conducted an interview from Professor Tomas Jansson who conducted his PhD research on evaluating how Scrum can motivate creativity and efficiency among system developers. That give us good insight into understanding motivation theory and creativity theory for working in scrum environment. He gave opinion on our research that it’s a tough subject to find correlation between scrum and efficiency of software development process so we need to keep our language humbler. Moreover, he mentioned that the role of product
owners and organizational culture plays a huge role if the scrum is to work along with the motivation and skills of the software developers. Further, he acknowledges that based on the time period we have for this research, what we have identified is very good (Jansson, T., 2015).

Based on the discussion above, this can be said that the general satisfaction among employees improve with agile methodology but one need to be careful with the pitfalls as if they are not taken care of properly, the whole process can backfire. The results are similar with the literature we have reviewed and as the research suggested that compatible people with agile methodologies will excel in their work.

5.3 Customer Satisfaction

This study suggests that since the deployment of agile, customer satisfaction has greatly improved which is in line with the earlier studies on the subject which highlights increased customer satisfaction with agile. (Shrivastava, 2017). The customer contact ratio has decreased from 2% of the customer base to 1.2% though the number of customer have increased 100% in 2014 from what it was in 2013. It rose 80% in 2015 and almost 80% again in 2016. The measurement done was through customer surveys where the ratios of happy customers were quite high compared to earlier surveys. Further, the contact ration to the customer service has greatly been decreased even though the customer numbers and the markets have been increased rapidly. This suggests that execution of the development is done more efficiently since they have gone agile. The shorter sprints have a strong validation process, which facilitate to understand customers and change the scope accordingly. The research of (Al-Tanni, 2013) suggests that if the development process is executed properly, the efficiency will dramatically increase. Thus, this study suggests that even though there is more room for betterment but agile facilitate customer satisfaction to a great extent but this can be further improved with shorter iterations.

The above statements can signify that agile approach has improved the efficiency especially seeing the customer satisfaction scale.
5.4 Time to Market

This study suggests that it was much easier and quicker to go live with the product much more quickly than earlier, which is at par with earlier research (Torgier, 2016). The key factor for quick market access is the shorter iterations, which helped the product grow in small pieces instead of a big chunk developed slowly. As we have already discussed above the customer increase, the number of cities were also increase from 165 in 2014 to 214 in 2015 and 350 in 2016, which shows that the market capture and expansion was very good. Further, one key finding is that the decentralized structure with responsibility with team members have greatly enhanced the time to market. The process gets more efficient with people on the team level taking decisions which helps greatly improve the decision-making process.

Based on the above statements we can argue that agile methods can help to increase time to market thus adding efficiency to the process of software development.

5.5 Communication and Collaboration

This study further suggests that agile methods have improved the communication process, which is also coherent with earlier research on the subject (Korkala, 2014). The main factors for improved communication is decentralized structure and it has even improved inter departmental communication resulting in less conflict of interest. Further, the teams have to collaborate and this interdependence brings more interaction among them, which makes the communication much easier. Further, the open culture and frequent evaluations ease the discussion and communication. In the BPI Survey, the employees gave a high score to communication and collaboration and it was not seen an issue in the organization.

According to (Mishra, 2012) the better communication is the backbone of quality interaction, which can highlight key factors well in time and thus will result in the end product produced in a more concrete way resulting in an efficient end product. Thus, based on the facts above, we can argue that agile improve communication and increase efficiency ultimately.
5.6 Discussion

While holding interviews from employees in Easypark, this was obvious that there have been pros and cons of agile software methodology. This study revealed that mostly it’s a satisfying way of developing software and IT products. Some of the employees didn’t see any disadvantages at all of agile. However, this needs to be kept in mind that the earlier way of building software and IT functionality was very rigid therefore; this new process was highly productive and satisfying for the staff. Further, there hasn’t been much research into the historical context of Easypark. This research is based on more on the perception of respondents who we interviewed and that entirely have created the outcome of this study. This needs to be kept in mind though we can still argue that this study helps to understand agile methodology and its efficiency.

While performing this research, we could clearly see the potential risks and benefits mainly focusing on the efficiency and productivity of agile. The main risk factor identified was the deployment of agile which is coherent with earlier research on the subject. The earlier research clearly suggest that organizational culture is one of the main hurdles and it wasn’t easy for the management to let the operational team be in control of many decisions. Further, the management wasn’t sure of the product developed through agile which has led to hesitation for the deployment of agile though that can’t be avoided in agile. This is more logical from the management as it’s not easy to make plans when you are not sure of the products that will be created. However, we can say that the role of management is very crucial to make the agile process more efficient. They need to delegate the decision making to operational staff, which will result in the operations going much smoother but they need to ensure to that the goals are clearly understood by the personnel to avoid misunderstanding, which can lead to waste of resources and time. Thus, this is agreed that uncertain output can be the biggest challenge in agile and we need to research more to find a more concrete solution for that problem.

As already discussed above, there is good enough risk for work that contradicts the organizational goal and vision. Studies have shown that through agile we get more strategic work but this can be a short-term result. Even though, the letting the operational staff make
decisions can help in many things like shorter lead times but as many people are involved in the decision-making process, this can be catastrophic for an organization if the staff don’t see the overall picture what the organization really wants to achieve.

To make a conclusion based on the above discussion we can say that there is a risk of miscommunication between upper management and operational team and this puts a lot of pressure on the upper management to provide clear goals and detailed elaboration of the functionality.

