Critical Success Factors for the Application of Agile Methodology in IT Telecommunication Projects: A Mixed Method Research Approach

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Abstract

This research project reflects an In-depth analysis of the critical success factors associated with the application of Agile project management methodology in the IT telecommunication domain in the region of the Middle East and Africa. The agile project management approach has proven to be effective in the area of IT telecommunications. The agile project management approach in the field of digital services and managed services are essential for the success of the project. The goal of this research project was to determine the critical success factors linked to people and organisational factors and the perceived success of software development initiatives in the two realms of managed services and digital services. This research is an explanatory study with a more in-depth emphasis on the contribution of five critical variables (Team Size, Team Communication, Team Performance, Customer Involvement, and Management Involvement) to the performance of agile projects. The researcher used the sequential explanatory mixed approach as a technique. Random sampling was extended to survey operators with a cross-sectional time horizon. Purposive sampling was extended to the interviewees to reach a consensus and answer the three research questions. A total of a hundred and ten study participants replied to the survey, and five interviewees contributed to the study.

Here, the researcher shows the agile project management approach to be practical as applicable to managed services and digital services. Team size between five and nine has proved successful, team communication using daily standups or video conference during pandemic proves to be successful, team performance in terms of experience and agile knowledge proves to be successful, customer involvement on daily basis is a key of success, and management involvement as governance and not micromanagement is important too. These five variables found to be a critical success factor for this research project. A positive linear relationship called correlation between the five variables and the success of the project in terms of the project value was found, although the strength and

the relationship between the five variables and the project success cannot be predicted statistically. Two pilot projects proved to be successful in achieving the project success value concerning time to market. More analysis areas are outlined; in particular, team communication, customer involvement, the form of contract, and internal company regulation. Whilst the research offers new insights into the form of contract, applying agile methodology on quality assurance, more in-depth research needs to be done to provide more understanding for people and organisational factors, especially in the field of IT telecommunications under both DS and MS departments.

Dedication

This Dissertation is devoted to the soul of my father, who died on the third of August 2020. He's a coach, a guide, and a constructive spirit. Father, I love you, and I've missed you, but I'm sure I'm going to see you again in different worlds at different times.

I would like to thank my mother, who has always pray for me, my lovely wife, Iman, who has offered much support over the last few years, beginning in 2016. Special thanks to the organisation, which gave me much support, and all the information needed to do this job. At last thanks to my Kids, Nour, Yousouf, Abdallah and Yahia.

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Chapter 1: Introduction

In the contemporary era of running a business, there is a need for a way to cope with the rapid change to market needs when it comes to IT telecommunication and offers offered to subscribers. The huge competition, and the big number of operators that can reach three or more per country, makes the business leaders always alerted, either to new business or even to react on new business by others. This opens the door for the service providers to think about how to cope with these changes in an agile way, So, not to lose the market share to other competitors. In the coming sections, there will be an introduction to all the IT telecommunication game players and also the problem statement and the Rationale behind this research project.

Organisations run projects as part of their business (Brosseau *et al.*, 2019). In the field of telecommunication (Techie, 2017), there exist both telecommunication service providers (Investopedia, 2019) and telecommunication service vendors (Techie, 2017). The telecommunication service vendors are entities that provide a service to the provider, who in turn offers the service to consumers or end-users in the market. In other words, the telecommunication service provider is the operator that is having a license from the country to run the telecommunication business to the people living in this country, while the telecommunication service vendor is the entity that is building the network to the provider and giving the services to them so that they can sell it legally in the market to the people in the country.

Any project needs to have a methodology (Balaji and Murugaiyan, 2012). Projects vary between waterfall, V-model, or agile project management methodologies (Balaji and Murugaiyan, 2012). If the project that the organisation is going to run it having a rapid change in the scope regularly and can be delivered in smaller tasks, and needed qualified personnel to produce the product/service within a limited period, then we have to use the

agile Model. If the project scope is huge with precise requirements, then we can use the waterfall model. If the project scope varies and not specific means it can be changed or not, and the project is a large size project in terms of delivery and requirements, proper validation to be carried out in each process, tester to be involved in the early stages of development. In that case, we can select V-model. Each organisation selects the project management methodology according to the project type, the requirements, the contract, and the aim of the project (Balaji and Murugaiyan, 2012).

In the telecommunication field, the service mainly depends on projects. Projects vary in their type, scope, and aim, which prompts project management offices in those organisations to start thinking professionally about running successful projects (Hirner *et al.*, 2019; Balashova and Gromova, 2017; Sertić *et al.*, 2007). Organisations aim to achieve project success by adopting the right project management methodology (Itai and Shtub, 2019; Krishna and Venkataiah, 2017), Itai and Shtub (2019), Krishna and Venkataiah (2017) have concluded that the right project management methodology is the way to succeed. To do so, factors affecting the success of the project, called critical success factors (CSFs) must be considered. Organisations should focus on the CSFs associated with the application of agile project management methodology to achieve project success.

Agile project management has proven to be successful in many fields, especially in information technology (IT) projects (O'Sheedy and Sankaran, 2013), and specifically in IT telecommunication projects (Balashova and Gromova, 2017). The success in this field encourages researchers to examine the success of projects in this IT telecommunication field or the IT domain generally. Organisations must follow specific tailoring criteria to adopt agile methodologies such as the external environment, the internal environment, and previous knowledge (Campanelli *et al.*, 2018).

The implementation of agile project management is seen as an innovative way to execute information systems development programmes in continually evolving environments (Diegmann *et al.*, 2018). Each organisation must confirm a suitable methodology to apply according to their criterion, considering that organisations use agile hybrid models to reach their project value (Gill *et al.*, 2018). Organisations progress through transition phases to move from waterfall to agile, passing via hybrid management in some cases. Traditional planning methodologies, such as Waterfall, cannot respond to dramatic growth in market needs, which is why organisations are beginning to move to agile methodologies (Zhbajnova-Mircheska and Antovski, 2018). For the transition process to work, it is essential to devote ample time and perseverance. Organisations will face a variety of obstacles, but it is important to be persistent even if it appears that the transformation is not going to work (Zhbajnova-mircheska and Antovski, 2018).

Therefore, in summary, the problem is to find the CSFs associated with the application of agile project management methodology to achieve project success. The field is IT telecommunication and the departments that the research project will examine are managed services (MS) (Speta, 2011; Kumbakara, 2008), and digital services (DS) (Leimeister *et al.*, 2014; Williams *et al.*, 2008).

IT Telecommunication Domain

The telecommunication (Techie, 2017) field consists of many domains, One domain under telecommunication is the IT telecommunication domain (Balashova and Gromova, 2017). Under the IT telecommunication domain, there are two important subdomains, one is called Digital services (Leimeister *et al.*, 2014; Williams *et al.*, 2008), while the other is called Managed services (Speta, 2011; Kumbakara, 2008). This research project will refer to Digital services as DS, while Managed services as MS.

Digital Services Domain

The digital services domain is the domain that is dealing with planning, solutions and delivery of either products or projects (Speta, 2011). This domain focus on the methodology to deliver the projects in an agile way due to rapid change in market needs and also to the competition in the market. DS projects vary between small, medium and complex that may extend to years as transformation projects. The most important part of the DS domain is that it contains the solution unit which gives the advantage for this domain to be very near to the customer translating the needs into a solution to be delivered.

Managed Services Domain

The managed services domain (Kumbakara, 2008) consists of two subdomains, the first one is the pure operation domain, which takes care of the network and its Key performance indicators called KPI. In simple words, this first subdomain makes sure that the network is running smoothly and efficiently according to specified preset matrices. The second subdomain is called Application development and modernisation referred to by ADM. In the ADM there are two concepts, the first one is just adding configuration to the systems to define new business offers, and this is called the Business management process refers to by BM, or adding code to construct new business offers from scratch and this is the ADM concept.

1.1 Background of the Study

Telecommunication vendors (Techie, 2017) are attempting to find the ideal methodology to deliver successful projects to telecommunication providers (Investopedia, 2019), which

we can call 'customers'. The need for a methodology to cope with rapid change in the requirements became crucial and important, and this is why Agile project management is the methodology to solve this issue which is the rapid change in requirements.

The agile project management manifesto was initially introduced by Beck et al. (2001), setting the roadmap for anyone adopting agile project management methodology to follow the manifesto in their project design. Goncalves (2020) defines 'agile methodology' by saying "Agile methodologies are different sets of great practices that are used to develop software that is common in today's world" he defines the methodology using the Agile manifesto Beck *et al.* (2001). Goncalves used the twelve principles and the four values defined by Beck et al. to define Agile methodology and describes what the agile transformation roadmap is.

From the time the manifesto was created until the present, research on agile methodology has presented still-evolving ideas, highlighted new variables such as people culture (Juhani and Netta, 2011), Methodical Project Definition Process (Tsoy and Staples, 2020), and detected new constraints such as contract type (Serrador and Pinto, 2015). Almost 19 years of continuous research have elapsed in the software development process specifically. However, agile project management methodology has proven to be successful in many other fields such as telecommunication, the automotive industry, manufacturing, industry, and other areas (Itai and Shtub, 2019). However, research in the telecommunication field and specifically the IT telecommunication field is limited, when it comes to DS and MS domains. This fact encourages the researcher to adopt this research project in an attempt to find the CSFs associated with the application of agile project management methodology to achieve project success.

Many varieties of agile project management methodology exist (Sharma *et al.*, 2012); for example, scrum, kanban, and extreme programming (XP). Each organisation must choose the most suitable methods to apply to achieve project success. In the discussion

and conclusion, the researcher highlights two successful pilot projects performed using Kanban as it was the most suitable agile project management methodology for those two pilot projects. Both scrum and kanban contributed to the development of effective programmes and the Kanban approach could be more comfortable than the scrum method in terms of project plan management (Lei *et al.*, 2017) and this is because of the visual tools used in Kanban, Easy to understand, focuses on determining a different duration for each iteration.

Agile project management is used in other fields such as manufacturing, teaching and consultancy, research and development, and education. Those fields also agree on some CSFs such as in software development of IT in general such as (1) management involvement, (2) conducting daily stand-up sessions, (3) team size, and (4) visual management (Totten, 2017).

1.2 Statement of the Problem

The problem that is facing any telecommunication service vendor in the IT Telecommunication domain under DS or MS is the rapid change in requirements and how to reach the project value quickly adopting these changes to reach the time to market. This research project is looking for the critical success factors that are associated with applying the agile methodology on the projects to reach the project value (TTM). Also to find is there a relationship between the independent variables (Management involvement, Customer Involvement, Team size, Team communication, Team performance) and the dependent variable which is project value (TTM).

One of the most important articles that almost all researchers are referring to it when it comes to Critical success factors, Chow and Cao (2008) define the CSFs for project

success as four main factors: people factors, organisational factors, process factors, and project factors.

The researcher surveyed the literature for the CSFs most suitable for the field of telecommunication IT that can also be searched inside the case study organisation where the research project occurred. Much research has been done on the CSFs associated with the application of agile project management methodology to achieve project success. Most of the researchers, if not all, adopted Chow and Cao's success factors, but every researcher tries to find or prove some of the success factors. Chow and Cao (2008) failed to prove the fundamental CSFs triggers for some of the variables such as customer involvement and they opened it for further researches, which has been proved in this research project to be CSF and there is a correlation with project value too. From that time 2008 until the present, each researcher has focused on some of the factors to establish them.

As an example of the problem statement, Chow and Cao (2008) focused on all success factors. Hummel and Epp (2015) focused on the team, customer, organisation, and communication. Aldahmash et al. (2017) focused on eight factors, which are Delivery approach, team performance, applying agile methodologies, customer engagement, project management methodology, corporate culture, collaboration and leadership support, leaving the relation of each variable with project success for future research, which will not be the case of this research project as the research project found a correlation between the project value in terms of time to market and the independent variables that have been chosen from the literature. Kalenda et al. (2018) indicate that the agile project management process can be customised to suit the organisation's needs. However, the authors keep the core values and principles of agile methodologies.

Nguyen (2016) states that the agile production team needs useful agile engineering strategies; the appropriate technology and development tools; the right agile project

management processes; customer involvement and efficiency, which is in line with previous articles on CSFs. Lalsing (2012) stresses team size as the most critical success factor. It is also imperative that, before any enterprise chooses to implement the agile approach, It assesses whether the organisational context, corporate culture, business practises and systems are sufficient for the implementation of agile project management strategies. (Lalsing, 2012).

In summary, all previous research has set the project success as the dependent variable, taking into consideration that each defines project success to suit the research. In this research project, project success refers to project value in terms of TTM. The independent variables have been chosen to be people and organisational factors.

1.3 Rationale

This study focused on two factors – the people and organisation factors – adopted from the literature review. The reason for choosing those two factors related to the importance of those variables concerning the organisation and to respect the time of the research project as all variables cannot be tested under the specified timelines. The detailed variables will be discussed in detail in the coming chapters. The researcher chose the team size, team capability, team communication, customer involvement, and management involvement as independent variables. This study focused on inspecting whether those variables are the most critical. Furthermore, it explores the relationship between each of these variables and the dependant variable which is the project value. Therefore, the study aims to determine the critical success factors associated with the application of agile project management methodology on both DS and MS and will it be successful.

Three research questions were considered for this research project:

1.4 Research Questions

1. Can the application of agile project management techniques prove successful for the Digital Services and Managed Services departments?

2. What are the primary critical factors associated with the application of agile project management that lead to project success?

3. Is there a correlation between successful agile project management and a team's communication, size, and performance?

1.5 Aim

The proposed project aims to identify the critical success factors that lead to project success (in terms of project value) associated with the application of agile project management techniques to the DS and MS departments. And to find the relationship between those variables. This project entails the following objectives:

1.6 Objectives

- Conducting a critical literature review to identify the gaps in existing research findings;

- Critically assessing the primary critical factors associated with the application of agile project management that lead to the value of a project being achieved;

- Determining whether there is any relationship between agile project management and a team's communication, size, and performance; and

- Triangulating and validating the results of both the quantitative and qualitative methods.

1.7 Significant contribution to the thesis/body of knowledge

The current research project proposed by the researcher was considered to be one of the least researched projects carried out in IT telecommunications and related to DS (Leimeister et al., 2014) and MS (Kumbakara, 2008) departments, as per the limited literature review. The researcher wants to add to the knowledge of project management and specifically the IT telecommunication field through the output of this research, which will be of added value to the field and the collaborating organisation. The result of this research project shows that the five dependent variables which are (team size, team capability, team communication, customer involvement, and management involvement as independent variables) correlate with the independent variable which is the project value (TTM). It also proves that Agile methodology is successful when it comes to DS and MS departments. It also opens the door for further research in more CSF such as people culture and type of contract, also open the door to apply Agile project management methodology on Artificial intelligence domain to add more benefit to IT telecommunication. Kanban proves to be a successful methodology in IT telecommunication, especially in Business management under MS or DS.

1.8 Definition of Terms

- Agile project management. Chow and Cao (2008) identified five factors which are people, process, organisation, technical, and project. This study focused on people and organisation.

- Agile software development. ASD is an incremental process (Hummel and Epp, 2015).

- Agile methodology. ASD is the family of agile development methods (Chow and Cao, 2008; Lalsing, 2012; Sharma *et al.*, 2012).

- Agile methods. AM is a set of iterative processes used within a project such as a scrum and a kanban (Chow and Cao, 2008; Barash, 2013, Ahmad *et al.*, 2014).

- Critical success factors. Are the elements needed to make the project successful.

- People factors. This factor refers to the team capability, team size, team communication in this research (Chow and Cao, 2008).

- Organisation factor. This factor refers to customer involvement and management involvement in this research (Chow and Cao, 2008).

- Project success. This concept represents the success of a project by achieving its value, by reaching the time to market.

1.9 Ethical Consideration

The researcher ensured that the proposed project followed all of the ethical guidelines required by the ethical committee at the University of Northampton. The survey participants and the interviewees will have the right to withdraw at any point in time. They can withdraw without the need to provide a reason for doing so. Moreover, the data collected will be kept in a secure place and will not be disseminated as raw data. The participants will be asked for their consent to participate. No participants will be under the age of 18; however, this will not be applicable for this research project.

1.10 Contribution to Professional Practice and Novelty

The results of the proposed research project add great value to the telecommunication sector, represented in this case by the DS and MS departments. The research project has identified the CSFs associated with agile project management methodology. These findings will make it possible for both departments to ensure greater project success when working on projects in this sector, which represents a topic that has not previously been investigated by researchers. The findings of the proposed research project will enrich project management practices in IT telecommunications. The collaborating organisation can use the results and apply them directly to its plans by changing the internal processes within these two departments which are DS and MS. It is worth noting that, as a services organisation, the company XYZ is dependent on projects; thus, project management practices add great value to the organisation and can help it to ensure that its projects satisfy project management standards. It is important to mention that the two pilot projects ensure that Kanban is a very good methodology that can be used by the organisation and it also helps in reducing the TTM reaching the project value. Moreover, customer involvement is one of the most important factors for success, Management involvement in terms of governance, not micromanagement is critical too, team communication, team performance are from the CSF too, team size is something very crucial to the success of the project and from the pilot projects, a team of five to nine not more not less was found to be optimal too as CSF.

1.11 Expected Findings and Limitations

After the proposed research project, it is expected that the CSFs associated with applying agile project management on top of traditional approaches to achieving greater project success will be identified. The proposed research project will focus on the IT telecommunications sector; specifically, the DS and MS departments in the Middle East.

However, this will result in the proposed project having a limitation in that it may not apply to all IT projects and may not be generalisable to other industries.

1.12 Chapters of the Research Project

The research project consists of five chapters. Chapter 1 establishes the purpose of the study, the study background, the problem statement, the research question, definition of terms, the significance of the research, limitations, and assumptions. Therefore, it highlights an introduction to the research project and reflects on the research questions, aim, and objectives of the research.

Chapter 2 contains the literature review. It starts with an introduction to the research and identifies all the elements of research and keywords for research before critical reflection on the literature from which variables have been identified. It also highlights the conceptual framework used for this research.

Chapter 3 represents the methodology and the methods used in this research project: it highlights all the tools and instruments used in this research project. Chapter 4 is the analysis of primary data. In this chapter, all the statistical analysis and the qualitative analysis is done and presented as raw data. Chapter 5 and the last chapter represent the discussion and conclusion, findings, implications, and contain recommendations for further research. The final chapter answers the research questions directly.

As a summary, this chapter highlighted an introduction to the research project. It explains the background behind this study, the statement of the problem and the Rationale. The research questions have been introduced reflecting the Aim, and the Objectives of the research project. Then it highlighted the significance of the study, Terms definitions to be used in the research project and at the end, the ethical consideration.

Chapter 2: Literature Review

2.1 Introduction

The rapid change in project requirements has become a considerable challenge. The need to finish a project before contractual time and the flexibility to address the changes and accept new requirements at any stage in the project life cycle is crucial. To accept changes at any stage of the project lifecycle, fulfil customer needs, and satisfy requirements for time to market, this research project was considered important.

The following research will explore agile project management methodologies in IT telecommunication applied in the Middle East and Africa to DS and MS departments to achieve project success. The research project will be conducted in the regional headquarters of a telecoms company that will be referred to as company XYZ, which has adopted the traditional project management methodology. The company's name will be kept anonymous during the research at the request of the organisation.

2.2 Research Keywords

The researcher used the following keywords when exploring the literature related to this research project. Examples of the keywords used are the following:

- Digital services and telecommunication
- Managed services and telecommunication
- Agile project management
- Critical success factors associated with the application of agile project management
- Transforming from traditional to agile

2.3 Introduction to the field of Research

2.3.1 Telecommunication

Telecommunication is one of the industries that contribute actively and considerably to the gross domestic product (GDP) of the world (Worldatlas, 2019). According to the largest industries in the United States of America (Worldatlas, 2019), telecommunication is the 10th-largest contributor with 4% of GDP.

To be more specific, research in telecommunications is a large field. Therefore, the researcher will focus on the IT component of telecommunication and will refer to IT as (IT telecom). The researcher will focus on IT telecom with reference to two specific departments. The first department under IT telecommunication and concerned with delivery and solutions is called Digital Services Department. The second one which is concerned with Business management and operations is called Managed Services Department. A digital services department is the department related to new projects and their implementation, while a managed services department is a department related to operations and maintaining network performance. Those two departments became crucial for the business of IT telecommunication (Kumbakara, 2008; Leimeister et al., 2014). Information technology telecom organisations in the market are expected to continue investment in business support system solutions to remain competitive in the market (Research, 2019).

In summary, the research will concentrate on digital services and managed services departments in the IT telecom department in the field of telecommunication, and the researcher will focus on the region of the Middle East and Africa to conduct this research.

In the field of telecommunications, there are two main players: telecommunication service providers and telecommunication vendors. The telecommunication service provider, or operator, is the organisation giving the service to the end-user, or subscriber. The

telecommunication vendor is the organisation that builds the service to the telecommunication service provider. According to market share (Investopedia, 2019), China Mobile Ltd, is considered to be the largest telecommunication service provider in the world with more than $50 Billion in revenue, followed by Verizon Communications Inc. There are also large European players such as Vodafone Group Plc. Looking at the telecommunication vendors and according to market share (Techie, 2017), Ericsson is considered to be the largest telecommunication vendor in the world, followed by Nokia and Huawei. The change in market share is rapid, such that top producers change places in terms of their market share. In this thesis, the telecommunication vendor and not the telecommunication service provider will be investigated.

2.3.2 Information Technology Telecommunication Departments

A digital services department is a department related to IT telecommunication that is related to all IT services from projects, roll-out and delivery point of view. Currently, the world is investing in fifth-generation (5G) networks. When the telecommunication services providers have this new technology, they will supply a high-speed internet which can be used by DS to apply to smart cities, the Internet of things, and many fast services (Leimeister *et al.*, 2014). It is important to realise that most of the organisations in the telecommunication field have moved from a product concept to the concept of a service, which enables the DS department to emerge and dominate in the IT telecom field (Williams *et al.*, 2008). Currently, there are large players in the market considered to be digital service providers. Among these players, providers such as Apple, Amazon, eBay are dominating the market.

A managed services department is a department that manages the operational part and maintains the performance of the service given by the telecommunication service provider. The managed services IT market has grown to 20% per year (Speta, 2011;

Kumbakara, 2008). Speta (2011), and Kumbakara (2008) showed that the market is crowded with service providers, varying from small providers to giant enterprises, which opens competition to gain a competitive advantage in the market. The authors proved the importance of this department through the extensive review of published materials from academia and industry. It is evident that this department is not only for IT telecommunication; it is useful for any IT department in any industry.

2.3.3 Information Technology Telecommunication Projects

Projects under both departments – DS and MS – can be performed by either the waterfall project method, the V-model, or the agile project management methodology (Kumbakara, 2008). If the project is small in size and the customer changes the requirements of the project frequently, it is best to use the agile project management model. If the project is large with clear requirements, then the waterfall model will be the best option. However, if the project is large and requirements change and testing are needed in each phase as early as possible in each stage, the V-model will be the best fit (Balaji and Murugaiyan, 2012). Different methodologies under agile project management are used, including XP, and kanban (Barash, 2013). Whether one methodology or a mixture is used depends on the project and the requirements.

2.3.4 Information Technology Telecommunication Project Management

It has become increasingly clear that project management is paramount to the success of numerous organisational activities. In telecommunications vendor providers, the emphasis has shifted from the organisation of products to that of services. Organisations are empowering their project managers and programme directors, as these individuals are – in many ways – responsible for running these businesses.

The proposed research project will focus on two departments that are concerned with IT telecommunications, namely DS and MS. The DS and MS departments deal extensively with IT projects related to business system support, value-added services, and the operation of the IT network; the responsibilities undertaken by DS range from simple to large IT projects.

There are various techniques in agile project management methodologies that have been proven to be more effective than the traditional project management framework (Onag, 2017). These techniques are recommended for IT work and developmental organisations in particular, as they allow employees to cope with continually changing customer requirements (Doyle *et al.*, 2005).

2.3.5 Project Success

Following the standard concept of project management, project success is the prompt execution of the project scope within the budget defined for the project; however, there is actually more than one main aspect, which is that the value of the project is one of the most critical considerations to be addressed (McGaughy *et al.*, 2018). The project value is to reach the strategic goal of the project without deterioration of any of the project constraints even if the project finished before its planned time, and it can be also measured by the time to market. The value of a project should be a priority even if it is completed within budget and on time. This is because changes often occur in the market, which can result in a project losing its value altogether if it is not completed up-front (McGaughy *et al.*, 2018). For an example of the importance of project value, consider the creation of a website: the website is finished on time and within budget, but the end-user is unable to find the required information easily. In this case, the project will not be considered a success. Another example is implementing an application on top of new technology, such as 5G in telecommunications. Assuming it is intended to be finished

within a year, after 6 months, there is a major need for this application, as it will produce significant revenue. If it is not possible to finish it earlier, the project will not achieve the desired value. Thus, when this research proposal refers to project success, the definition thereof is project value.

2.3.6 Agile Methodology

Agile project management is popular in the IT and digital industries (Kaur *et al.*, 2015). This is due to the contemporary era of digital transformation and continually changing requirements with regard to meeting project objectives. In order to highlight the research gap, a critical literature review was conducted to explore the project within the literature and to identify appropriate guidelines to follow during the research project.

The literature review predominately focuses on the success factors associated with applying the agile methodology that lead to project success. Some articles refer to these factors as CSFs (Špundak, 2014; Davis, 2014; Joslin and Müller, 2015; Serrador and Pinto, 2015; Chan and Thong, 2009; de Carvalho *et al.*, 2015; Misra *et al.*, 2009; Lindsjørn *et al.*, 2016; Sheffield and Lemétayer, 2013a; Chow and Cao, 2008), while others refer to them as success factors (Serrador and Pinto, 2015; Rasnacis and Berzisa, 2015; Kaur *et al.*, 2015; Livermore, 2008; Davis, 2014; O'Sheedy and Sankaran, 2013; Misra *et al.*, 2009). There is no difference in the naming convention between critical success factors or success factors rather than the articles called CSF gave the factors more focus in their research than others.

Under this predominant theme, there are sub-themes as shown below in Table 1.

Project success	Project management methodology and project success	Agile and traditional project management	Agile benefits and challenges
Agile implementation and affecting factors	Mixed agile with traditional	Agile adaptation	Agile framework and success factors
Acceptance of agile methodology	Success factors in adopting agile	Teamwork quality and project success	Adaptation and implementation of agile project management

Table 1: Sub Themes

Table 1 represents the sub-themes that have been obtained during the literature review. There are some articles for example focuses on teamwork, quality and project success, while some of the other articles focus mainly on mixed agile with the traditional approach. The predominant theme is the CSF associated with the application of the agile methodology, from these grouped sub-themes, the researcher starts to regroup them into more focused groups to be used in the literature analysis. So, for example, sub-themes like Agile and traditional project management, Mixed agile with traditional can be grouped to be one theme holding all articles together and called From traditional to agile. The researcher applied the same on all sub-themes to come out with main research themes. The main themes investigated have grouped all those themes to follow the following themes, under which the critical analysis was conducted by the researcher.

1. Project success factors

2. Project management methodology and project success

3. Agile project management and project success

4. From traditional to agile

5. Implementing agile and affecting factors

2.3.7 Agile Methodologies

According to (Alexander, 2018a) the percentage rate of agile methodology adoption according to different industries are shown in Table 2 below.

Industry	Agile adoption (%)
Software	23
Financial services	14
Professional services	12
Insurance	6
Healthcare	6
Government	5
Telecommunication	4
Transportation	4
Manufacturing	4

Table 2: Agile Methodology Adoption, source: adapted from (Alexander, 2018a)

Table 2 represents the Industry and the percentage of adopting agile methodology in this industry. It is clear that the software industry has the highest adoption percentage which is 23% followed by financial services 14%, then professional services 12%, while telecommunication came only 4% adoption percentage which ensures that the Industry requires this methodology. Important to say that Professional services are considered in telecommunication to be part of services under the Digital Services domain. The percentages above show that the telecommunication industry has a lower agile adoption rate: even if we consider software as IT Telecom, the rate of adoption is low. This highlights that there is a strong case for agile methodology adoption by the telecom industry.

The agile manifesto developed by Beck *et al.* (2001) purposes 12 key principles that were still under discussion by many, but it was agreed to consider this as the main principles for agile methodology. Alexander (2018b) confirms those 12 principles, which are shown in Table 3 below.

Deliver customer satisfaction by delivering valuable software continuously
Always accept change of requirements no matter how early or late in the project
Deliver software that works within a shorter timescale
Both developers and business professionals must work closely together daily throughout the project
Information is best transferred between parties in face-to-face conversations
Motivate people to build a project by creating an environment of appreciation, trust, and empowerment
Working software is the key measure of progress
The agile process promotes sustainable development
Continuous attention to excellence and quality in technical development and design boosts agility
Simplicity is a vital part of effective agile management
Self-organised teams produce the best architecture, requirements, and design
Teams should reflect through inspection and adaptation to be more effective

Table 3 (Agile Principles) source adopted from Alexander (2018B)

Table 3 is a table representing the twelve principles of agile methodology that was agreed upon during the creation of the manifesto by Beck *et al.* in 2001 and by looking at the first two principles it is clear that customer satisfaction and accepting requirements changes at any stage of the project are points that are leading to achieve the project value which is the time to market and this is in line with the research project dependent variable.

Many agile methodologies have been developed and used since 2001. Furthermore, there are widely used methodologies and others that are rarely used. In this section, a

comparison between the methods and the benefit of each one will be introduced. Table 4 below refers to agile methodologies that are commonly used.

Extreme programming (XP)
Scrum
Feature-driven development (FDD)
Dynamic system development method (DSDM)
Adaptive software development (ASD)
Crystal
Lean software development (LD).

Table 4 (Agile Methodologies)

Al-Zewairi *et al.* (2017) and Margini *et al.* (2017) defined the agile methodologies that are widely used as per Table 3. Goncalves (2020) agreed with the authors that there are several agile methodologies, many of which have common procedures, characteristics, and philosophies. However, from the point of execution, each agile methodology has its methods, terms, and strategies. Goncalves (2020) accordingly compared all methodologies highlighting the advantages, disadvantages, and supporting practice for each methodology as shown in Table 31 in Appendix II.

In the following section introduction of each method will be discussed.

2.3.7.1 Scrum

Scrum is a framework controlling and managing the iterations and increments in all project types. Scrum is a flexible framework that can be used with other agile methodologies. Scrums have become popular under the agile methodology because of higher productivity rate, simplicity, and flexibility. Scrum provides guidelines on the use of product backlogs, cross-functional production team involving sprint preparation, scrum analysis, product owner, scrum master and sprint reflective sessions (Al-Zewairi *et al.*, 2017; Margini *et al.*, 2017). A sprint, as seen in figure 1 below is a brief period when the scrum participants are working to achieve the specified amount of work. Sprints are always at the core of scrum and agile methodologies, and doing sprints right can help the agile team launch products that are focused on fewer headaches.

Figure 1: Sprints @Source (Gear, 2018)

2.3.7.2 Lean Software Development

Mary and Tom Poppendieck (2003) developed lean software. They consider it as an iteration methodology. Lean product architecture emerged from the lean business

movement, which was first used by lean software in Toyota. Lean aims to deliver complex software systems based on seven principles 1) creating knowledge, 2) quality, 3) delivering fast, 4) respect commitment, 5) people respect, 6) system optimisation and 7) waste elimination (Al-Zewairi *et al.*, 2017; Margini *et al.*, 2017). The lean methodology stresses speed and efficiency, and it depends on two-way communication between the customers and programmers. The emphasis is more on the quicker and more effective decision-making capabilities of individuals or small teams, rather than on more efficient decision-making capabilities typical of hierarchy-controlled methods.