A comparative research of the literature we have reviewed and the actual observations through interviews in Easypark reflect that most of the time it conforms with literature when it comes to development efficiency in software development. Thought, there are many cultural and organizational aspects which needs to be taken in consideration regarding the agile software development process. The role of individual leadership and product owners is not mentioned that much in the literature but according to the interviewees, it plays a big role. Further, the reward process for quality work also plays a part in term of quality software development.
6. Conclusion

In this chapter will be presenting our conclusions from this research. Moreover, we will be highlighting what else can be done to improve as a future research in terms of bringing more efficiency in the agile methodology for organizations.

6.1 Conclusion
The aim of this research was to explore agile software development as a process and if the same after implementation in Easypark have improved software development efficiency as we have mentioned in chapter 1 i.e “How can the agile software process improve development efficiency?” The empirical data collected through interviews and the theoretical study regarding the same at Easypark we can present our conclusions as follows:

Empirical finding suggests that overall the agile software methodology have contributed in improving the efficiency of software development. The criterions we choose to research in agile methodology have been highly improved through which we can concretely argue that agile has improved efficiency of software development. Even though the efficiency is improved, we couldn’t find concrete evidence that the team productive has also improved and the individuals have started to deliver much more and quality work than before. Furthermore, we couldn’t draw a clear conclusion if the qualities of functionalities have improved, as the statements from respondents were quite different from each other though we could identify certain positive characteristics.

Moreover, permanent teams were seen as a big positive leap in achieving efficiency in agile development as the same facts were reflected by many different correspondents. The emphasis was that it improved collaboration, team productivity and knowledge sharing was much easier through the theoretical research didn’t make it very obvious. Further, the two-week sprint cycle was seen as a big positive step for efficiency by the correspondents but that was in line with the theoretical study we did.

Agile deployment was seen with hostility by the organization in general and most of the staff was unsure of how if delegating responsibility to the team members will improve the
efficiency as well there were huge uncertainties regarding the output of agile methods. As discussed above, upper management plays a crucial role to sort out this kind of problems.

Moreover, this research further reveals that there is a potential agile blind spot. The requirements of staff who needs to be highly skilled and have a certain personality is not an easy thing to find in a demanding IT market. In large organizations, it will be a management problem as the skilled workers are high in demand and even if they are skilled, they might not have the personality to work agile which can affect efficiency of the team. Thus, it’s not only the methodology but also the people using the method need to be of certain type and agile may not be a suitable way of working for everyone.

6.2 Theoretical and Empirical contribution

The research in general agrees with the literature we have studied for our research adding more elaboration through this case study. Agile is claimed to be an efficient way of working for developers but it’s a very complex to understand how and why and in what situations agile can bring the best out of developers. Along with a certain way of working, motivation, work environment plays a huge role as we have identified. This research has mainly contributed to explore how agile methodologies can bring efficiency in software development process by analyzing existing theoretical research and then comparing finding at Easypark AB to find the similarities and differences between both. The main contribution of our research focuses on the change process of going agile and how it can affect the software development efficiency in an organization. The results suggest that the efficiency greatly improves once the agile methods are adopted for the development process but the organizations need to understand the risks as well associated while going for efficiency. Thus, this research can be useful for organizations that are planning to go agile, as this will provide them some insight into the positives and potential pitfalls and further affirms the research on agile methods.

This research invites a discussion regarding software efficiency and work environment challenges in organization who are agile though no generalization can be made from this
study, it still contributes to focus on key changes when opting for agile as a software development methodology.

6.3 Future Research
There can be further research on how the management of the organization can improve the operational work situation for the agile working groups. It’s a common practice among organization to plan long strategic goals but the operational work is not easy to plan when there is little knowledge of the end product. This can be a risk for the middle management to work operation on the same level as the upper management expects.
Reference

Written Sources
Cottrell (2014), Dissertations and Projects reports, A step by step guide, page 55, 157, 158, 163, 169
Kniberg, H. (2007) Scrum and XP from the Trenches

Electronic sources
Anderson, J. D., (2006), “Qualitative and Quantitative Research” Imperial COE
Bjornar, T. (2014) Individual empowerment of agile and non-agile software developers in small teams, Dept. of Information Science and Media Studies, University of Bergen


GAO., (2012), Software Development, Effective practices and Federal Challenge in applying agile methods


Jansson, T., (2015), Agila projektledningsmetoder och motivation


Miruzaman, ABM. et al, (2013) Comparative Study on Agile software development methodologies

Mishra, D. et al. (2012) Impact of physical ambiance on communication, collaboration and coordination in agile software development: An empirical evaluation


Orlikowski, W. J. (1991), integrated information environment or matrix of control? The contradictory implications of information technology, page 39-42

Papadopoulos, G. (2015) Moving from traditional to agile software development methodologies also on large, distributed projects, Social and Behavioral Sciences 175 (2015) 455 – 463, Hellenic Open University, School of Social Sciences, Greece


Scrum diagram, https://www.valueflowquality.com/blog/scrum-the-diagram/


**Interviews (Conducted in 1st week of May 2017)**

**Respondents:**

1. **Anders Bäck**
   
   Anders is the country Manager for Easypark Sweden and is head of legal as well distribution in Swedish Market. He is been working for Easypark since 2003.

2. **Johan Thalin**
   
   Johan is the Product owner, Team Lead and Designer for the App development team. He is also responsible for Prices and Packages and all the functionality related to the app. He is also been working for Easypark since 2003.

3. **Robert Petersson**
Robert is the product owner for the permits and distribution in Sweden as well as responsible for EVC (electrical vehicle charging) solutions. He is been with Easypark from 2010.

4. Kari Kaupilla
Kari is the CAM (contract and account manager) in Finland and is working with Easypark from 2001.

5. Markus Tarmak
Markus is the Backend Developers Team lead and has been working with Easypark from 2002.

6. Siim Talvik
Siim is the Developers Team lead for Methods of Payment solutions. He has been also working with Easypark from 2002.

7. Tomas Jansson
   Professor at Karlstad Universitet.

Interviews Answer

1. General questions:

Q: What's your job position, role?
ANS: MD Sweden

Q: In which department/unit are you working?
ANS: Sweden Operation, Market

Q: How long have you been working in the company?
ANS: 16 years

Q: How long is your working experience in agile methods?
ANS: Since 2012

Q: What are the pros and cons of working in traditional Software Development processes?
ANS: Pros. Traditional is more transparent, planned,
Cons. cannot stick to the plan, longer to adopt any changes

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Q: What are the pros and cons of working agile?
ANS: Pros. Quick changes, external stockholder, request booking from other city, collaboration.
Tight collaborate in tradition.
Cons. Not as transparent as traditional, no proper documentation, no documented plans, where to ends up.

**Employee Satisfaction**

Q: How is your general idea about working agile?
ANS: High level, in general its good, more time on actual work, compare to traditional methods which takes much time for planning.

Q: What do you personal opinion about working in an agile team?
ANS: Serve the purpose, really well in the kind of company and challenges we have.
Pressure, to work to convey that we are in the project

Q: How does collaboration works in agile method?
ANS: It works really good. Connectivity within team working for us, as inter connection is important.
I am Positive.

Q: How do you observe your colleagues/employees attitude working agile?
ANS: Really good.

Q: Has this changed since EasyPark implemented agile?
ANS: I would say probably yes.
All the members are more involved in activities.

Q: In agile way of working, team members responsibilities has been increased, what do you think this has led to?
ANS: Good feeling that each member is responsible,
Good positive pressures all are actively involved in projects.

Q: Increased performance?
ANS: It is hard to say something concrete about it.

Q: Has an agile approach led to any difficulties / disadvantages?
ANS: Many backend/front end releases.
That is just development in team not because of agile,
Internal and external stockholder

Q: Stress/Hectic Situation?
ANS: I don’t know if there are any differences, guessing working agile in theory don’t have written plans, can be in pressure sometimes, better to have written plans.
Might be messy, but not hectic.

Q: Many argue that it is difficult to implement agile. How you are experiencing this process?
ANS: We are coming out of that stage and doing with rapid speed, while with waterfall we would not be able to do thing the way we are doing now.
Learning progression

Q: Has the team's productivity changed since the agile implementation?
ANS: Yes, led to higher productivity, which leads to spend more time in development phase.

Q: How do you observe that knowledge management has changed within organization since agile was implemented?
ANS: Looking at development perspective, higher sharing in team, all will be listened, pressure to collaborate.
We don’t spend time in documentation.

Q: Has creativity changed since implementation of agile?
ANS: Guess, this allows high degree is led in positive way.

Q: How do you experience the organization's discipline?
ANS: A lot of stakeholder internal and external. Working with customer care team it is hard to priority the work…e.g Italy team.
In Sweden, we have more discipline, getting more information for a problem solution.

Q: How do you experience team members' discipline?
ANS: Helped us how to prioritize things.
Its good, I find myself with CTO and other top management.
Interconnected with each other, very disciplined as a team.

Q: It is argued that there is insufficient documentation in the agile way of working; this could result in minor organization history, which may lead to less understanding in the long term. What is your point of view about this?
ANS: Most of vital things are documented, in Jira.
Analyses and conclusion, we do documentation in pre-phase.
That might be a risk that everything is not documented.
But due to this we don’t want to go back to traditional methods, as everything is set in Jira.

Customer Satisfaction

Q: How much customers are satisfied in general today? Satisfaction level?
ANS: It depends who are customer i.e. internal or external.
A list of thing we have to take care of in order to increase satisfaction level.

Q: How does customer relationships work today?
ANS: Internal, the customer care team need tight connection with management team.
Sometimes it leads to low customer priority.
Things working good, but in projects few things need to be high prioritized e.g. Mellan city.
We could not end up with several cities but with the passage of time we have implemented big changed and now works good in general.
Q: How do you measure customer satisfaction? Has this been improved?
ANS: We do have process for measuring it e.g. feedback form motorist using this service etc. But these are not done because of agile.

**Time-to-Market**

Q: Has Time-to-Market improved?
ANS: Yes very much.

Q: Do you get functionalities faster in the market now?
ANS: Yes, quite faster if we compare to 5,6 years back. We have external tech team, have more resources now.

Q: What do you think it depends on?
ANS: More time in development more features.

Q: What is your opinion about agile encourages a better proactive behavior in a changing world?
ANS: Encourages the proactive behaviors, everyone is involved in team work.

**Communication**

Q: How do you think communication between departments working?
ANS: Quite good, but still not very perfect.

Q: Has it improved or got worse now?
ANS: It works good, can’t say it is good or bad. Created a team process owner, they are more connected to market, organization. Processes development are well connected. In customer care perspective, the process owner is documenting and formulizing method e.g. how process works like payments etc.