2.3.7.3   *The Kanban Method*

The kanban approach is used to handle the creation of the project while stressing continued execution and not overstraining the construction team. As with scrum, kanban procedures are developed to ensure colleagues function more proficiently. The kanban board allows the team to further enhance its performance by visualising the workflow, making challenges recognisable and enabling the flow to be handled by adopting the job to the phase limit (Al-Zewairi *et al.*, 2017; Margini *et al.*, 2017). The Kanban Method is based on a series of standards and procedures for organising and optimising workflow. It is a non-disruptive, evolutionary approach that encourages incremental changes to an organization's processes. If you implement these principles and practises, you will be able to effectively use Kanban to maximise the benefits to your business process – boost flow, minimise cycle time, and increase efficiency. Figure 2 below as visual control board shows the tasks in its stage from ToDo phase passing by Doing phase till Done phase.
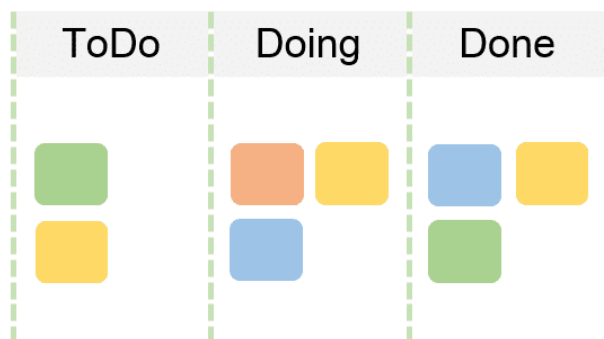
Figure 2: Kanban @Source (Thu, 2020)

2.3.7.4   Extreme Programming

Kent Beck (2004) XP has been described as one of the most common and provocative agile methodologies. Extreme programming is a way of producing high-quality applications efficiently and consistently. The user is active in continuous preparation, monitoring and quick reviews to produce working applications and minimise time on the market (TTM). Extreme programming influenced technical techniques such as the use of story cards, iterative development, recompilation, automatic testing. As shown in Figure 3 below the XP process started with the planning phase. This is the initial step, and we must keep several things in mind. In this phase, the project's aim is established, and the project's cost is estimated. Keep in mind how a new system is designed within a particular budget while also meeting user expectations. A programmer investigates numerous options for developing software. In Analysis the actual labour of creating and developing. End-user needs are collected at this phase. This is accomplished with the assistance of a user who specifies all of the requirements, including the user's expectations from the new system. After making all of the necessary decisions, the developer proceeds to the following stage, known as the Design

Phase. The blueprint for the new system is designed at this phase. It contains Data Flow Diagrams, charts, and other items that represent the project's flow. Sample workouts are created for the front end customer, which is then used by the programmer to build the software. After the product has been developed, the next step is to put it into action. Following implementation, it is evaluated by users, and user input is gathered. If it does not meet the requirements of the consumers, the product is maintained.
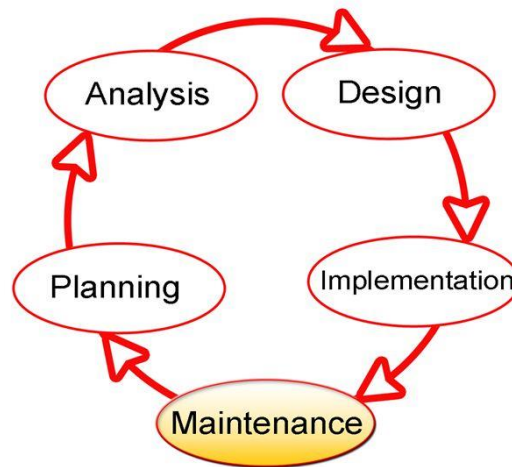
Figure 3: XP @Source (techversyssolutions, 2013)

2.3.7.5   *Crystal*

The Crystal technique considered to be the lightest and utmost efficient techniques for application development. It consists of many agile systems, including Transparent, Crystal Yellow, and other approaches. Many considerations influence these systems, such as the system importance, the staff scale, and the project goals. The Crystal family focuses on the understanding that each initiative has distinctive properties and thus,

procedures need to be modified to suit such characteristics (Al-Zewairi *et al.*, 2017; Margini *et al.*, 2017). Crystal is one of the most adaptable frameworks, allowing your development team to create methods that work for them. However, because crystal concentrates on team communication around the product being produced and avoids superfluous documentation and reporting, other departments of the business find it difficult to understand how the project is progressing.

2.3.7.6   *Dynamic Systems Development Method*

A dynamic system design methodology emerged in 1994 to provide a business project management platform for what would be then perceived as fast technological growth. While common in the 1990s, the approach to fast technological growth appeared in an unstructured fashion. From its inception, the DSDM has grown and developed and provides an organised framework for the planning, execution, delivery and replication of agile systems and iteration initiatives (Al-Zewairi *et al.*, 2017; Margini *et al.*, 2017).

2.3.7.7   *Feature-Driven Development*

The FDD was developed by Rajashima, Lim Bak Wee, Paul Szego, Jon Kern and Stephen Palmer. It is a concept-driven, quick-repeat approach to operating by first identifying the form of the agile model. Different versions of 'plan by feature, create by feature' are performed every two weeks. The features improve the customer experience as they are lightweight and functional (Al-Zewairi *et al.*, 2017; Margini *et al.*, 2017).

Table 5 below represents the summary of the most widely used agile methodologies

Key Features		
Scrum	**Kanban**	**XP**
1. Responsibility to targets in the Sprint 2. Faith to do the best thing you think is 3. Emphasis on working things in the present sprint 4. Openness to whatever obstacles you encounter 5. Value the confidence that they will do their best	1. Visualisation 2. Trying to limit work on the development 3. Process management may be carried out either by handling queues or by restricting work in progress. 4. Make policy transparent 5. Use feedback mechanisms 6. Observational Growth	1. Communication is the key 2. Simple 3. Regular Feedback 4. Valour 5. Admiration

Table 5 (Most widely used Agile methodologies)

2.4   Literature Review Main Themes

Project success factors	Project management methodology and project success	Agile project management and project success	From traditional to Agile

| | Implementing Agile and the affecting factors | | |
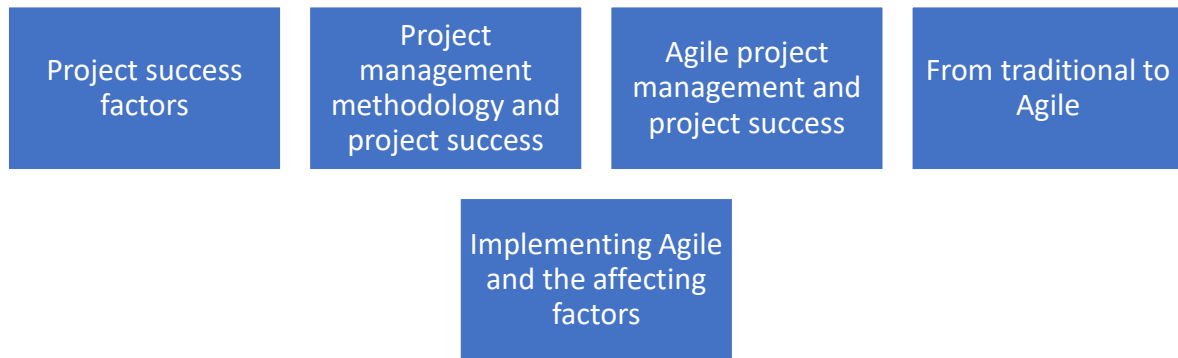
Figure 4: Main Themes

Figure 4 Above represents the main five themes extracted from the literature review for this research project. As stated in Table 1 which represents all the sub-themes found during the literature review, the researcher grouped those sub-themes into five main themes which are represented in Figure 4. The rationale behind those themes is to group the literature under the project success factors associated with applying the agile methodology to reach project success or project value (TTM), the project management methodology used to reach the project success, the agile project management specifically and project success, moving from traditional to agile and implementing the agile methodology and the associated factors. By following those five themes, it can be deducted how to move from traditional project management to agile project management, how to apply the Agile project management methodology, the methodologies of Agile, and at last the success factors for adopting the methodology. Following the above-mentioned steps and the themes critical analysis, the Aim of the research project has been fulfilled and the research questions have been answered.

Before going into details with each theme from the literature, it is important to highlight that the literature highlighted all the possible critical success factors that will be discussed in details later in this chapter. As an example, in the first theme which is project success factors, the articles related to this theme highlighted the critical success factors, and each article has its way to prove this factor or even leave it for future research.

It is important to say that the researcher as a process did a critical literature review. Then from the review, the researcher grouped the articles into themes. Then critical analysis was done for each theme to prepare for the relation when primary data collection finished and also to be able to support in answering the research questions when analysed and supported by primary data collection and all that leads to fulfilling the Aim of the research project by answering the research questions.

So, in simple words, the researcher followed the following steps, Determine the Issue, Examine the Literature, Clarify the Issue, Define Terms and Concepts Clearly, Identify the Population, Create the Instrumentation Plan. Collect data, then analyse it. Important to say that during the critical literature review the researcher rejected some of the articles, either because they did not contain much information or did not add any value to the research or it is from a different philosophical perspective. So the literature was based on the key factors that the researcher starts with, like the critical success factors, factors affecting the transformation from traditional methodology management to Agile methodology, factors affecting the success of applying agile project management.

In summary, the themes gathered by the researcher in this research projects ensures that the key concepts of the research project were covered and leads to ease the critical analysis that was done in the concluding chapter of the research project.

2.5   Theme 1: Project Success Factors

Davis (2014) defined success factors from the perspectives of various stakeholders. In terms of methodology, he employed a systematic integrative literature review to define these factors. He found that there were no common perceptions of success factors among the stakeholders whom he investigated. Therefore, for example, the perception of project managers regarding project success was the traditional approach – which considers time, budget, and scope – meaning that a project should be delivered within the given budget and on time. Project team members viewed project success as achieving a certain level of collaboration and the raising of their learning curve (Cooke-Davies, 2002; Barclay and Osei-Bryson, 2010). Senior management perceived success in terms of making gains for corporations. The only common success factor that Davis found in his research while discussing the various perceptions and the opinions of these different stakeholders was communication, which is in line with the position of the Project Management Institute (2013).

Chow and Cao (2008) conducted a survey study among agile experts to identify CSFs. Unlike Davis, Chow and Cao were able to use primary data collection to identify success factors and classify them under three categories, which are (1) strategies used for delivery, (2) techniques used in agile software engineering, and (3) capabilities of the delivery team. However, the authors failed to find evidence for certain preconditions for the success factors when employing agile methodologies such as strong executive support, which has also been confirmed by Stankovic *et al*., (2013). Stankovic *et al*., (2013) also find that they cannot apply all these success factors at least in their study in Yugoslavia, but they also introduce two other success factors related to timelines and cost. Chow and Cao defined five dimensions which are the organisation, people, process, technical, and project. Under these dimensions, they defined 36 CSFs as shown in Table 6 below, taking into consideration that most of the research since 2008 has always

referred to these factors, as Chow and Cao's research is considered to be one of the main pieces of research in this field.

Organisation	1.Strong executive management support 2. Committed sponsor 3. Organisational culture to be Cooperative 4. face-to-face communication 5. Organisations believe in agile methodology 6. The collocation of team 7. Facility to allow proper agile work environment 8. Reward system in place
People	9. High competence 10. Great motivation 11. Management knowledgeable in agile process 12. Leaders having adaptive management 13. Self-organising teamwork 14. Customer relationship
Process	15. Following the agile process 16. Following the agile project management process 17. Following agile configuration management process 18. Daily face-to-face meetings 19. Honouring regular working schedule 20. Strong customer commitment and presence 21. Customer having full authority

Technical	22. Well-defined coding standards 23. Adopting simple design 24. Rigorous refactoring activities 25. The right amount of documentation 26. Regular delivery of software 27. Delivering Important features first 28. Correct integration testing 29. Appropriate technical training to team
Project	30. Project nature being non-life-critical 31. Project type being of variable scope with emergent requirement 32. Projects with dynamic, accelerated schedule 33. Projects with small team 34. Projects with no multiple independent teams 35. Projects with up-front cost evaluation done 36. Projects with up-front risk analysis done

Table 6 CSFs as defined by Chow and Cao (2008)

With regard to the quality of teamwork as a success factor in agile project management, Lindsjørn et al. (2016) found no significant differences regarding the effect of the quality of teamwork from traditional surveys. However, they also found that the effect of the quality of teamwork on teamwork performance when using an agile approach was greater than in traditional approaches, which highlighted the value of the agile approach.

Kaur et al. (2015) conclude that agile might not be the best fit for testing, maintenance, and large-scale development projects. Rehman and Nawaz (2020) find solutions and suggested tools to be used for testing software developed by agile methodologies, which enables applying the agile methodology to testing phases. The article by Kaur et al. sheds light on the benefits of using agile project management and the other methodologies, such as Scrum or XP. The findings of the article have been contradicted by Joslin and Müller (2015), who found that applying the project management methodology to service leads to greater project success than when using it for products. Furthermore, the authors also found that the greater project management experience applied in adopting the methodology, the higher the likelihood of project success. The findings of the work are intriguing; however, the methodology used to achieve these findings is unclear. To summarise this section, there is debate over whether agile project management methodology can or cannot be applied to testing and maintenance projects, for which it was found to be successful and applicable by this research project.

Lalsing (2012) specifically focused on team size to achieve successful agile project management, and his results show clearly that to successfully apply agile methodology it is crucial to select the appropriate team size from the beginning. In contrast, Mohammad (2013) stated that the core of the agile methodology is the people, and he defined the people as the customer and agile team members, which agrees with Lalsing (2012), adding the customer to the results of Mohammad's research.

Wan and Wang (2010), in their study about CSFs associated with agile methodology, found that education and preparation have a great significance in the effective application of agile technique. In addition, agile approaches should be part of the agile community and take care of the architecture and implementation of the technology. Drury-Grogan (2014), from a different perspective, discusses CSFs and focuses on the team and critical

decisions, and agile team iteration objectives. It is clear that Drury-Grogan agreed with Lalsing, and both Wan and Wang that people factor or the agile team are from the CSFs.

Lindgren and McAllister (2014) also confirm that self-organising teams are considered to be a distinctive feature of agile success, agreeing with Mohammad (2013), and Lalsing (2012), who also confirms that the team is one of the CSFs in applying the agile methodology.

Aldahmash *et al.* (2017) studied the CSFs associated with applying agile project management methodologies. The authors found eight factors selected as CSFs. These eight CSFs were mapped under the following categories: Technical, Organizational, People, and Process. The categories defined by Aldahmash *et al*. (2017) are in line with those of Chow and Cao (2008), who agreed on the same categorisation. Aldahmash *et al*. (2017) Effective considerations such as implementation strategy, leadership capabilities and preparation, agile growth methods, client engagement, project management process, corporate culture, collaboration and high-level management support were presented, which are again in line with (Ahimbisibwe *et al*., 2015) and (Wan and Wang, 2010). New factors have been discovered by Tsoy and Staples (2020a); specifically, data quality, building customer trust, and model validation, which also added value to the CSFs found by Chow and Cao and agree with the researcher on the value of the customer involved to gain customer trust that may have an influence on the project value. Customer involvement as CSF value will be determined through this research project.

Meenakshi et al. (2020) found that the planning, team communication, and development processes were considered among the CSFs associated with the application of agile project management methodology to achieve project success, encouraging future researches to identify more success factors. It is important to highlight that none of the researchers was able to identify the entire set of success factors. Tam *et al.* (2020a) found

that team capability and customer involvement are the most critical success factors. The factors of success identified by Chow and Cao (2008) again leave room for further research for more CSFs, which was also confirmed by Tsoy and Staples (2020) setting both Customer Involvement and a Project Process as CSFs.

It is clear in this section that all articles are aligning on the factors, but each article tries to prove some of the success factors leaving a recommendation for future research to prove more success factors, which will be performed by this research project.

2.6   Theme 2: Project Management Methodology and Project Success

While investigating how others can apply agile project management and measuring project success, it was found that the definitions of this concept are inconsistent. Nevertheless, Conforto et al. (2016), for example, defined agility as a culture rather than a framework. The authors found that agility has to be considered as being reflected in the performance of a team, not as a process or method that has to be followed. The performance of the agile methodology depends on the stakeholders. The authors also found that agile success can be measured through rapid project planning and customer involvement, which is in line with Tam *et al.*, 2020. This, however, poses the question of whether agile serves as a beneficial methodology for project management. Serrador and Pinto (2015) found evidence that the quality of a project's goals will act as a significant moderator between the adoption of the agile methods and the likelihood of project success. One topic that may prove interesting for future research and is related to the proposed research project is a mixture of agile and traditional methods and its effect on project success.

As discussed in theme one that project success has multiple meanings, project management success also can be measured at the end of the project against other

criteria, which is considered to be a debatable point. Within this theme, we will highlight how project management methodology and applying the right methodology will lead to project success from a governance point of view. Joslin and Müller (2015) highlighted different types of project management methodologies such as Prince2 (Axelos, 2020) from the office of government commerce (OGC, 2002), and PROPS-C (Management, 2016) from Ericsson (2013), and the body of knowledge that is governing them which is PMI (PMI, 2020). Using a post-positivist perspective, the cross-sectional survey as a tool, and adopting mixed-methods methodology, the authors were able to find that using project management methodology for a service gives higher project success than using it on products. It was also found that the greater the project management experience used in applying the project management methodology, the greater the success project rate. The article did not reflect which project management methodology is better than others, leaving this as a question for further research. Starting by defining project success, de Carvalho *et al.* (2015) begins by defining the success factors the project will be measured against. The authors defined the schedule, cost, and margin. Using a quantitative longitudinal field survey for three years, the authors found that the project complexity – whatever the methodology used – affects positively the project success. This article shows that project management enablers and project management efforts have positive effects on project performance. To summarise, both articles highlighted the effect and importance of project management methodology on project success and urge further research.

Kalenda *et al.* (2018) found company culture, lean experience, and management support to be key success factors for adopting an agile project management methodology, which was confirmed through their action research. The authors also found that resistance to transition, rapid roll-out, consistency issues, and incorporation without agile business to be the critical challenges in applying agile project management methodology. Therefore, as a conclusion from their research, the authors found that applying agile project

management methodology Within an enterprise, it is not essential to implement a particular scheme, but the procedure or technique should be adapted to fit customer demands, retaining the key principles of agile methodologies.

Itai and Shtub, (2019) in their study, presented the way organisations measure agile project management output success of their projects. The authors found that most of the projects failed to achieve the aim and goal of the organisations and the criteria the organisation used to measure the project's success. Their study shows that organisations are still measuring the success of agile projects using the traditional success criteria, which is 'planned vs. actual' concerning timelines and 'product Quality', but no adequate tools exist to measure this under an agile structure.

Ikram and Dev (2020) state that one of the most important advantages of using agile project management methodology is that agile project management methodology is faster in its software release development, is easily understood, and the need for documentation is less, which highlights the importance of agile project management methodology for projects.

The agile approach emphasises the importance of supplying the consumer with a full market value, and this is the main purpose of agile project management. Furthermore, agile thinking is an approach to customer loyalty and needs. Lean software development claims that something that does not add value to consumers is deemed waste. One way to comply with these concepts is by separating criteria with respect to their market value and by making use of the prioritised set of criteria for leading the production process. This is a pattern that has been embraced by specific design approaches such as scrum or intense programming (Jarzębowicz and Sitko, 2020).

2.7 Theme 3: Agile Project Management and Project Success

Misra et al. (2009) defined the success factors associated with applying agile project management using a purely quantitative methodology on a larger scale than those found in other articles. The authors were able to construct a success factor framework that includes people and organisational factors and confirmed that the important factors were those related to the customer, such as customer satisfaction, customer collaboration, and customer commitment. Other factors identified related to management aspects were time needed for a decision, corporate culture, and control of the project. Additionally, the identified factors related to project managers were personal characteristics, societal culture, and training and learning, although research by Gandomani *et al.* (2020) indicates that there is no independent position corresponding to 'project manager' in agile methodologies.

In attempting to identify the factors associated with the successful application of agile to project management to achieve project success, Sheffield and Lemétayer (2013) came to the conclusion – validating certain sections of Misra et al. (2009) – that success factors are affected by organisational culture. This was in keeping with a previous article (Conforto *et al.*, 2016) that stated that agility was a culture and recommended the empowerment of project team members, which is also in line with the conclusions of other articles that have investigated this issue. O'Sheedy and Sankaran (2013) focused on deriving an agile project management framework and what to stress during each of the traditional project management phases, leaving the need for action research to be conducted or practical applications to be investigated.

As traditional project management fails to adapt to the rapid changes in project requirements, which resulted in higher time to market and long product lifecycles requested by customers, this was the trigger that introduced the agile project management methodology (Livermore, 2008).

Sheffield and Lemétayer (2013b) find that there are important factors that lead to project success using an agile methodology. First, both the project environment and project should be aligned with one of the agile methodologies that will be applied. Second, to achieve project success, Organizations should follow the most acceptable degree of agility in software development. Third, upper management, project management, the team and the client can all collaborate on software development resilience to guarantee the performance of the project. Fourth, a more agile and adaptable strategy to project management and software creation can be embraced by the development team, project manager, client and senior management.

Hummel and Epp (2015), in their research about the CSFs, find that self-government is the principal team distinguishing, which is in line with the research in the first theme. Moreover, management involvement and agile values are crucial for project success at the organisational level. Customer involvement was found to be the most important factor for project success (Tam *et al.*, 2020b) and communication. In summary, the researcher has found that Chow and Cao, Misra et al., Wan and Wang, and Sheffield and Lemétayer all agree on team characteristics as a critical success factor to be applied using agile methodology. The authors also agreed on customer involvement and organisational culture. Some of them agreed on the project management process, delivery Strategy, customer satisfaction, project nature, and control.

Eight success factors have been identified for agile methodology. These eight CSFs are mapped into a) technical, b) organisational, c) people and d) process (Aldahmash *et al.*, 2017). As was true in most of the articles, Aldahmash et al. agreed that for the technical success factor, delivery strategy and agile techniques are the factors of success. On an organisational level, culture and communication play an important role as success factors. On the people level, team capability and training, customer involvement, and top management support are the success factors. On the process level, the project

management process is the success factor. Aldahmash et al. stated that future research needed to identify the weight of each of these CSFs, which will be part of the researcher's current project. Aldahmash *et al*. agree with Ahimbisibwe *et al.* (2015), who found 37 critical success factor grouped on a different level but intersecting in the topmost critical factors.

Ramadan Darwish and M. Rizk, (2015) identified 34 CSFs and grouped them into five groups: four are the same as Aldahmash et al. and one group was added: the project. The authors developed a conceptual framework reaching the same results as the previous researchers, agreeing on all on the top CSFs.

Nasir and Sahibuddin (2011) identified 26 different CSFs. They found that a) customer involvement, b) senior management involvement and support, c) capable project manager, d) accurate estimation of the budget and schedule, e) clear requirements, and f) effective communication was considered to be the most critical success factors, which is again in line with all other articles. Furthermore, the authors grouped them into the same groups, which are people-related factors, process-related factors, and related technical factors.

Dikert *et al.* (2016) found 29 success factors. They were divided into 11 groups. The most critical success factors were a) selecting and modifying the agile model, b) thought and alignment, c) management involvement, and d) preparation and coaching.

Agreeing with most of the articles on the groups and the CSFs, Dikert *et al*. found that the research is still lagging because the acknowledged success factors and challenges came from the practitioners.

Boehm and Turner (2003) stress that success factors for agile project management methodology adoption are related to people. The authors defined those related factors as staffing, values, communication, culture, and expectation management. They found that these people traits are critical to the success of software development and management.

Chiyangwa and Mnkandla (2018) examined the perception that applying agile project management methodology leads to project success in the IT field urges for action research to prove what they have found. Still, they are in line with previous researches about the same success factors that lead to agile project adoption success.

2.8   Theme 4: From Traditional to Agile

Alqudah and Razali (2017) found that 50% of the projects adopting an agile methodology were successful, while the failed projects were due to selecting the wrong methodology.

Papadopoulos (2015) stated that the inflexibility of traditional project management and its failure to respond to customer requirements changes led to the need for an alternative. The use of agile project management can increase customer satisfaction and hence ensure that a project's value will be achieved. This is due to the flexibility of this approach in terms of identifying requirements and ensuring project success. The case study concluded by Papadopoulos focused on a telecommunications company producing software using scrum over the waterfall, which is more commonly known as the traditional technique. In this case study, the proposed project was developed using both techniques to be able to compare the results. The results of the applied case study prove that the agile Framework improves quality and allows for requirements to be changed during the project lifecycle and that it also improves employee satisfaction. Adopting the agile methodology will not be straightforward for large corporations that have adopted the traditional methodology, and the application of an agile approach requires care.

Papadopoulos (2015) recommended a tailored, agile methodology for large organisations; however, it required further investigation. Špundak (2014) stated that each project is unique; therefore, a project management methodology should be chosen according to the type, size, and importance of a project. However, choosing a specific methodology for each project is likely to prove difficult and a waste of both time and money (Špundak, 2014).

In a comparison between agile and traditional and the quality achieved from adopting agile, it was found that agile is preferred over traditional because it deals with unstable requirements and also achieves time to market (Abdalhamid, 2019).

Sharma *et al.* (2012) compared the agile process with other software development life cycles and found that agile may not be the best choice in some cases, and this proves that there are still organisations working with the traditional framework. In conclusion, the authors found that an agile project is better than others concerning productivity, performance, TTM, and risk analysis. They also found that agile processes are implemented in web-based, testing tools, which is proof of what the researcher wants to apply in this research as Agile methodology can be successful when applied to testing and quality assurance process.

To move from traditional to agile project management, there are factors to be considered to ensure the success of applying agile project management methodologies. Robbins *et al.* (2016) identified the failure and success factors in agile project delivery as a) organisational culture, b) skill level and attitude of team members, c) project type and project planning, d) structure of the team, e) Involvement of stakeholders, and f) customer involvement.

Paasivaara *et al.* (2018) were able to highlight how a large-scale organisation such as Ericsson succeeded in introducing agile project management methodologies in the

research and design department (R&D) as a transformation process. They based their qualitative research on semi-structured interview and derived four lessons:

1) Transformation at a large scale should start with an experimental approach.
2) In complex large-scale organisations, the implementation of the transformation process should be step by step.
3) It is very limited to perform team inter-changeability under significant transformation.
4) The transformation process in large-scale organisations should be under a common agile framework. Furthermore, combination with common training and management coaching technique is essential to avoid this leading to transformation failure.

The same has been confirmed by Conboy and Carroll (2019), who, alongside Bick *et al.* (2018), identify the challenges faced during implementing a large-scale agile framework.

Misra *et al.*, (2010) indicated that to move from traditional to agile and ensure that the organisation will succeed by adopting the agile project management methodologies, the organisation must ensure the changes in the organisation culture, management style, knowledge management strategy, and development processes. This is in line with Robbins *et al.* (2016).

Importantly, if the company is working on basic projects and their projects are specified with consistent scope and specifications, traditional models will suffice. Alternatively, agile is the path ahead where requirements are unclear, ambiguous, and always change in requirements or scope (Reddy and Kumar, 2020). Furthermore, Nurdiani *et al.* (2019) suggested that agile practices should be introduced in a certain order to overcome any obstacles from traditional to agile.

There is still debate between practitioners that agile project management and traditional project management are complementary, although it has been proven that moving from traditional to agile specifically in the field of software development produces significant results and achieves greater project success (Ciric *et al.*, 2019). The key point is how the organisation will adopt the agile methodology and how it will introduce it and the success factors that will be determined and adopted. Furthermore, it has been found that the people's perceptions about agile transition are the key success to the move from traditional to agile (Ciric *et al.*, 2019), which again stresses how people are one of the most critical success factors implementing agile and achieving project success.

2.9   Theme 5: Implementing Agile and the Affecting Factors

Software development methodologies associated with agile are the following:

1. Scrum
2. Crystal methods
3. FDD
4. XP

Each methodology has advantages and disadvantages; Livermore (2008) stated that there are factors that affect the adoption of agile project management, among which are the project management methodology used and which project management methodology best suits an organisation. Rasnacis and Berzisa (2015) claimed that 2.5% of all companies globally had a 100% completion rate for their projects. The authors also indicated that most projects exceeded their budgets or durations or were not completed. The article suggests that future research should focus on the effect of introducing the project management methodology to be used to a team before it is implemented, as this likely to promote the successful adoption of the methodology in question.

Rasnacis and Berzisa (2016) discussed methods to be used for the adaptation and implementation of agile project management. Similarly, to the previously discussed articles, they suggested first following the steps for identifying a methodology, then identifying the requirements, and finally entering the adaptation phase. They concluded that agile project management would improve the organisation development process. The project team is a key success factor in the successful implementation of a project. Thus, the structure and motivation of a team and the ability of its members to adapt to agile roles can lead to success (Rasnacis and Berzisa, 2016; Garousi *et al.*, 2019). The case study also identified some limitations, as this approach was only found to work for smaller teams. A team must have previous cooperation experience and should have worked with the agile methodology previously.

Having summarised the literature review, the gap identified in the literature requires the identification of the CSFs associated with applying agile project management methodology to the traditional project management methodology to promote a greater likelihood of project success. In addition, the proposed study will determine whether applying the agile approach to project management will prove successful for service findings, which – if it is found to be the case – will contradict the findings of Kaur *et al.* (2015). Abdalhamid (2019) finds that XP and scrum are the most used methods in applying agile project management methodology. Furthermore, he finds that most domain areas that are used in agile are as follows: adaptive planning, continuous improvement, and value-driven delivery.

Many challenges will face an organisation planning to switch to agile project management methodology. Fuchs and Hess (2018) proposed that a large-scale agile transformation should be taken as a sequence of agile phases. They also identified the barriers to reach the right agile transformation. The challenges the organisation will face will be changed in the process, which will need firm engagement from the management layer.

Livermore (2008) stated the differences between the agile methodologies. He stated that XP is the most popular method in adopting agile. He also stated that in order to adopt this methodology, the customer should be collocated with the development team to ensure fast adoption of requirements. For iterative delivery, Livermore suggested the FDD methodology. In contrast, the scrum methodology, as stated by Livermore, was developed to handle rapid changes in business requirements. Concerning the Crystal method, Livermore stated that it is a software development method to be used when individuals impact software development more than tools or processes.

Bavani (2009) researched the CSFs which have to be addressed when utilising agile product creation and testing through different departments. He found the following to be the CSFs: set up base camp for teams to work with each other, Ensure clear delegation and confirmation of hypotheses, break communication chains, promote tool-driven question resolution, introduce test drives, evaluate internal efficiency, handle effort variation proactively, take stock of user stories for status tests, engage in corrective actions, and complement individuals to improve processes. He finds that those are the critical factors to be applied to ensure successful agile implementation, and this finding is in line with other themes especially when it comes to teams and communication.

Melo *et al.* (2011) stated that the team composition and allocation, external dependencies, and staff turnover are considered the important factors in agile team success, which is in line with Hummel and Epp (2015). The team is the asset and the important cornerstone for any business and to achieve project success under agile methodology: the team should be cooperative and supportive. The openness in the team is one of the CSFs too: the climate that the management will create for the team will play an important role in achieving project success (project value) using agile methodology, as confirmed by both Gren *et al.* (2017) and Vishnubhotla *et al.* (2020).

Lindgren and McAllister (2014) agree with Livermore (2008), both stating that scrum and XP are considered to be as two of the most popular used methods. The authors also stated that they allow agile teams to self-organise, which is considered to be one of the most critical success factors, as stated in the first theme.

While implementing the agile methodology, Barash (2013) finds that a combination of project management methodologies in large complex projects reduces risk and leads to success

Amir *et al.* (2013) highlighted that the software system is developed through several increments using agile methodologies. People use agile methodologies because they simply accept the change request at any stage of development. The authors also indicate that there is still a strong need for a software development lifecycle process under agile and that there are problems associated with applying agile methodologies, such as management support, limited support for reuse, and the contract not being well defined with subcontractors, which indicated why agile project management approach is not fully adopted in the industry. Agile projects have received less attention (Zaitsev *et al.*, 2020) as organisation and people factors are considered to be the most important factors used to achieve agile implementation success. Apparently, a recent study requires a comprehensive review about how to adapt objects to agile software development and promoting project teamwork (Zaitsev *et al.*, 2020).

Lebdeh *et al.* (2020), as a result of implementing agile in large-scale organisations, indicate that the first approach to the integration issue is to strengthen coordination between the various technical and management personnel. The planning stage of the large-scale construction project must also require the development of effective communication plans. Each and any project must have an agile structure customised prior to implementation with a view to optimising tasks and plans as per work specifications.

Importantly, scrum and kanban are the agile techniques most widely used to effectively achieve project deliverables. The main success drivers of the agile technique have been determined as organisational working style, organisational framework, execution of sound management practices, economic climate, backlog prioritisation, day-to-day stand-up meetings, design of the required project management resources and strategies, the scale of the project, team capacity, and customer engagement in the project (Shakya and Shakya, 2020), which agrees with all of the researchers on the success factors.

As a summary for the literature review, Please refer to Table 8 Appendix VII which summarise the five themes with the authors selected for each theme.

2.9 Research Gap

Agile methodology is predominantly used for software development as per the literature review. Very limited research was found to have been applied to DS and MS generally. A limited number of articles from the literature review highlight the field of telecommunication. The limited research in the field of telecommunication highlights that there is a research gap for agile methodology in the telecommunication field and for the two chosen departments, to which this project will be applied to. Therefore, the output of this research project will add to the knowledge of the application of the agile methodology to both MS and DS in the telecoms field.

During the literature review process, it was also found that there is a new trend of applying the agile methodology to the IT department to serve the artificial intelligence (AI), and machine learning (ML) fields that are considered to be the future of IT departments.

As a summary, the Literature review chapter highlighted the field of research, including the Telecommunication field, then the Information technology under the

telecommunication field. It also defines what is project success as a definition. The chapter introduced the Agile project management methodologies. Five themes have been identified from the literature where the chapter reflects on each theme.

2.10 Conceptual Framework

The conceptual framework is the representation that shows the relationship between the dependent and the independent variables (Blomquist *et al.*, 2016). It will be used during the research project to ascertain the relationship between the variables and whether there is a causal effect of the independent variable on the dependent one.

From the literature review, it was found that the researchers are using project success as the dependent variable, and each researcher defines project success. Some of them used the traditional ones like scope, time and cost (Shakya and Shakya, 2020), others used quality, scope time and cost (Chow and Cao, 2008) as project success, while in this research project the researcher defines the project value (TTM) as project success. Moreover, as stated in the literature some of the researchers used the people factor only as Independent variables, others used all factors (people, project, process, organisation), while in this research project the researcher used the people factor and organisation factor only.