Q: Does the IT and Business departments have the same priorities for your solutions?
ANS: Act as kind of priority based working, if the stockholders are external/internal etc. Business unit focus more on business perspective, so conflicts arise in order to sort out small problems. Innovation team looking for future innovation i.e. 6-12 -18 months ahead.

Q: Are departments looking for the same requirements for solutions?
ANS: Quite good, if we should do, yes We don’t develop things that does not have owner.

Q: Quick solutions Vs quality?
ANS: Quality comes first. In traditional method, we did not have any layers, had to go deep. Quick fixes are possible now, so way high quality looking at 6 years back.

Q: How do you think communication/coordination among teams are working now?
ANS: Works well, always a challenge to see things developed and innovative in order to reach to the market demands.

Q: If you would like to give any advise to EasyPark regarding implementation of agile Software development, what changes or improvements would you like to implement?

It works quite well.

Interviews Questions/Answers

2. General questions:

Q: What's your job position, role?
APP UI Designer / APP Team lead

Q: In which department/unit are you working?
Service Management / App Team

Q: How long have you been working in the company?
16 years

How long is your working experience in agile methods?
5 years

Q: What are the pros and cons of working in traditional Software Development processes?
Waterfall development often means clear and comprehensive specifications for the developers that can work independently for a long period of time. Obviously not that flexible and you won't see the result before the project, or big part of the project is done. Requires lots of preparations to make sure of proof of concept.

Q: What are the pros and cons of working agile?
Scrum is more flexible and lets you specify and modify as you go. You divide your projects in many small tasks or iterations and can easily adjust the result. Very often you end up quite far away from the initial mockups. The flipside could be that it sometimes is difficult for some developers to be flexible enough to work agile.

Employee Satisfaction

Q: How is your general idea about working agile?
As designer you need time for your design to mature, you need to put stuff in the hands of users to make sure your initial ideas are viable and working as expected. Often much iteration is needed to test and get proof of concept as you go.

Q: What do you personal opinion about working in an agile team?
Only positive but might not suitable for all types of developers that also needs to be agile.

Q: How does collaboration works in agile method?
Much hands-on, sitting next to developers, constantly updated mockups so that everyone are updated on the latest. Communications are done via our own slack channel and LOTS of Jira tickets.

Q: How do you observe your colleagues/employees attitude working agile?
No problem when in a small team of 6 developers. We have removed several people from the team since they do not suit this development philosophy

Q: Has this changed since EasyPark implemented agile?
Don’t get the question

Q: In agile way of working, team members responsibilities has been increased, what do you think this has led to?
If you hire the right developers and educate/form them this is not a big problem. I have very high and clear expectations of my team members and after some months they know what is expected from them and how much they can bend the specs.

Q: Increased performance?
Since im working very close to my developers and observe them on a daily, sometimes hourly basis in standups and sprint burndowns I guess you could say that there is little room to lie around.

Q: Has an agile approach led to any difficulties / disadvantages?
Not other than mentioned above. Guess projects are in general longer than in waterfall development but the outcome in terms of customer experience and satisfaction is not sacrificed.

Q: Stress/Hectic/Messy Situation?
Yes always and I like it. Things can always be better.

Q: Many argue that it is difficult to implement agile. How you are experiencing this process?
Not really, you just need the right team members and work according to the scrum routines.

Learning process

Q: Has the team's productivity changed since the agile implementation?
Have only worked with scrum but quite sure it leads to higher productivity.

Q: How do you observe that knowledge management has changed within organization since agile was implemented?
Employees and developers are more aware of where we are going and why and what goals needs to be met. EasyPark has a customer first perspective in everything we do and this is clearly stated to the teams on a daily basis and in inspirational/innovation presentations and workshops. When changing team members we have good routines for knowledge transfer.

Q: Has creativity changed since implementation of agile?
Yes a lot, now developers are participating in the specs and if you encourage them, you get a lot of good ideas. Since you specify as you go and you have a lot of iterations you invite colleagues and peers for creative input.

Q: How do you experience the organization's discipline?
Good

Q: How do you experience team members' discipline?
Good
Q: It is argued that there is insufficient documentation in the agile way of working; this could result in minor organization history, which may lead to less understanding in the long term. What is your point of view about this?

Yeah that’s one flipside but not really a problem in our rapidly changing business. The documentation is in the code.

**Customer Satisfaction**

Q: How much customers are satisfied in general today? Satisfaction level?
Very high satisfaction rates, a net promoter of 63 (industry benchmark 21).

Q: How does customer relationships work today?
Besides marketing efforts and CRM the app team reads user feedback sent in via the app on a daily basis.

Q: How do you measure customer satisfaction? Has this been improved?
NPS, net promoter score. Asking randomly selected users how likely the are to recommend our services to a friend (between 1-10).

**Time-to-Market**

Q: Has Time-to-Market improved?
Have nothing to compare with but since you are spending more time on iterations and re-design during the projects, it could potentially take longer to get things out. On the other hand you don’t have to spend a lot of time to specify the full scope in advance.

Q: Do you get functionalities faster in the market now?
Single functionalities, yes

-What do you think it depends on?
We don’t have to wait and release everything at once

Q: What is your opinion about agile encourages a better proactive behavior in a changing world?
Since we are more flexible and not locked up in longterm projects we can act more proactively when we see potential issues on the horizon.

**Communication**

Q: How do you think communication between departments working?
Good

Q: Has it improved or got worse now?
Can’t tell since I have always worked agile.