People Factor
- Team Size
- Team communication
- Team Performance

Organisation Factor
- Management involvement
- Customer involvement

Agile Project management Methodology

Project Success
- Value
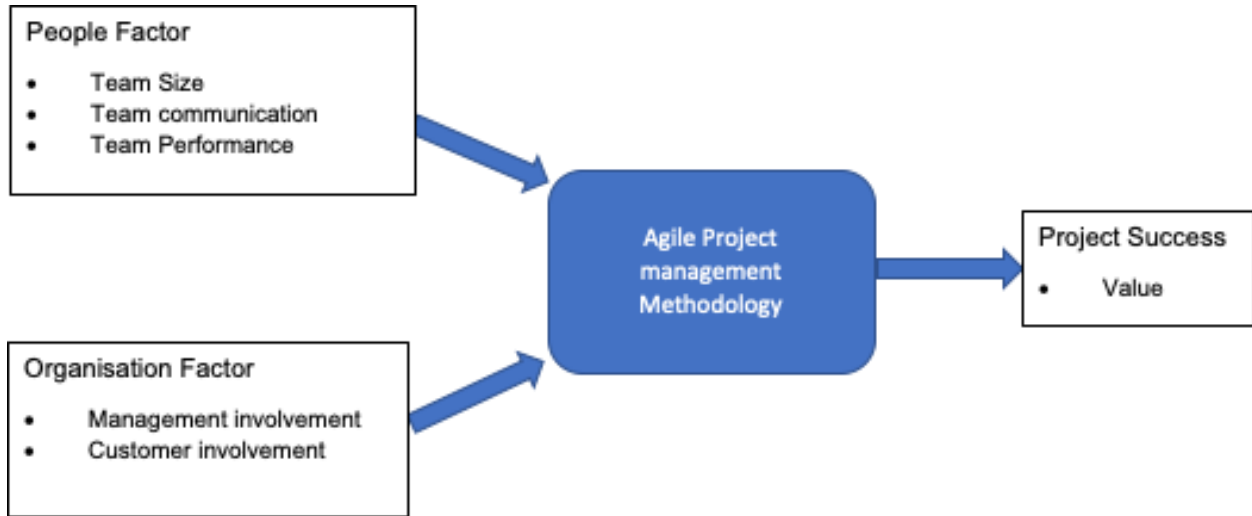
Figure 5: Conceptual Framework

The conceptual framework represented in Figure 5 represents the relationship between the selected independent variables to examine their effects on the dependent variable, which is project success, as previously defined in the project success section and as per McGaughy *et al.* (2018).

The researcher chose two factors from the five factors found in the literature review. Those chosen factors are the project factor and the organisational factor. Those factors were chosen because – as per the literature review, these are the most important and critical factors affecting the success of implementing the project using agile project management methodology (Chow and Cao, 2008; Hashim *et al.*, 2013; Stankovic *et al.*, 2013; Bavani, 2009; Nasir and Sahibuddin, 2011; Livermore, 2007; Tam *et al.*, 2020). Moreover, discussions with managers and project managers in company XYZ also confirm that both the people and the organisation factors were considered to be the most important.

The researcher chose the team size, team communication, and team performance to judge the people factor, while for the organisation factor the researcher chose

management involvement and customer involvement. Those two factors are considered to be the independent variables, which will be used during primary data collection to measure the output or the effect on the dependent variable, which is, in turn, the value of the project represented in project success.

2.11 Summary

In this Chapter the Literature review the researcher highlighted the field of research, including the Telecommunication field, then the Information technology under the telecommunication field. It also defines what is project success as a definition. The chapter introduced the Agile project management methodologies, it highlighted the most used methodologies. Five themes have been identified from the literature where the chapter reflects on each theme, and the researcher highlighted how the five themes have been identified from the literature. The conceptual framework has been developed from the literature and the researcher highlighted why the people and organizational factors have been chosen as independent variables. Research Gap has been identified and stared clearly that there is a scarcity of researches in the two domains DS and MS under the IT Telecommunication field.

Chapter 3: Methodology

3.1 Introduction to Methodology

This chapter discusses the methodology and the method used in this research project. In this chapter, the researcher will introduce the philosophical position and the detailed approach to achieving the aim and objectives of this research. The chapter will start with an introduction to the methodology and then follow the adopted methodology for this research project. The methodology is simply the theory of how the researcher will undertake the research (Saunders *et al.*, 2009, p.3).

Saunders et al. (2016) presented what they call the research onion: a representation of the philosophy and the strategy each researcher can adopt in his/her research. The research onion subdivided into layers, as shown in Figure 6 below.

The researcher will highlight the used methodology from each layer in this chapter.
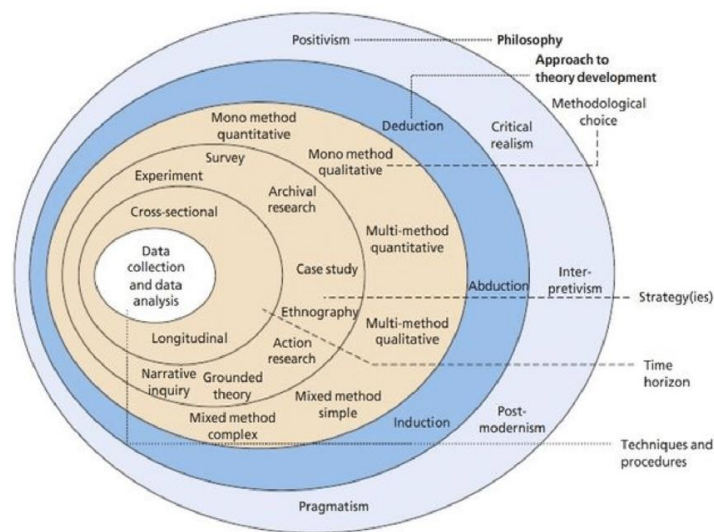
Figure 6: Research Onion. Source: author following Saunders et al. (2016)

3.1.1 Ontology

Ontology is how things can be proved to exist or not. It is also concerned with the nature of reality (Saunders *et al*., 2009). Ontology is concerned with two different approaches: objectivism and constructivism. According to Saunders *et al*. (2009), objectivism represents that social entities exist already without depending on social actors, while constructivism represents that people construct their understanding based on experiencing things and reflecting on those experience.

Ontology	Answers	Main issue	Approaches
Assumptions about the nature of the social world	What is believed exists?	Are social entities objective with a reality external to social actors or are they socially constructed by the actions and perceptions of social actors?	Objectivism and constructivism

Table 7: Ontology

3.1.1.1 Objectivism

Social events and their implications occur regardless of and limit the behaviour of social actors (Bryman and Bell, 2015, p.26). It is an ontological stance that states that social structures exist in a reality that is separate from and independent of the social agents that are associated with their existence (Saunders *et al.*, 2009).

3.1.1.2 Epistemology

Epistemology concerns how knowledge will be created from research (Goertz and Mahoney, 2012). It also works on understanding the social world. It is considered to be a branch of philosophy concerned with the essence of knowledge and what constitutes suitable knowledge in a particular area of study (Saunders *et al.*, 2009).

Epistemology	Answers	Main issue	Approaches
Aims to understand the social world	How to know things? What types of proof looked for to justify what believed to exist	Are the approaches of the natural sciences appropriate for the social sciences?	Positivism, interpretivism, and critical realism

Table 8: Epistemology

3.1.2 Layer 1: Philosophy

3.1.2.1 Positivism

Positivism is an epistemological position (Bryman and Bell, 2015, p.30) with the following characteristics:

• Focused on natural science methods

• Distinguishes reality (objectives) from beliefs, views, etc (subjective).

• The purpose of the study is to evaluate proposals (hypotheses) that are focused on measurable items.

• Produced awareness creates universal rules

• Mostly uses quantitative approaches (e.g. surveys) to define, quantify and show the causal relationship between social systems.

3.1.2.2 Interpretivism

Interpretivism is a contrasting epistemology to positivism (Bryman and Bell, 2015, p.30). Truth is not assumed to be empirical and external but is created and given meaning by humans. Emphasis is not on truth, but on realizing what people think and feel about themselves, and how this impacts their behaviours. Adopting Interpretivism the researchers have the following :

- Their actions are, therefore, unpredictable.

- Traditional scientific methods are not appropriate for the study of society.

- Society is not objective and external to people but is given meaning by their actions.

- Social reality (social structures) is subjective and constructed by individuals.

- Social science is about making sense of the emotional perception of individuals.

- To understand humanity, the implications that culture has for people need to be discussed.

- The goal of the research is to clarify how social actors perceive and view reality and then to demonstrate how these understandings influence their actions.

- Research results are contextual, contingent and fluid – that is, this research will not produce universal laws.

	Positivism	Interpretivism
Approach	Deductive	Inductive
Methodology	Survey or experiment	Ethnography, case study, or grounded theory
Method	Questionnaire scales, analysis of empirical data. Quantitative approach.	Interviews, observations, focus groups, discourse analysis. Qualitative approach.

Table 9: Positivism Vs Interpretivism

3.1.3 Layer 2: Approaches to Theory Development

In this section the researcher will highlight both the deductive and inductive approaches with a summary per each approach as below:

3.1.3.1   Deduction

In the deductive approach the researcher is Using research to test the validity or truth of theories, testing the theory, the researcher deduces hypotheses. The researcher then tests these hypotheses against evidence, for example through a survey or experiment. So as a summary the deductive approach starts with the theory that the hypothesis comes

from the theory, then the hypothesis is tested, followed by the conclusions and then the results, the last step is to reject or affirm the theory or to update the theory.

3.1.3.2   Induction

In the inductive approach, the researcher uses the bottom-up approach often associated with interpretivism, using the data collected to develop a theory – that is, an abstract explanation of social phenomena. The researcher makes observations/ findings, looks for patterns, develops tentative questions. Then the researcher collects data to answer the research questions through survey or interview, reviews findings in light of data collected develop theory.

Inductive	Deductive
Theory building	Theory testing
Building understandings of the relationships between meanings and actions of human subjects	Testing of hypotheses

The analysis is 'grounded' in the data – context of the situation is incorporated into the analysis	Data gathered, and information used to test whether the hypotheses are supported
Data leads to a credible explanation of behaviours that have been observed	Adopts a replicable approach

Table 10: Deductive vs Inductive

3.1.4 Layer 3: Methodological Choice

3.1.4.1 Quantitative Method

The quantitative method is the method depending on numbers and statistics, used to describe, explain, or even predict (Cooper and Schindler, 2014, p.147). It can be used to collect primary data from the large sample size, can be applied cross-sectionally or longitudinally over time. Quantitative methodology include answers to questions such as how much, how frequently, how many, why, and how. Although the survey is not the only technique used by quantitative researchers, it is the most common (Cooper and Schindler, 2014, p.147).

3.1.4.2 Qualitative Method

The qualitative method is the method used to understand and interpret. It is used for in-depth understanding and theory building, too (Cooper and Schindler, 2014, p.147). The sample size is typically small compared to the quantitative method. Techniques used in decision making arose from anthropology, sociology, psychology, linguistics, communication, economics, and semiotics. Specific depth interviews and community interviews, as well as assessment, ethnography, intervention analysis, and grounded theory, are examples of popular techniques. (Cooper and Schindler, 2014, p.167)

3.1.4.3 Mixed Method

The mixed-method is a method that involves both quantitative and qualitative methods together in one method. The analysis can be done parallel or sequentially (Saunders *et al.*, 2009). There are reasons for adopting a mixed-method, as shown in Table 11 below.

Triangulation	Using two different data collection methods to confirm the research results
Facilitation	Choosing the appropriate data collection method to support studies using another data collection method
Complementary	Use two different strategies to cover various aspects of an investigation
Generality	To contextualise the main study

Different aspects	Looking at micro and macro aspects using qualitative and quantitative
Solve dilemmas	To solve uncertainty when one method reveals unanswered questions
Interpretation	Using qualitative data to explain the relationship between quantitative variables

Table 11: Why Use Mixed Method? Source: adapted from (Saunders et al., 2009, p154)

The alternative strategies for mixed methods

Sequential explanatory	Sequential exploratory
Concurrent triangulation	

Table 12: Alternative Mixed Method Strategies

3.1.4.4 Sequential Explanatory Mixed Method

Is a common mixed methods design approach that often appeals to researchers with deep quantitative backgrounds. Under this method, the quantitative data is collected and analysed, followed by qualitative data collection and qualitative data analysis. The result from the qualitative part is used to explain the result from the quantitative part (Creswell, 2017, p.209). Typically, a sequential explanatory design is used to clarify and analyse quantitative findings by capturing and evaluating additional qualitative details. It is particularly helpful when surprising findings from a quantitative analysis emerge (Creswell, 2017, p.211).

3.1.5 Layer 4: Strategy

3.1.5.1 Experiment

Experiments are studies that need involvement by the researcher. The need of the researcher is to manipulate variables and observe the effect on the study. The researcher manipulates independent variables and then observes the effect on the dependant variable (Cooper and Schindler, 2014, p.192).

3.1.5.2 Survey

The survey is a data collection strategy in which questions are being asked to the survey-takers (Sreejesh *et al.*, 2014, p.17) The survey can be performed through different channels such as emails, telephone, and face to face.

3.1.5.3 Action Research

Action research is a strategy of applying the research to real-life and testing the output, rather than obtaining results and recommendations alone (Saunders *et al.*, 2009, p.147). Hence, the researcher is part of the organisation as an insider, where it will be easy for the researcher to apply the results.

3.1.6 Layer 5: Time Horizon

3.1.6.1 Cross-Sectional

A cross-sectional time horizon involves collecting data at a single point of time: most surveys fall into this category. The overall target population is divided into different segments in this form of sample, and data is obtained from all of these segments using a

sampling process. Cross-sectional surveys had the advantage of being more reflective of the population. (Sreejesh *et al.*, 2014, p.61)

3.1.6.2 Longitudinal

Longitudinal studies are research studies that use several surveys to collect data over time. They aid in the tracking of behavioural changes in the population of concern to the researcher. This method of survey is adaptable and can interview multiple subjects over time as long as the new subjects are either from the same group or sub-group roots. As a result, longitudinal studies are critical not only for learning about existing social conditions but also for measuring their variation over time. For the development of longitudinal surveys, a variety of designs are available. (Sreejesh *et al.*, 2014, p.61).

3.1.7 Layer6: Techniques and Procedures

3.1.7.1 Data Collection and Data Analysis

Data collection concerned with the following:

- Identifying and selecting all objects to be measured
- Extracting evidence of the value from these objects
- Recording this evidence

The methods and protocols used to provide the final layer of the research onion. It is used to better illustrate the methods and aims of the study. At this stage, the researcher must select between primary and secondary data, as well as qualitative and quantitative data gathered from various sources. In the research onion framework, data is regarded as the most important component. Data analysis is the interpretation of scores obtained in a study to generate the outcome of the study (Dul and Hak, 2008, p.94).

3.2 Methodology

The methodology is the paradigm that underpins research activity (Blaxter and Hughes, 2010, p.59) or the steps that will be followed to reach the aim and objectives of a research undertaking. The methodology will ensure that the research questions are answered. Many articles and many books provide details regarding research methodologies and their types and how they should be adopted.

The aim of this research project as stated in chapter one is to allow the organisation being investigated to achieve its project goals by giving the project value. In the process of achieving the project aim, the selected method will be used. A mixed-method approach will be adopted (van Griensven *et al.*, 2014; Molina-Azorin, 2016; Harrison, 2013). This approach will be in line with the sequential explanatory mixed-method design discussed by (Creswell, 2009, p. 209). A sequential explanatory mixed-method design will be used to identify the most significant amount of data collected, or – in other words – to reach a statistically significant level of data from the population sample and to subsequently analyse it. Moreover, triangulation performed using the two different methods will form the basis of the validation and confirmation obtained, using semi-structured interviews (Schultze and Avital, 2011; Doody and Noonan, 2013) as a qualitative method. The researcher here adopts the mixed-method strategy as it is the most suitable for answering research questions and the most suitable for such types of research.

| Quantitative Data Collection | Quantitative data analysis | Qualitative data collection | Qualitative data analysis | Interpretation of Entire Analysis |
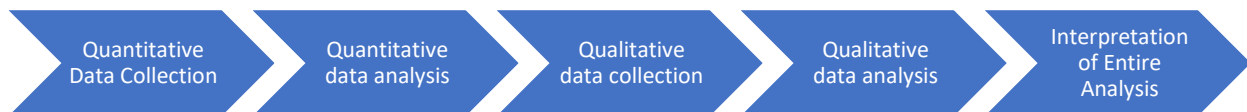
Figure 7: Sequential Explanatory Mixes Method

3.2.1 Method

Following the adoption of the methodology discussed above, the subsequent steps will be the application of the quantitative method, which will initially be the quantitative data collection method followed by quantitative data analysis. In turn, this will be succeeded by qualitative data collection and qualitative data analysis. The researcher used, the data obtained from the qualitative phase after analysis to explain findings obtained in the quantitative phase, triangulate the findings in terms of confirming whether the same results were obtained from two different sources, and thus also validate the findings. In other words, the researcher runs the quantitative analysis on the primary data collected then the analysis takes place. After that, the researcher runs the qualitative analysis on the data collected from this phase. The researcher uses qualitative analysis to explain what was obtained in the quantitative one. As an example, the most critical success factor, for example, customer involvement as per the quantitative analysis, the qualitative analysis explained that this is the most important factor as the customer involvement is the core of project achieving its value and this is also aligned with the literature. The researcher chooses this method to obtain the max amount of information from the quantitative method, and then using the qualitative method starts to explain the findings. Moreover, the research questions developed after the literature review cannot be answered using only one method, as there is a question that can be answered qualitatively but another needs to be answered quantitatively. Therefore, by beginning with the deductive research methodology and using a mixed-methods approach as a means to answer the research questions, both quantitative and qualitative data collection methods (Bryman and Bell, 2015) were used.

For the quantitative method, a survey was used as a data collection tool. For the qualitative method, semi-structured interviews (Schultze and Avital, 2011; Doody and Noonan, 2013) were used to collect data.