Q: Does the IT and Business departments have the same priorities for your solutions?
Not always but you often find a good balance or compromise.

Q: Are departments looking for the same requirements for solutions?
ANS: Don’t get the question.
Q: Quick solutions Vs quality?
ANS: I believe quality often goes first if the customer (or the large majority of) is affected by the solution.

Q: How do you think communication/coordination among teams are working now?
ANS: Good

Q: If you would like to give any advise to EasyPark regarding implementation of agile
ANS: Software development, what changes or improvements would you like to implement?
ANS: Think above comments sums it up.

Interviews Questions/Answers

3. General questions:

Q: What's your job position, role?
ANS: Business Developer.

Q: In which department you are working?
ANS: Service Management Unit.

Q: How long have you been working here in the company?
ANS: 8.5 years.

Q: How long is your working experience in agile methods?
ANS: 2012 – 5 years

Q: What are the pros and cons of working in traditional Software Development processes?
ANS: Swish direction during the projects, features we build which is very imp in our software.

Q: What are the pros and cons of working agile?
ANS: Time-to- market.

Employee Satisfaction

Q: How is your general idea about working agile?
ANS: In the start it was confusing, pain, did not know how to work, took some time to get used with commitments and meet dead line etc. Get into details and know more exactly how it works.

Q: What do you think about working in an agile team?
ANS: Team work, get a chance to know what others doing. Role of product owner, special applies agile, effective in short-term priority activities. To keep track what is happening during the project but hard to keep track long-term initiatives. Short term get high priority compare to long term.

Q: How does collaboration work in agile method?
ANS: It works fine as it helps us in knowledge sharing and meetings to discuss different issues within the team and other relevant departments.

Q: How do you observe your colleagues/employees attitude working agile?
ANS: Top-level management can see what teams are working on, go to details. We have adopted agile in our marketing unit as well.

Q: Has this changed since EasyPark implemented agile?
ANS: Yes, in the beginning quite some employees lost transparency i.e. what is going on and what exactly we need to do. Because of this employees were frustrated.

Q: In agile way of working, team members responsibilities have been increased, what do you think this has led to?
ANS: Developer themselves needed to take more responsibility and perform tasks. Working in short cycles. More responsibility on team members i.e. work hard to be more dedicated to work.

Q: Increased performance?
ANS: Generally, in start there was Pain in implementation, but strictly adapted to agile methods. Adopted how we want to work going agile, which works better for us now.

Q: Has an agile approach led to any difficulties / disadvantages? Stress? Hectic? Messy?
ANS: Main one, hard time to commit to certain release date, customer delivery was delayed. Planning and communication with client was not easy.

Q: Do you see any more benefits to work agile?
ANS: Time to realize what you really need, build what actually to be used, quick implement.

Q: Many argue that it is difficult to implement agile. How you are experiencing this process?
ANS: It’s not tricky for the developer, but it is for the business people. They were exited but actually it was not easy how to plan according to the agile. Would not go back to other methods, positive and way better than traditional methods.

Learning process

Q: Has the team's productivity changed since the agile implementation?
ANS: We took courses, read books to learn more about agile. The rest of the organization did not get directly what was going on. We got development team who had knowledge about agile and we got quite useful information through them.

Q: How do you perceive that knowledge has changed within the organization since agile was implemented?
ANS: It was new to our department, but we read through a lot of books, made it sure to be on the same page, e.g. through onboarding. Newly hired developers are accustomed to the agile and did not need any training.

Q: Has creativity changed since implementation of agile?
ANS: Especially product owners come up very much creative, visualize things, creativity we could deliver on time, test new ideas, and market research enable to be innovative.

Q: How do you experience the organization's discipline?
ANS: Less discipline, waterfall is stricter, there was not big control like if everyone is working 100%, like I was quite free to play around with ideas.

Q: How do you experience team members' discipline?
ANS: Good, more connected.

Q: Freedom within team, everyone knows their responsibility.
ANS: Yes, members in the team know what they need to perform.

Q: It is argued that there is insufficient documentation in the agile way of working and that this can lead to a minor organization history which may lead to less understanding in the long term. What is your point of view on the whole?
ANS: Yes, somehow it could be an issue if documentation of everything is not possible but we do document important things in Jira.

**Customer Satisfaction**

Q: How much customers are satisfied in general today? Level?
ANS: Customer satisfactions are through the roof compare to old days, very higher now.

Q: How does customer relationships work today?
ANS: Depends up on customers. We have two types of customers 1. Cities parking/authorities. 2. Consumer using our app. Cities parking authorities can be less happy because they can’t really know when we deliver things. On the other side, we offer 100 times more and better things to consumer.

Q: How do you measure customer satisfaction? Has this been improved?
ANS: It’s hard to say about it. We did not use any proper method for it before but now we started net promotor score.

**Time-to-Market**

Q: Has Time-to-Market improved?
ANS: Tremendously improved.
Q: Do you get functionality faster in the market now?
ANS: Functional, bugs fixes are faster, could be within a day.

Q: What do you think it depends upon?
ANS: Yes, it would be never possible to go that way in tradition development ways. It’s necessary to work in shorter cycles these days and produces quick results.

Q: What is your opinion about agile encouraging a better proactive behavior in a changing world?
ANS: I am on for it; we don’t have anything to do with hardware. I think that the hardware side of agile is more complicated than the software side. I can only say about the software perspective.

**Communication and collaboration**

Q: How do you think communication between departments working?
ANS: In general I am happy, but could be a bit tricky sometimes. Department work with cities (clients), they are not as happy as other ones e.g. with development team members.

Q: Has it improved or got worse now?
ANS: Cons: when to get things done. Pros: Deliver as soon as possible. People really want to know when exactly a process should be done, which could be hard to tell sometimes.

Q: Does the IT and Business departments have the same priorities for your solutions?
ANS: Tricky line between them, exactly I have been working, we don’t how to build things, but know how to manage, hybrid roles who works with business and developer side.

Q: Are departments looking for the same requirements for solutions?
ANS: Sort of, business unit has control of planning, we do the original planning and other adapt to our planning. Form business perspective i.e. what are main goal, could be new features to be build or a new service. ANS: Business side doesn’t have lot of requirements. Business unit translate their requirement into technical specification to be implemented.

Q: Quick solutions vs quality?
ANS: I would love to say quality, but some time we do corner cutting, we try to avoid but sometimes you have to do in order to deliver on time. Overall the quality has increased.

Q: How communication among team members works today?
ANS: A bit tricky, we have our primarily development team in Estonian, some members does not talk too much and don’t like to be in communication. In agile it’s very important to have good communication among team members. We are involving them to be more communicative and have improved it within team members.

Q: How do you think communication/coordination among teams are working now?
ANS: Distance is not bigger issues, in agile communication is developed frequently.
Q: If you would like to give any advise EasyPark regarding implementation of agile Software development, what change or improvement would you like to implement?

ANS: Specially, in the beginning it very important to take notes of proper sprint planning i.e. what was good, what was bad and what should be continued etc.

Interviews Questions/Answers

4. General questions:

Q. What's your job position, role?
ANS: Contract and Account Manager

Q. In which department/unit are you working?
ANS: Distribution

Q. How long have you been working in the company?
ANS: 16 years

Q. How long is your working experience in agile methods?
ANS: 2 years

Q. What are the pros and cons of working in traditional Software Development processes?
ANS: Pros: maybe the big picture is better
Cons: project grows bigger than estimated

Q. What are the pros and cons of working agile?
ANS: Pros: small manageable sprints and quick results. Project management is easier.

Employee Satisfaction

Q. How is your general idea about working agile?
ANS: I like it and it is easy to give comments to ongoing projects and follow.

Q. What do you personal opinion about working in an agile team?
ANS: Much better as in “earlier” days

Q. How does collaboration works in agile method?
ANS: The collaboration is better as everything is in the tool like Jira. You get quick answers and you can follow the progress.

Q. How do you observe your colleagues/employees attitude working agile?
ANS: They have adopted agile way of working very well

Q. Has this changed since EasyPark implemented agile?
ANS: Yes it has
Q. In agile way of working, team members responsibilities has been increased, what do you think this has led to?
ANS: Better quality

Q. Increased performance?
ANS: Yes, it has increased performances.

Q. Has an agile approach led to any difficulties / disadvantages?
No

Q. Stress/Hectic/Messy Situation?
ANS: Not for me

Q. Many argue that it is difficult to implement agile. How you are experiencing this process?
ANS: Of course it takes some time to implement a new way of thinking.

**Learning process**

Q. Has the team's productivity changed since the agile implementation?
ANS: Yes, it has increased

Q. How do you observe that knowledge management has changed within organization since agile was implemented?
ANS: Projects are better controlled.

Q. Has creativity changed since implementation of agile?
ANS: Don’t know

Q. How do you experience the organization's discipline?
ANS: It works fine.

Q. How do you experience team members' discipline?
*Discipline among team members works fine, more connected to each other.*

Q. It is argued that there is insufficient documentation in the agile way of working; this could result in minor organization history, which may lead to less understanding in the long term. What is your point of view about this?

ANS: I haven’t seen this as a problem.

**Customer Satisfaction**

Q. How much customers are satisfied in general today? Satisfaction level ?
ANS: Customer satisfaction is in high level.

Q. How does customer relationships work today?
ANS: Very well

Q. How do you measure customer satisfaction? Has this been improved?
ANS: We are doing continuous measurement on customer satisfaction. Yes it has improved.
Time-to-Market

Q. Has Time-to-Market improved?  
ANS: Yes, it has improved.

Q. Do you get functionalities faster in the market now?  
ANS: Yes, changes can be done easily and released are faster.

Q. What do you think it depends on?  
ANS: Very concrete steps.

Q. What is your opinion about agile encourages a better proactive behavior in a changing world?  
ANS: Agree

Communication and collaboration.

Q. How do you think communication between departments working?  
ANS: Communication works quite well now.

Q. Has it improved or got worse now?  
ANS: It has been greatly improved.

Q. Does the IT and Business departments have the same priorities for your solutions?  
ANS: Yes.

Q. Are departments looking for the same requirements for solutions?  
ANS: Not always, sometimes there are conflicts of interest between departments.

Q. Quick solutions Vs quality?  
ANS: Both, we are working for quality and quick solution.

Q. How do you think communication/coordination among teams are working now?  
ANS: It works quite well, and teams are more connected to each other.

If you would like to give any advise to EasyPark regarding implementation of agile Software development, what changes or improvements would you like to implement?