A concrete time plan was adopted to ensure that the timelines for this research were not exceeded. A SMART (specific, measurable, achievable, realistic/relevant, time-bound) approach to research was followed (Lee-Kelley and Blackman, 2012; Yardley, 2014; Quader and Quader, 2008; Zwikael *et al.*, 2018). The aim, objectives, and research questions were specific, measurable, and achievable; they were realistic and were achieved within the 2-year time frame.

The literature review has been conducted as the first step to account for the gaps in the literature and to avoid reproducing previously conducted research (Blaxter and Hughes, 2010, p.101). The literature review also helps develop the conceptual framework, as it makes it possible to determine the relationships among the dependent and independent variables. Therefore, the researcher's philosophical position is an objectivist ontological, and positivist epistemology. A critical review of the literature has been conducted from this perspective. Since the researcher believes that social phenomena exist and have meaning, his philosophical position is that of an objectivist. In addition, the researcher believes that the truth exists and needs to be discovered, which is why his epistemological position is positivist.

The collection of information, according to the proposed methodology, has been ensured. The gap in the research has been identified to ensure the outcome of the proposed research project will add to the existing knowledge. The data collection phase is therefore described below.

3.2.2 Data Collection

The data collection proceeded using the appropriate instruments which are the survey as a tool for the quantitative and the semi-structured interview as tool for the qualitative, they considered the most appropriate tools for such methods in the same field., starting with the quantitative method and the collection of the quantitative data. For the sake of the

research and to ensure a fair and non-biased selection, the probability random sampling method was used to determine the sample size (Israel, 1992; Hsieh *et al.*, 1998; Bartlett *et al.*, 2001). A survey was sent to the selected samples using Bristol online survey tool (Jisc, 2020). It aimed to measure all of the relationships among the independent and dependent variables. Moreover, to account for the effects and causality thereof, SPSS (Field *et al.*, 2013) was the tool used to analyse the collected data. Both descriptive analysis and inferential analysis used in this research project to analyse the collected data from the survey. The survey was cross-sectional and was conducted for over 2 months. The findings were noted and explained with reference to the finalised qualitative research.

Phase two of applying the methodology was the data collection, which was performed using the qualitative method. In this phase, individual managers were chosen using purposeful sampling (Creswell, 2009, p.217) to ensure that the most relevant resources for explaining and triangulating the findings obtained during phase one were selected. The chosen resources play a vital role in the organisation concerning agile project management methodology in both departments: DS and MS. Furthermore, they are decision-makers running agile projects. The triangulation was based on collecting data using two different methods. The aims of choosing the professionals with whom the interviews were conducted were to confirm the validity of the quantitative data that was collected and analysed in phase one and to explain this data and acquire more information to enrich the research analysis. Thus, by conducting semi-structured interviews (Doody and Noonan, 2013; Schultze and Avital, 2011), it was possible to validate the results of the survey and provide the interviewees with the opportunity to comment on and contribute to the research. The analysis was conducted using NVivo software. Both the analyses were used to triangulate the respective results and to confirm the results, which made it possible to answer the research questions.

It is crucial to mention that because of the pandemic COVID-19 case in the whole world, the interviews were done using video conference, sue to restrictions in travelling abroad. The video interviews were then transcribed and then used for analysis. The survey was given online as normal so the Pandemic did not affect the collection of data.

3.2.3 Sample Size

The sample size, as stated before, was identified according to predefined formulas (Israel, 1992; Hsieh *et al.*, 1998; MacCallum *et al.*, 1999; Bartlett *et al.*, 2001). The ideal sample size was determined to be 110, to be considered as survey takers out of a population of 130 with a confidence level equal to 99%, and a confidence interval equal to 5. In the qualitative method, as stated before, purposive sampling was used, it is also called judgemental nonprobability sampling and ceases when no further info has been acquired from the semi-structured interview. The sample size of the qualitative method was five interviews and the researcher stopped when no more info was obtained and the same information starts to be collected from the managers.

3.2.4 Analysis and Reflection

In this phase, the analysed data is critically reflected upon, which contributes to both the proposed research project and filling the gap in the literature. The critical reflection demonstrates how the research project closes this gap and answers the research questions. The researcher will attempt to publish a section of the work that can support the research project if possible when sufficient data has been collected. The researcher will use peer review during the remaining lifecycle of the project to ensure it is understandable and to identify any points that may be vague. The researcher also attended conferences and fora related to the research topic, where he was able to acquire more knowledge, consult experts, and engage in peer review with professionals. The researcher will use the output of the research project and attempt to apply it to the

organisation where this research (considered as action research) was conducted. Therefore, the output is a recommendation to the management, resulting from an actual action research project that can be used as a pilot for the application of the results of the proposed research project.

3.3 Ethical considerations

The researcher ensured that the proposed project followed all of the ethical guidelines required by the ethical committee at the University of Northampton. The survey participants and the interviewees had the right to withdraw at any point in time without the need to provide a reason for doing so. In addition, the data collected was kept in a secure place and was not disseminated as raw data. The participants were asked for their consent to participate. No participants were under the age of 18; however, this was inapplicable for this research project. The Pandemic did not affect any of the ethical consideration during the data collection procedure and this is because everything was done online due to the COVID-19 pandemic.

3.4 Summary

As a summary for this chapter, the researcher will follow Table 13 below as a methodology to fulfil the aim and objectives of this research project.

Ontology	Objectivism
Epistemology	Positivism
Approach	Deductive
Methodological Choice	Sequential explanatory mixed method

Strategy	Survey and semi-structure interview
Time Horizon	Cross-sectional

Table 13: Summary of Methodology

The chapter discussed the methodology adopted by the researcher in details. It also reflects on the philosophical position of the researcher in regards to the research project. It explains how the primary data will be collected, including sampling techniques, and then ends with ethical considerations.

The researcher is a positivist epistemology, using a deductive approach, the researcher chooses the sequential explanatory mixed-method research to explain what will be obtained as primary data from the quantitative method, to validate, explain, and triangulate the output and reveal any surprises. The researcher used the survey as the quantitative tool for collecting primary data, and the semi-structured interview as a tool to collect qualitative primary data. The time horizon is a crosssectional one.

Chapter 4: Analysis of Primary data collection

4.1 Quantitative

4.1.1 Introduction

As stated in the Methodology chapter, the researcher adopted the sequential explanatory mixed-method design to be able to answer the research questions and to be able to triangulate the results using the mixed method. The survey was adopted as an instrument for primary data collection, and the survey was designed to be able to answer the research questions. Using both the literature review and the research questions, the survey questions have been formulated to answer the research questions. The survey was designed in Four main sections; Section one was the demographic questions, followed by Section two about Agile project information, followed by Section three about Agile success factors, and at last Section four about the perception of success. It is important to say that the survey was populated online using the Bristol online website, as a place to collect the primary data as stated in the methodology chapter.
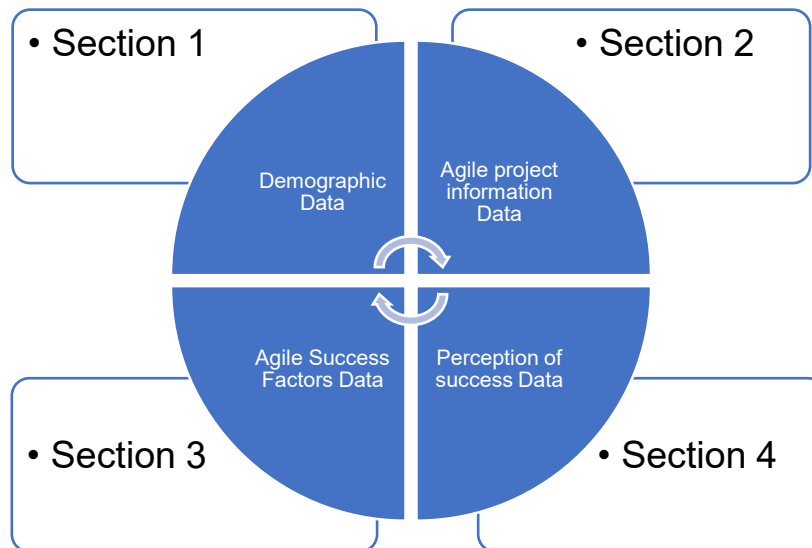
Figure 8: Survey Sections

4.1.2 Section 1: Demographic

In this Section, Demographic questions were asked to be used during the analysis and conclusion chapter. Five questions were asked as per table 14. The demographic questions help the statistical analysis of the survey takers according to their position, age, department and so on.

Gender	Age	Department
Position	Location	

Table 14: Demographic Information (Survey)

4.1.3 Section 2: Agile project information

In the Agile project Information section, the researcher got the answer to the questions related to project management methodology, project definition and scope, and three critical success factors as per the literature which are Customer involvement, Management involvement, and team capability, as per table 15:

Project Management Methodology	Project Definition	Team Capability
Customer Involvement	Management Involvement	

Table 15: Agile project Information (Survey)

4.1.4 Section 3: Agile Success Factors

Under the Agile success factors section, the researcher got answers related to questions formulating some of the independent variables, the same as in the previous section. So,

Variables like team size, team communication, team performance have been obtained to be analysed. questions related to table 16 were asked:

Team Size	Team Communication	Team Performance
Proper Training	Active Management	Implement Complete Methodology
Team Access external Resources	Corporate Size	Team Collocation

Table 16: Agile success factors (Survey)

4.1.4 Section 4: Perception of Success

Under the last section, which is the perception of success, questions related to table 17 has been asked. This section is crucial as the researcher intended to obtain the perception of the survey takers in the success of Agile project management methodology in their projects on both the DS and MS departments to be used after that and explained during the semi-structured interviews.

Agile in digital services	**Agile in managed services**

Table 17: Perception of success (Survey)

The researcher added an open question as free text is not mandatory for the survey takers to take their opinion about applying Agile project management in their organisation under the selected departments which are managed services and digital services.

The survey was opened for almost two months. There were multiple reminders during this period to encourage the participants to participate.

After the survey closed, the researcher exported the data collected through Bristol online and transferred them to the SPSS where the analysis took place.

As per the conceptual framework in figure 5 introduced in the Literature Review chapter, there are five independent variable and one dependent variable as per table 18.

Team Size (Independent Variable)	Q11, Q18
Team communication (Independent Variable)	Q12, Q19
Team performance (Independent Variable)	Q8, Q13, Q14, Q17
Management involvement (Independent Variable)	Q10, Q15, Q20
Customer involvement (Independent Variable)	Q9, Q21
Project Value (Dependent Variable)	Q6, Q7, Q16, Q22, Q23, Q24

Table 18: Independent and Dependent Variables

As per table 18, each variable was identified through the questions that were asked during the survey, producing six new variables that will be used during the data analysis that will come in the coming sections. Thus, the questions now have been mapped with each variable in the conceptual model to be used for analyses. As an example, all questions related to Team size as a variable have been grouped and the average was obtained to create a new variable called Team size that represents this independent variable. In which the researcher will use it in the statistical analysis either inferential or descriptive.

All questions except Section one questions have used the Likert scale as per table 19, were 'Strongly agree' have the value five and 'strongly disagree' have the value one:

Strongly Disagree	Disagree	Neither agree nor disagree
Agree	Strongly Agree	

Table 19: Likert Scale

4.2 Descriptive

The sample size was 110, with zero missing data means 110 survey takers answers all the questions. With this sample size, the sample will be considered as a normal sample as it's bigger than 100, so, the parametric analysis will be directly applied to it.

By computing the frequencies for Section one questions related to demographic information, please see table 33 Appendix VIII:

Checking the frequencies of the demographic section, it is shown in table 33 that all the samples taking the survey were valid with no missing sample. The mean, skewness and kurtosis of each variable are presented in table 33. As an example variable like Age, a hundred and ten survey takers answered the Age question with zero missing. The mean is 3.69 means that most of the survey takers are above 40 years, skewness is 0.154 means fair symmetry of data, Kurtosis is equal to -0.439 means the tail from a normal distribution is on the left side of the mean. Table 34 Appendix VIII represents that 95 out of 110 survey takers were Male while 15 out of 110 were female, with a percentage of 86.4% males, and 13.6% females. From table 35 Appendix VIII it is obvious that 50% of survey takers are over 40 years old means seniors. While in the mid-age most of the survey takers are between 36 to 40 years old confirming that most of the employees

working in this domain are seniors. Table 36 Appendix VIII represents the department which highlighted that 68.2% of the survey takers were from digital services while 31.8% were from managed services. Although the sample was taken randomly it highlights that may be the digital services department is bigger than managed services department in this organisation. Table 37 Appendix VIII represents the frequency and percentage of the survey takes per department. So, 48.2% of the survey takers were project/program manager, while 22.7% presents the program director as this is one of the biggest positions in the Digital Services department. From managed services department 1.8% chiefs, 2.7% directors.

By cross tabulating to representing the gender by department, age, and location please refer to table 38 Appendix VIII, Table 38 represents that female is working in digital services more than managed services, and the same goes for males. 65 Male in DS while 30 in MS, 10 female in DS, while 5 in MS. Table 39 Appendix VIII represents the crosstabulation between age and gender. For example, 2 females under the age of 30 or even equal to 30 while no males under that age. 46 Males between 40 and 50 years old, while 10 Females between the age of 36 to 45 years old. Table 40 Appendix VIII represents the crosstabulation of gender per region and it's clear that 71 males are in the Middle East while 9 Females only are in the middle east. Looking for Africa as a region 24 males only while 6 females are in Africa.

4.3 Reliability

By checking the reliability of the dependent and independent variables, it was found that data are reliable according to table 20 below:

Variable	Reliability test (Cronbach's Alpha)
Team Size (TEAM_SIZE_INDVAR1)	0.800
Team Communication (TEAM_COMM_INDVAR2)	0.543
Team Capability (TEAM_PER_INDVAR3)	0.710
Management Involvement (MANAGEMENT_INV_INDVAR4)	0.753
Customer involvement (CUSTOMER_INV_INDVAR5)	0.734
Project Value (Project_Value_DEP_VAR)	0.737

Table 20: Reliability test

4.4 Correlation

In this section, the hypothesis was developed to be tested. The hypothesis aims to find is there any relationship between the dependent variable and the independent variables. Five hypotheses have been developed one per each dependent variable as below:

$H1_0$: There is a relationship between Team Size and project success (Value)

$H2_0$: There is a relationship between Team communication and project value

H3$_0$: There is a relationship between Team Capability and project value

H4$_0$: There is a relationship between Management Involvement and project value

H5$_0$: There is a relationship between Customer Involvement and project value

The five hypotheses have been checked through SPSS, and please refer to Appendix VIII tables 41, 42, 43, 44, 45 for the result.

Table 41 shows that the p-value is equal to 0.007 which is less than 0.01 means significant and this leads to Team size and project value having a positive correlation which is equal to 0.255. Table 42 shows that the p-value is equal to 0.000 which is less than 0.01 means significant and this leads to Team communication and project value having a positive correlation which is equal to 0.392. Table 43 shows that the p-value is equal to 0.000 which is less than 0.01 means significant and this leads to Team performance and project value having a positive correlation which is equal to 0.538. Table 44 shows that the p-value is equal to 0.000 which is less than 0.01 means significant and this leads to Management involvement and project value having a positive correlation which is equal to 0.482. Table 45 shows that the p-value is equal to 0.001 which is less than 0.01 means significant and this leads to customer involvement and project value having a positive correlation which is equal to 0.312.

4.4.1 Summary of correlation

Variable	Pearson Correlation
Team Size (TEAM_SIZE_INDVAR1)	0.255
Team Communication (TEAM_COMM_INDVAR2)	0.392
Team Capability (TEAM_PER_INDVAR3)	0.538
Management Involvement (MANAGEMENT_INV_INDVAR4)	0.482
Customer involvement (CUSTOMER_INV_INDVAR5)	0.312

4.5 Regression

As an extra analysis, the researcher runs the regression test to check the following five hypotheses:

$H1_0$: There is a causality between Team Size and project success (Value)

$H2_0$: There is a causality between Team communication and project value

$H3_0$: There is a causality between Team Capability and project value

$H4_0$: There is a causality between Management Involvement and project value

$H5_0$: There is a causality between Customer Involvement and project value

Analysis has been done, and the five hypotheses have been checked as below:

Table 47 Appendix VIII shows that R square is equal to 0.065 which is almost 6.5% prediction percentage from Team size to project value, which is considered to be very low. Table 49 Appendix VIII shows that R square is equal to 0.154 which is almost 15.4% prediction percentage from Team communication to project value, which is considered to be very low. Table 51 Appendix VIII shows that R square is equal to 0.29 which is almost 29% prediction percentage from Team performance to project value, which is considered to be low. Table 53 Appendix VIII shows that R square is equal to 0.233 which is almost 23.3% prediction percentage from Management involvement to project value, which is considered to be low. Table 55 Appendix VIII shows that R square is equal to 0.098 which is almost 9.8% prediction percentage from customer involvement to project value, which is considered to be very low.