Interviews Questions/Answers

5. General questions:

Q: What's your job position, role?  
ANS: Lead Backend Developer

Q: In which department/unit are you working?  
ANS: Backend Team

Q: How long have you been working in the company?  
ANS: 6 years
Q: How long is your working experience in agile methods?
ANS: 10 years

Q: What are the pros and cons of working in traditional Software Development processes?
ANS: Pros. In traditional software development there are proper planning needed but these are more transparency.
Cons. Always have to work as planned, takes long time to do any changes in development.

Q: What are the pros and cons of working agile?
ANS: Pros. Changes can be performed quickly, teams are more connected, and deliver the product to the market is quick.
Cons. Less documentation, documentation is not properly done, don’t have to follow the documented plans when changes required.

Employee Satisfaction

Q: How is your general idea about working agile?
ANS: It is very good, spending time on development work rather then planning etc. It is helpful in developing quality products, and deliver on time.

Q: What do you personal opinion about working in an agile team?
ANS: It is a good way of working in development perspective, but I think that level of engagement can be increased more to help the tech team understand business strategies.

Q: How does collaboration works in agile method?
ANS: It works fine for us. Teams are strongly connected, working together to produce good results.

Q: How do you observe your colleagues/employees attitude working agile?
ANS: Quite good.

Q: Has this changed since EasyPark implemented agile?
ANS: Yes, all the team members are more connected to each other and showing responsibility to deliver quality product.

Q: In agile way of working, team members responsibilities has been increased, what do you think this has led to?
ANS: Each member of the team feels more responsible in the entire development processes.

Q: Increased performance?
ANS: Yes, because through agile we can develop products with quality and according to the market pace.

Q: Has an agile approach led to any difficulties / disadvantages?
ANS: Different release which could be hard to but with the passage of time you get used to it.

Q: Stress/Hectic Situation?
ANS: Not much in our team.

Q: Many argue that it is difficult to implement agile. How you are experiencing this process?
ANS: At start it could be hard to understand all the process and but once you start using it and understand then it become more easier.
Learning progression

Q: Has the team's productivity changed since the agile implementation?
ANS: Yes, it has been greatly improved after the company started using agile.

Q: How do you observe that knowledge management has changed within organization since agile was implemented?
ANS: The knowledge transfer is much easier now, the longer the team member’s work together it is becoming much more productive without spending time in documentation.

Q: Has creativity changed since implementation of agile?
ANS: I think yes.

Q: How do you experience the organization's discipline?
ANS: It is good, agile made it possible to work in a team where members are sitting in different countries but still you are more connected to the members.

Q: How do you experience team members' discipline?
ANS: Working agile help us to prioritize processes according to company/clients requirements.

Q: It is argued that there is insufficient documentation in the agile way of working; this could result in minor organization history, which may lead to less understanding in the long term. What is your point of view about this?
ANS: Yes, sometimes it seems like there is lack of documentation but we do keep important thing is Jira.

Customer Satisfaction

Q: How much customers are satisfied in general today? Satisfaction level?
ANS: Not easy to say exactly, but by agile way of working we are able to fix bugs at very early stages. This can help us to increase customer satisfaction level.

Q: How does customer relationships work today?
ANS: Works just fine.

Q: How do you measure customer satisfaction? Has this been improved?
ANS: Based on the customer feedbacks.

Time-to-Market

Q: Has Time-to-Market improved?
ANS: Yes it has been improved.

Q: Do you get functionalities faster in the market now?
ANS: Yes, functionalities can be implemented and released faster.
Q: What do you think it depends on?
ANS: We focus more on development process and changes can be made quickly.

Q: What is your opinion about agile encourages a better proactive behavior in a changing world?
ANS: Yes, as it keeps team members more involved throughout the development process.

Communication

Q: How do you think communication between departments working?
ANS: It is good.

Q: Has it improved or got worse now?
ANS: I think it has improved as different units are more connected to each other.

Q: Does the IT and Business departments have the same priorities for your solutions?
ANS: Generally, yes as we try to be on the same page but sometime it can be hard.

Q: Are departments looking for the same requirements for solutions?
ANS: Yes, as our goal is to deliver quality product to the market.

Q: Quick solutions Vs quality?
ANS: Quality comes first but sometimes it depends on the problem impact.

Q: How do you think communication/coordination among teams are working now?
ANS: Works fine, more connected and coordination among the teams.

If you would like to give any advise to EasyPark regarding implementation of agile
Software development, what changes or improvements would you like to implement?

Interviews Questions/Answers

6. General questions:

Q: What's your job position, role?
ANS: Software developer, team lead

Q: In which department/unit are you working?
ANS: Tech team, back end development

Q: How long have you been working in the company?
ANS: 5 years

Q: How long is your working experience in agile methods?
ANS: 10 years
Q: What are the pros and cons of working in traditional Software Development processes?

ANS: Pros: Requirements (if well analyzed) are more clear from beginning and one can design/implement better with knowing this picture.

Cons: It’s not possible to foresee if everything required is needed and often at very end stage it can be discovered that product is not what expected. It’s hard to change implementation when requirements are changed later.

Q: What are the pros and cons of working agile?

ANS: Pros: You start with minimal requirements and don’t go too early too complicated with implementation. Will get product out to market sooner to start testing user behavior and to understand next requirements better. Involves customer and software developers more together so that all time everyone knows what’s going on. Easier to change requirements and implementation when it’s needed.

Cons: Requires skilled, dedicated team. With large teams it’s hard to adopt this method. Sometimes too many meetings and daily discussion can be frustrating as it’s hard to focus and need lot of changes all the time.

Employee Satisfaction

Q: How is your general idea about working agile?