4.5.1 Summary of Regression

Variable	R square
Team Size (TEAM_SIZE_INDVAR1)	0.065
Team Communication (TEAM_COMM_INDVAR2)	0.152
Team Capability (TEAM_PER_INDVAR3)	0.290
Management Involvement (MANAGEMENT_INV_INDVAR4)	0.233
Customer involvement (CUSTOMER_INV_INDVAR5)	0.098

4.6 Free test question

As stated in this chapter, the researcher added an open text question that can be used for analysis in a later stage after the completion of primary data collection. The question was as below:

Please add any comment you consider valuable for the survey like your opinion for applying the agile Methodology. Add any information that you consider valuable for Applying Agile Methodology on digital services, managed services, or even testing. (This question is not mandatory)

The output will be presented here as it even if it contains grammatical errors for the professionalism of copying and pasting the survey takers answers as it is. Important to say that not all participants answered this question.

Please add any comment you see it as valuable for the survey like your opinion for applying agile Methodology. Add any information that you can see valuable for Applying Agile Methodology on digital services, managed services, or even testing. (This question is not mandatory)
Everything is fine from my point of view

Agile Way of working is more important than applying it as a process.
Applying Agile Methodology is valuable for any non clear first scope to minimise the changes through implementation.
We are belive that the agile project management will be achieves successful Telecommunication Projects, and we hope to apply it soon
- customer onboarding is important - training of either XYZ or Customer is important - setup and enablement costs are not in the budget in most of the times - products used today have a long journey until they can support an agile approach of delivery especially in the upgrades
Contracting and Exec sponsor must be aligned on the Agile scoping and ways of working
Transformation in Digital services is a must for all operators and only using Agile Methodology can make acceptable the required timelines to execute the transformation

Follow the agile frame work is the continuous improvement that we enable with Inspect and Adapt system.
Adopt approcah must have full amagagement commitment and have smooth takover from tradintional approach. All team members will need to be preskilled on the Agile approach
Requirements and type of deliverables are key contributor for deciding the delivery methodology to be used.
What is noted that we are running to apply Agile just to follow the trend, however in reality nothing changed
I dont have any agile experience so its not possible for me to effectively qualify the questions.
Agile project management best practices and success stories need to be shared with the organisation
Hybrid system might do better than pure agile unless customers are aligned and equally agile
Customer Experience & handset-based Testing Automation are key to Agile project success in a GSM environment

Agile Methodology is more significant in digital services filed rather than network roll out
One can not say categorically that Agile would be better then traditional project management or vise versa. It depends on the nature of the product to be implemented.
Planning is very important to setup and drive the project using Agile Methodology.
Use of Agile Methodology on ADM and SI projects can bring a positive efficiency and ability to detect and correct problems faster - by simply failing faster. In traditional ways of working, we tend to build upon a product version without taking its modules or functions to test / demo with the customer representatives. Consequently, we end up spending much more time in case there is a mismatch in functionality viz customer expectations. By using Agile we can avoid that or atleast minimise the impact. In telecom scenarios particularly it is very useful because telecom landscape changes rapidly. Customer requirements get revamped during the course of transformation projects / Large Crs. However, it may be noted that in ADM landscape, with small or medium level CRs, iterations and agile may not be possible to be applied.

This is must as new technology is evolving and these tools create value for money.

Agile in Telcos will require 1. Alignment/support from customer 2. Management support

Agile is a very good approach, but tailoring the approach to suite the project requirement is worth considering.

For software development / delivery related DS projects Agile is mandatory , however for NRO / Typical expansion projects its not applicable/ required , rather i prefer waterfall style project delivery

Applying agile Methodology depends on the size of the project that's why Lessons learnt and best practices for agile Methodology should be recorded&tracked.

I assume by following this approach we can get more business value plus customer satisfaction.

The concept of agile project management methodology in the public sector aims to overcome some of the weaknesses of conventional project management, such as the cumbersome communication system, the multilevel hierarchy in reporting levels, ex-post control, voluminous documentation, so i think its will be the future of management

Agile Methodology helped us to make the projects more easy to manage and implement and gave our teams the space to innovate and create healthy work environment which increase the productivity of the team
In managed services "Agile Methodology" can help us to improve the quality of project and delivery.
please consider type of project where Agile can be a value

Table 21: Survey takers free text question (quoted as they wrote it)

It is essential to say that this free question acts as an important question that directly answers one of the research questions as the researcher cannot grab all critical success factors through the survey. Still, a non-mandatory research question acts as an interview like a question where each survey taker, left with the choice to add whatever he/she sees as valuable information to add to the research.

It was found that thirty-six respondent representing around 33% of the survey takers have chosen to answer this non-mandatory question and they add valuable information that will be presented in details with reflection and relation to the literature with the coming chapter.

4.7 Qualitative

4.7.1 Introduction

The second phase of the Methodology is to run a qualitative analysis to obtain the following:

1. More detailed information from the experts
2. Explain what was gathered and analysed from the quantitative analysis
3. Triangulate the analysis obtained from the quantitative step

Purposive sampling has been chosen in this phase, which is also known as judgemental sampling (Cooper and Schindler, 2014, p.152). This sampling technique was used to give room for the experts and the decision-makers to provide the information. The information coming from the semi-structured interview will lead to the utmost benefit for the research project, and for sure for the benefit of the organisation itself. It will also act as an explanation to the statistical information gathers ad analysed through the survey and for sure will triangulate the quantitative information too.

It is essential to say that the interviews were fruitful and full of information that definitely cannot be collected through the survey. The semi-structured interview (Cooper and Schindler, 2014, p.153) was the right tool to be used which opened the door for the interviewer and the interviewee to interact seeking more info even beyond the pre-set questions for the interview.

Important to say that the information gathered through the interview adds a lot to the research and for the organisation itself once it is published internally, all the details will be reflected in the next chapter.

Five interviews have been conducted with the following titles:

1. Head of MS GCU Zain & CU GCC
2. MS Chief Operating Officer
3. Head of PMO PO BSS GCC digital services
4. Head of DS Strategy and BO
5. Head of Digital Services MMEA

For the sake of confidentiality, the names and the organisation will be kept anonymous as agreed with the organisation. But for the sake of transparency and proof to the university, the recorded interview and the transcript holds all the information about the interviewees.

In total, the interviewees represent digital services and managed services, where three of them represents digital services, and two of them represents managed services. The decision was taken to stop at the fifth interview due to the following

1. No more new information gathered
2. Information starts to be redundant (Same info)
3. The interview was done with almost all the decision-makers and involved parties

4.7.2 Thematic Analysis

Thematic Analysis (Kiger and Varpio, 2020) is the method used during Qualitative analysis to analyse the data obtained into themes and then codes to be able to do further analysis and then connect them with the literature. Thematic analysis is an influential and adaptable tool for interpreting contextual data that can be used in a variety of paradigmatic or epistemological frameworks. When attempting to explain experiences, emotions, or actions through a data set, thematic analysis is an effective form of analysis. The most commonly used method for performing thematic analysis is a six-step procedure that includes the order to familiarize yourself with the details, creating initial codes, looking for themes, updating themes, identifying and naming themes, and compiling the study (Kiger and Varpio, 2020). Please refer to chapter 4 for how thematic analysis have been identified from the qualitative data obtained and linked to the literature. As for the themes obtained from the literature, the researcher applied the below six steps to the articles.

1. Familiarizing Yourself with the Data
2. Generating Initial Codes

3. Searching for Themes

4. Reviewing Themes

5. Defining and Naming Themes

6. Producing the Report/Manuscript

The researcher used thematic analysis to analyse the interviews collected during the semi-structured interview. The researcher follows the six steps above to complete the qualitative analysis. The researcher used audio data that needed to be transcribed; the transcription process was time-consuming, but it also served as an ideal means for the researcher to get acquainted with the data (Kiger and Varpio, 2020). The researcher then starts to generate codes from the transcript using the NVIVo as a software tool, from the codes generated Team capability, Team size and so on. Then the researcher starts searching for the themes using the transcripts. From the themes that were found like Critical success factor, Transformation from traditional to agile project management. Then the researcher review all the themes developed then the analysis of the interviews were done and linked to literature as per Chapter 5. In the next section, part of the interviews will be highlighted and will be fully analysed in Chapter 5.

The transcribed files have been introduced to NViVo as software, where the researcher has followed the above six steps and produces nodes as per figure 28 Appendix VIII. Extra Analysis has been done to check the word frequencies to make sure that it's the highest obtained from different interviewees. As an example, the word agile has been repeated 264 times and it's the biggest notable word, Customer for example repeated 90 times, and the word involvement repeated 66 times as shown in figure 30 Appendix VIII. Communication, people, and organisation have been repeated, 54, 53, 51 times respectively. Looking at cluster Analysis it was found that there is a high correlation between the node names which represents the variables of the Conceptual Framework and other nodes representing other variables as per figure 29 Appendix VIII. As an example Team communication, Team Performance, and Team size have a high correlation with the Critical success factors in general, which confirms that those variables

are the most important agreeing with the Quantitative analysis and explaining why Team performance has the highest correlation. Nodes have been identified to identify the final themes, four themes have been identified. Two main themes the first one is Critical Success Factors, and the other one is Agile Success. There was a theme for Extra information, and introduction and closure. The coming section will highlight parts of the interviews done with the interviewees.

4.7.3 Interviews

At the beginning of each interview, the interviewer seeks consent from the interviewee for recording the interview for the sake of transcription, and the consent granted by each interviewee.

The interviewer asks for the demographic information too for the sake of the interview formality, and the below is the information:

Name	position	location
M.S	Head of MS GCU Zain & CU GCC	MMEA
E.A	MS Chief Operating Officer	MMEA
K.A	Head of PMO PO BSS GCC	MMEA
K.M	Head of DS Strategy and BO	MMEA
L.R	Head of Digital Services MMEA	MMEA

Table 22: Interviewees (Name, Position, Location)

There are pre-set of questions that have been designed for the semi-structured interview the following questions are the designed questions for the interview

4.7.4 Interview Questions

1. Do you think that Applying Agile project management methodology on both DS & MS department will lead to achieving project value?

2. From your point of view, what are the critical factors that lead to achieving project value by applying Agile project management methodology?

3. Do you think that there is a relationship between team size, communication, performance, and agile project management methodology?

4. What do you think about customer involvement and management involvement in projects operated by agile Methodology?

5. What is your opinion if the organisation fully applies agile project management methodology in all its domains under DS & MS?

6. What do you think might be other critical factors that contribute to project success in terms of achieving its value when applying agile project methodology?

During the interview, there was an interaction and additional explanatory questions were inserted that will come in this chapter later while presenting the output from the interviews.

In the following section, selective replies to the interviewees will be presented as it is without any analysis or reflection as the analysis and reflection will come in the next chapter.

4.7.4.1 Question 1

This question aims to check the perception of the interviewee for applying Agile project management methodology in both digital services and managed services to achieve the project value and sample from the answers got as below:

(The interviewee samples of replies down was transcribed as it is according to the voice recording removing non-English words):

M.S said: "I think applying this Agile Project Management methodology will be the silver bullet to improve the digital service project implementation, and also the managed services. It's a fact, you know, the one that we see every day. Implementing the Waterfall model, I think, doesn't help because it's not fixable enough, but Agile Methodology… it's… it's the new trend that the customer is requesting us, all the CSPs are requesting from us to start to implement." The interviewee here confirms that Agile Project Management methodology is a must and that the organisation should go out of the waterfall model.

E.A said: " I see it's it can conf… or sure it can contribute in in such success for for both PGS and manage services, but if I talk about the manage services specifically I see it's it's it will add value since you are controlling the the main main pillars of the manage service like contracts. و especially focus on the on the value and how to do like some changes in using the the the Agile method. Agile Methodology." The interviewee is confirming the ability of Agile project management methodology on both DS and MS departments

K.A said" Yes, because it saves a lot of time. Aaa I think, it helps you to board and unboard resources when they are needed. It help you a lot to optimise the resource cost. And also the project when you have --- the Agile Methodology is more aa dynamic respond to the

customer changes and the customer requirements quicker." The interviewee is also confirming the ability of Agile project management methodology.

K.M said": aaa yes, for sure, because umm Agile umm Methodology provides umm two main umm benefits for projects., on the one side it's a very very clear structure, so you have good control about the resources you hire or engage umm for your project there's very high visibility. And then the other side, when you have umm aaa an open scope, it provides you a lot of flexibility in the outcome, and the need of shifting demands. Agile might not adapt aaa for any customer requests, for example, even for internal requests some benefit from a classic waterfall project, when it's absolutely clear what the scope is in the beginning and the end." The interviewee confirms the importance of applying the Agile project management methodology.

L.R said "Umm Waterfall for telecom, in some circumstances, makes sense, and Agile… Agile far better now as we moved to… I would say much more of a software based project scope. Yeah, where we can essentially aa, you know, move on the go… adapt on the go. We can have our spirits and we can have minimum valuable products that can get us to market and be quicker. However, yeah, however, you have to be conscious of your target audience, as well. Because if your customers are not ready to work with Agile, and… which is also because traditionally they worked with Waterfall, then it's aaa it's not a way it's going to be successful. And that's why I say to you it really does depend on the situation on when we can really truly get Agile to work." The interviewee confirms on Agile methodology but with a condition of the customer awareness and involvement.

Question one highlighted that all the interviewees confirm the ability of Agile Project Management Methodology to be successful in DS and MS departments. Each interviewee highlighted it with his expression, So, one said it's a silver bullet, the other said it's crucial, another said makes sense.

4.7.4.2 Question 2

Under this question, the aim to gather the information from the interviewee about the critical factors associated with applying agile project management methodology to accomplish project value and the answers was as below:

M.S said "First of all, the culture in the organisation, we have to make sure that the people mindset… they they are accepting to do such changes. This is number one. So in order for them to reach that stage, we have to show to them the benefit in the ground. This is number one. Number two is the competence of the resources which is very critical factor in order to change completely from the Waterfall model which is cascaded model of… aaa cascaded model of doing the activity to be agile, it is that we need a high competence in source who understand… who has this mindset to change. At the same time, we need the management by end. So this is what I think the most important thing." The interviewee highlighted the culture as critical success factor which opens a door for future research, Team performance, Management involvement as critical success factors too.

E.A said: "the critical success factor here, Ahmed, is the process simplicity this is" The interviewee here talks about process simplicity as a Critical Success Factor.

K.A said: "Aaa. I think, it's four main points. It's control; you have to control your costs scope fine, with the customer. You have to have the right solution in place. First point, you have get buy in and aa good alignment from aa the the customer, and we need to stallholder in the customer organisation, and we need the customer organisation to be working with you, as well. And also you need alignment with in many projects, we need alignment with the business team, as well." The interviewee highlighted Customer involvement, management involvement to be from the critical success factors.

K.M said "yes, I think that is a few of them actually. First of all, umm a project classic waterfall project umm aaa, I would say very known from the organisation very known by the practitioners and even, if I am not mistaken, when you do certificates today umm like your PPM aaa, they aaa… even project management institute they apply Agile Methodology in the testing only by next spring. So, you see how how how new that is. So, that's why when you apply an Agile Project, I think it's it's important that you umm aaa take people in the team who have already experience aaa in Agile Project Management, so they can guide the rest of the team. The team needs to be umm trained in that Methodology and guided through the process. And it's important to have an open mind set, because Agile ways of working will take away some of the freedoms where we had normal project management less spot checks; by Agile Methodology, you have very very fast, almost daily, spot checks on on work. So, people need to be open-minded umm and aaa and trained. So, I think that umm that's very very critical." The interviewee highlighted team performance to be from the most critical success factors.

L.R said "Without a doubts. Aaa the second piece is aaa you need to have contract to construct. You need to have an agreement with the customer, that will support this mode of Agile work. You cannot apply the existing legacy contracts, the frame contracts, the contracts that the customers have had for many years in the same way. Aaa because it's a… it's just fundamentally different. The third piece is obviously aa obviously you have to have the hygiene correct and what I mean by the hygiene is that you need to set up the right project team… project fundamentals… scrum masters… people to run the screens… stand ups, etc. Aaa you have to have that structure internally correct, as well. And you can't have one or two people understanding it, and then the rest of the team is, you know, could completely oblivious to it." The interviewee highlighted also a new variable that needs future research which is the contract type, Team communication to be from the top critical success factors.

4.7.4.3 Question 3

On the third question, the interview moves to another aspect asking about relationship between independent selected variables and the dependent variable and the interviewee answers as below:

M.S said "Of course, there is a there is some kind of correlation between all these factors and the agile deployment. Whenever we… but a is not a one to one mapping in my view a but for example team size for agile should be supporter team than waterfall. And we can have different teams and each team can have certain competence, then we can make sure that at the end of the critical part of the project we have lower time to market. The other factor you said team size and what is what is the others?" The interviewee highlighted that there must be a correlation between the five independent variables and the dependent variable but iy should not bother to be a high correlation.

E.A said "Aaa I see (silence), but but the mythology itself should not should not be aaa like change it. That's why we call it Agile should not be when you when you have more or bigger size project, more complicated project." The interviewee here highlighted that he doesn't bother about correlation as it will not give the right decision.