ANS: For me working agile means working together with customer and understanding the needs better, develop the solution together with customer.

Q: What do you personal opinion about working in an agile team?

ANS: This way team members communicate more and if someone has troubles he/she gets help more easier. But it must respected that everyone also needs to focus their own task/work to complete.

Q: How does collaboration works in agile method?

ANS: Daily meetings, team chat channels were to discuss, working in same room to discuss eye-to-eye. In most of time it tends to be good collaboration.

Q: How do you observe your colleagues/employees attitude working agile?

ANS: Seems to be promising

Has this changed since EasyPark implemented agile?

ANS: Has been more-or-less agile since I started with EasyPark

Q: In agile way of working, team members responsibilities has been increased, what do you think this has led to?

ANS: With taking more responsibility you are more committed to project. This way team members care more of end result.

Increased performance?

ANS: Sometimes

Q: Has an agile approach led to any difficulties / disadvantages?

ANS: Sometimes, see the next question

Q: Stress/Hectic/Messy Situation?

ANS: Sometimes
Q: Many argue that it is difficult to implement agile. How you are experiencing this process?
ANS: Yes, it requires team member commitment and good relationship with customer.

Learning process

Q: Has the team's productivity changed since the agile implementation?
ANS: Productivity is sometimes better sometimes worse, but can’t compare because mostly worked using agile implementation.

Q: How do you observe that knowledge management has changed within organization since agile was implemented?
ANS: It is so and so. Some knowledge is shared better, some not.

Q: Has creativity changed since implementation of agile?
ANS: Yes

Q: How do you experience the organization's discipline?
ANS: Good

Q: How do you experience team members' discipline?
ANS: Good

Q: It is argued that there is insufficient documentation in the agile way of working; this could result in minor organization history, which may lead to less understanding in the long term. What is your point of view about this?
ANS: We haven’t argued about this. But it looks to be this way if the history goes very long.

Customer Satisfaction

Q: How much customers are satisfied in general today? Satisfaction level?
ANS: Looks to be satisfied. 8 out of 10 I would say

Q: How does customer relationships work today?
ANS: Relationships are good

Q: How do you measure customer satisfaction? Has this been improved?
ANS: I personally don’t know if we have measured.

Time-to-Market

Q: Has Time-to-Market improved?
ANS: Sometimes yes, sometimes no

Q: Do you get functionalities faster in the market now?
ANS: Small functionalities yes

-What do you think it depends on?
ANS: If the functionality is bigger/more complicated, then some complicated feature still takes lot of time and blocks getting out to market

Q: What is your opinion about agile encourages a better proactive behavior in a changing world?
ANS: It does not always work and it’s need to use your own head/thinking to understand, not always use what other people tell.

Communication

Q: How do you think communication between departments working?
ANS: It could be better I think

Q: Has it improved or got worse now?
ANS: If we won’t work agile I think it would be worse

Does the IT and Business departments have the same priorities for your solutions?
ANS: Not always

Q: Are departments looking for the same requirements for solutions?
ANS: Yes

Q: Quick solutions Vs quality?
ANS: Sometimes we do quick solution first but we never want to let quality down. Just add more features later, but everything for release should be quality.

Q: How do you think communication/coordination among teams are working now?
ANS: Looks to be good but as always can be better

Q: If you would like to give any advise to EasyPark regarding implementation of agile Software development, what changes or improvements would you like to implement?
ANS: Try to group/structure tasks and projects so that teams could work more dedicated with focused topics. Even if going agile and everything doesn’t have to be decided in the beginning it should not be forgotten to see bigger picture how features affect each other in multiple areas.

Appendix

Appendix 1: Interview Questions

General questions:

What's your job position, role?

In which department/unit are you working?

How long have you been working in the company?

How long is your working experience in agile methods?
What are the pros and cons of working in traditional Software Development processes?
What are the pros and cons of working agile?

**Employee Satisfaction**

How is your general idea about working agile?
What is your personal opinion about working in an agile team?
How does collaboration works in agile method?
How do you observe your colleagues/employees attitude working agile?
Has this changed since EasyPark implemented agile?

In agile way of working, team members responsibilities has been increased, what do you think this has led to?
Increased performance?
Has an agile approach led to any difficulties / disadvantages?
Stress/Hectic Situation?

Many argue that it is difficult to implement agile. How you are experiencing this process?

**Learning Progression**

Has the team's productivity changed since the agile implementation?

How do you observe that knowledge management has changed within organization since agile was implemented?
Has creativity changed since implementation of agile?

How do you experience the organization's discipline?
How do you experience team members' discipline?

It is argued that there is insufficient documentation in the agile way of working; this could result in minor organization history, which may lead to less understanding in the long term. What is your point of view about this?

**Customer Satisfaction**

How much customers are satisfied in general today, satisfaction level?
How does customer relationships work today?
How do you measure customer satisfaction? Has this been improved?

**Time-to-Market**

Has Time-to-Market improved?

Do you get functionalities faster in the market now?

-What do you think it depends on?

What is your opinion about agile encourages a better proactive behavior in a changing world?

**Communication and collaboration**

How do you think communication between departments working?

Has it improved or got worse now?

Does the IT and Business departments have the same priorities for your solutions?

Are departments looking for the same requirements for solutions?

Are they focusing on quick solutions and/or quality?

How do you think communication/collaboration among teams are working now?

If you would like to give any advise to EasyPark regarding implementation of agile Software development, what changes or improvements would you like to implement?