K.A said "Aaa I think, you need to have the right team size, and you have to have proper resource planning that is part of the team size, as well. Because if you are applying Agile Methodology, aaa you need to make sure that you have good team size who can deliver this. Aaa Also this people in the team they have to be dynamic, because they have to be patient, they have to meet the customer requirements. They have to apply it quickly. They have to digest it the right way. Because if you don't have good quality, the whole concept of the Agile deployment will collapse. You have to repeat, you will keep doing things

repeatedly you will lose momentum and time methodology." The interviewee here highlighted that he doesn't bother about correlation as it will not give the right decision.

K.M said "**:** yes, there is a relationship. aaa the nature of Agile Project is a very tied communication of the team and there's only so much, especially now in Covid times aaa. There's only so many people you can put into one team, listen to each other, understand what the other one is doing umm aaa and at one point in time you might face a situation that your team becomes too big. In this case you need to split up the team, create for example aaa a different stream, a different epic aaa have teams work on on on different umm streams of your project to keep the size in a in a certain manner. And even we now, here in the Lighthouse, have for example split some teams because they became too big and then they become (background noise) not Agile enough anymore. So, there's a correlation, but this is something each team needs to find. It might… some people might find teams of 10 people already too big; other might be able to handle 15. But this natural size due to the frequency of the communication on how big the teams can aaa work on one topic." The interviewee here highlighted that there is a correlation but it is variable per case.

L.R said "**:** Because I think, all the three elements have a relationship to the success of Agile projects. However, I will say the most important is the second one: communication." The interviewee here highlighted that team communication should have the highest correlation which found not to be the case as per the inferential statistics which opens the door for further research.

4.7.4.4 Question 4

Continuing on question three asking for more two independent variables and the answers were as below:

M.S said "**:** In general, micro-management is not is not preferred during the implementation of the project. Maybe it will… it should happen at the beginning of the project just to make sure that everything is on the ground and on track, but after that, you know, we should leave the team on the ground to manage, and the management from both customer side and vendor side should do the government, and the government will be in monthly basis, by monthly or whatever. But of course we should have a strong governance, but we should leave the people on the ground to do such Agile Methodology in a proper way. Because again you know the main idea, in my view, for the agile Methodology is the time to market, so we need to leave the team to work, to innovate aa and our role should be only the government part in suitable frequency of such governance." The interviewee here highlighted that customer involvement and management involvement should have a positive correlation with project value and he highlighted management involvement to be governance and not micromanagement.

E.A said "**:** I think is is great definitely. involvement your customer in in aaa it's not… it's a kind of milestone what I understood from your aaa aaa from your wo… your words here. Like aaa before we go from the milestone to another milestone that we…" The interviewee here highlighted that customer involvement should have a positive correlation with project value and he highlighted management involvement to be governance and not micromanagement.

K.A said "Customer involvement and management involvement is very important because most of the projects have two side: we have vendor side and the customer side. When the customer is not progressing or giving you the input you needed--- and again you lose the momentum also management will help you to get attention and resolve many issues any project will be sponsor in both vendor side and management side. If this is not happening, we are not getting the priority and thus your project is affected, as well." The

interviewee here highlighted that customer involvement and management involvement should have a positive correlation with project value.

K.M said "**:** aaa aaa customer involvement is absolutely crucial. aaa you need to aaa… And that's the whole idea of Agile. You need to test frequently with your customer whether you still on the right track whether what you just did. This the whole idea why you started you MBB. You test up for a customer; you have your first release of a test to the customer, so there's a lot of customer interaction. While interaction of the management should be limited umm to umm, do not talk about the management in umm Agile project, talk about the overall management. They should be limited to the touch points aaa of the guidance, which have been established as governance before. For example, you have a steering boat; you meet a steering boat on a monthly or quarterly basis; umm you report your your releases; you report your sprints necessary and your planning, but day to day involvement of management in your project is is toxic, so you need to have your Agile team running. It needs to be a trustful environment; it needs to be open speech environment, and you don't do that when top management is always looking. and then you start becoming politically correct things do not move forward." The interviewee here highlighted that customer involvement and management involvement should have a positive correlation with project value and he highlighted management involvement to be governance and not micromanagement.

L.R said "Everyone is governing because you're all swiming towards the same end objective, regardless of the spring that you're working upon. And because you are communicating daily. Because you have full awareness of what happening in Egypt springs as an example. But I think, that that governance works at all levels. And that's why I say that management involvement, you called it management involvement, is need to be less anyway even the micro-management… aa for for sure project leaders and project managers will need to do aaa, you know, the the level of project management they

always needed to do. I don't doubt that. But in the… when you come Waterfall as an example." The interviewee here highlighted that customer involvement and management involvement should have a positive correlation with project value and he highlighted management involvement to less regardless it is governance and not micromanagement.

4.7.4.5 Question 5

On the last question, the interviewee allowed to answer from decision-maker point of view whether or not to apply the Agile project management methodology on both digital services and managed services and the answer were as below:

M.S said "I think, you know, it is not an opinion. I think, part of this Agile Methodology has been implemented in my current company which is Ericson, but it is implemented in the RND part, and the result was amazing. Ericson, you know, now they are in the front… forefront when it comes to technology for core, for the digital services despite the fact that we have a lot of fragmented supplier in the market. So aa I was following them up couple of years ago when they started to implement that one in the RND and the result was amazing. So if we start to extent our wings for such implementation in in other functions, as well, as we said, for DGS and BDGS and for B Manage Service, for sure, you know, will be able to still with pride the success that has been done in the RND and implement them, and I'm sure that the result will be… will be successful as well." The interviewee here highlighted that there is no option rather than applying Agile project management methodology on both DS and MS departments. He also confirms RND department started applying that.

E.A said ": I see that's that's a tricky point, as well. And I think… I think, that needs like if you want to… if you want to… to go onto this… yeah, like because it depends on your… on your organisation, as well. So if your organisation are u… are using very similar

Methodology or very near Methodology to that one that can be aaa planned and maybe can be applied to every projects and and… But definitely needs to go into phases. But if the organisation is using totally different like Methodology on on managing their projects that aaa may have may be… it will be somehow aaa complicated, but it needs to be applied aaa as well into phases, but in in more simpler project aaa before they they can go and apply it on a wide range or projects, more type of projects." The interviewee here highlighted that it needs further discussion for applying Agile project management methodology on both DS and MS departments.

K.A said "No. it's not fully applied yet. We are trying to work in some projects with this, but I cannot say that this is ongoing in every project" The interviewee here highlighted that we need to apply Agile project management methodology on both DS and MS departments

K.M said "(pause) Oh haha no, I do not think that would be possible because umm you would need to… First not all projects are actually I would say aaa applicable for an Agile Project Methodology, not yet, umm because it needs something to be working with the customer. That itself is a transformation process, yeah? You start with few costumers with your projects; aaa you start with certain teams, and we do not have yet our practitioners trained in that Agile Methodology; they have no experience in it. So you cannot reach from one day to another. So I think that is a learning process when organisation has to go through and more and more, it can be applied, but you need to also start selling a project, or aaa customer engagement in the way with that Methodology. You cannot sell it as waterfall project…" The interviewee here highlighted it would not be possible applying Agile project management methodology on both DS and MS departments.

L.R said "aa where it makes sense. So I go back again. I think, what you need to do is you need to equip your project leaders." The interviewee here highlighted that there is no

option rather than applying Agile project management methodology on both DS and MS departments.

Before going to the discussion and conclusion chapter, it's important to say that the information gathered from the interview was beneficial for the research and the research project overall. It also opens the door for more investigations, especially for points that the researcher did not open at the beginning of the research project as it is confidential. Still, the decision-makers open them in the interview which worth internal research to support this organisation.

Worth saying that the organisation is undergoing Artificial intelligence and Machine learning paths in their business, and they are also creating a new operational framework, that Agile Methodology is one of its corners. So, this research project is in line with the organisation strategy under the two selected departments, the managed services and digital services.

It is essential to say that question related to management involvement some of the interviewees understand it as micromanagement and others understand it as governance and support. Necessary to say that the interviewee understood this from the first interview and used this clarification in the other four interviewees by asking each one of the interviewees what do you understand from this question.

Essential to highlight that the interviewees were very knowledgeable and enthusiastic about the research, which makes the interview smoot and full of information.

One of the interviewees who are currently running a program using Scrum as an Agile project management methodology and under the digital services domain, add a lot to the research that will be reflected in the next chapter.

One important piece of information gathered by the head of the market area middle east and Africa is that the organisation is running a lot of contracts now, and most of the contracts doesn't support the transformation from traditional to Agile Methodology. And he also confirms that the project manager should be empowered and no more involvement from the management needed. They all agreed that customer involvement (Akerele *et al.*, 2014) and team communication are the top most critical success factors.

L.R suggest that is important to start the transformation using internal projects as the organisation will be the customer and at the same time, the vendor L.R said: "because we are the ones driving, and the ones receiving, yeah. And when it comes to end customers, end clients project, I really want to have the buy-in of the clients and the customers that this is the right Methodology and they will contribute to the success when we go ahead".

An advice from K.M for adopting Agile project management methodology, he said: "I think Agile is aaa rather new Methodology. and aaa it will aaa require a lot of attention and and training sometimes in patience to see that happening. But I think that's a very interesting topic at a very interesting time because our, not our industry, but our industries will definitely change their approach and as I know from experience Kanban might be seven years old, but still, there are many many companies that never heard of it yeah?"

As a summary for this chapter, the chapter represents the information gathered through the quantitative method and the qualitative method. Analysis without reflection has been done on the statistical information, and the qualitative information has been presented as raw data. In the next chapter, the discussion and the reflection on this chapter will be discussed, and the conclusion drawn reflection and relation to literature will be drawn, and research questions will be answered.

This chapter reflects on the output of the primary data collection. It explains the statistical output from the quantitative data which has been collected without discussing them. Also, it reflects the quantitative data which has been collected from the interviews leaving the discussion and conclusion and how it is related to the literature to the last chapter.

Chapter 5: Discussion and Conclusion

In this chapter, the output and analysis of the primary data collection will be discussed, a reflection on the result will be made, and a relation with the literature review will be established. At the end of this chapter, a pilot project will be presented showing the output for two different projects in two different locations, in the region of the Middle East and Africa related to managed services domains, and the lessons learned from both projects described. The projects were in line with the research project and confirmed according to the success of the application of agile project management in the telecommunications field.

This chapter also answers the research questions, highlighted during the discussion, to ensure that the research project answers the main research questions and fulfils the project aim and objectives.

The chapter will be divided into sections as per Table 23 below:

Section number	1	2	3	4
Title	General Reflection	RQ1	RQ2	RQ3
Conclusion	General Conclusion			
Pilot project	Pilot Project 1	Pilot Project 2		
Future work	Recommendation for Future Work			

Table 23: Discussion and Conclusion sections

5.1 General Reflection

The methodology used for this research project was a sequential explanatory mixed-method (Creswell, 2017, p.209), explained in detail in the methodology chapter. The methodology set the process of the quantitative method first, followed by the qualitative method, where the qualitative method explains the quantitative method.

The primary data collection indicated that 110 respondents had taken the survey with 100% correct data, meaning no missing or skipped questions except for the non-mandatory final question, as stated in the previous chapter's analysis of output data.

The reliability test was conducted as shown in Table 24 below to ensure the independent variables and the dependent variable are reliable to ensure that the analysis was statistically reliable and can be used for decision making.

Variable	Reliability test (Cronbach's Alpha)
Team Size (TEAM_SIZE_INDVAR1)	0.800
Team Communication (TEAM_COMM_INDVAR2)	0.543
Team Capability (TEAM_PER_INDVAR3)	0.710
Management Involvement (MANAGEMENT_INV_INDVAR4)	0.753
Customer involvement (CUSTOMER_INV_INDVAR5)	0.734
Project Value (Project_Value_DEP_VAR)	0.737

Table 24: Reliability test output

Therefore, from the above table, it is clear that all variables are reliable based on Cronbach's alpha test. According to the statistics, all variables are considered to be acceptable as they are > 0.7, except for team communication which is > 0.5, statistically considered a being poor in terms of reliability (Field *et al*., 2013). The team communication variable, as an independent variable reliability test, is one of the questionable results and will be discussed in this chapter.

The demographic information that may represent important information to the organisation was extracted from the survey, but it is not a critical point for the research project.

From the demographic information, 86.4% of the survey takers were males, while 13.6% only were females. Survey takers from the age range 36–40 years represented around 30% of the total, while those from the range of age 41–45 years represented around 30.9%. Therefore, more than 60% of survey takers lay between the ages of 36 years and 45 years; 8.2% of survey takers represented people above 50 years old, implying greater experience in the organisation.

From the departments of DS and MS, 68.2% of survey takers were from DS, and 31.8% from MS: 48.2% were project managers, followed by 22.7% programme managers.

As for the region, 72.7% were from the Middle East while the rest 27.3% were from the Africa region.

5.2 First Research Question

Can the application of agile project management techniques prove successful for the DS and MS departments?

To answer the first research question, the analysis of the primary data will show how the survey takers answer this question and how the interviewees explained it.

Question 22 in the survey, together with question 23, were two direct questions regarding this point. Both of them asked whether agile project management would be successful in DS compared to the traditional approach and also if agile project management would be successful if applied to the MS department?

It was found from the survey takers that 37.3% strongly agreed that applying agile project management methodology to DS would be successful over a traditional methodology and 39.1% agreed to that, leaving 20.9% as neutral respondents and only 2.7% disagreeing. Statistically adding Agree and Strongly Agree gives the percentage of 76.4% agreeing to the proposition, which is considered to be a large number.

Figure 9: Agile Project Management will be Successful in Digital Services Compared to the Traditional Approach?

The results confirm the importance and success of agile methodology when applied to DS (Sjödin *et al.*, 2020) and enable further research on DS, which is currently scarce (Leimeister *et al.*, 2014; Williams *et al.*, 2008), and MS (Speta, 2011; Kumbakara, 2008).

As for the MS question, the survey takers were asked whether agile project management would be successful in MS if applied? As the answers below show, 29.1% strongly agreed with the proposition, and 37.3% agreed, leaving 28.2% neutral, 4.5% disagreeing, and

0.9% strongly disagreeing. Adding the Agree to the Strongly Disagree respondents gives 66.4% agreeing, which is statistically significant when compared to the non-agreeing percentage.
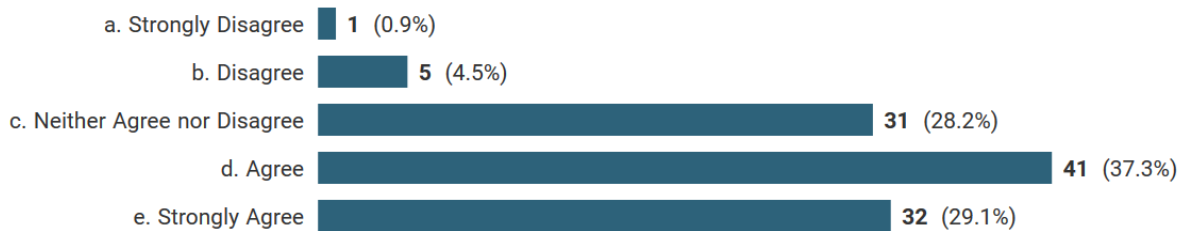
Figure 10: Agile Project Management will be Successful in Managed Services if Applied?

The interviewees were asked the above questions precisely, and the results also aligned with the survey and the limited literature. The interviewees were given the following question: What is your opinion if the organisation fully applies agile project management methodology in all its domains under DS and MS?

From the five interviews, we concluded that agile project management methodology has already been started to be applied in the organisation in the R&D globally as per the head of the customer unit. He said: 'I think, you know, it is not an opinion. I think, part of this agile methodology has been implemented in my current company which is XYZ, but it is implemented in the R&D part, and the result was amazing. XYZ, you know, now they are in the front … forefront when it comes to technology for core, for the DS although we have a lot of fragmented suppliers in the market.' His words are in line with the research done on the same organisation (Paasivaara *et al.*, 2018).

The implementation of the agile project management methodology needs to be implemented in phases as per the chief operating officer. As a confirmation of his wording, it was stated that 'So to repeat what you are saying here; you are saying that yes, agile

project management methodology is currently necessary, but for large organisations or large projects we may need to go for [a] pilot first to test where we can go and how'. Therefore, he confirms moving from traditional to agile project management but in phases, starting with a pilot project, which is in line with the literature (Fuchs and Hess, 2018; Rasnacis and Berzisa, 2016).

The head of DS denied applying the agile project management methodology to all projects fully. He said: 'No. It's not fully applied yet. We are trying to work on some projects with this, but I cannot say that this is ongoing in every project'.

Still, he insists that it will be successful if used on DS and MS. After asking him 'do you … do you believe that it's right to fully apply on managed services and digital services if it's in your hand… you are decision maker… you will take this decision to fully apply?', he said, 'In most of the cases, yes'.

The head of DS strategy confirmed that we cannot apply the agile project management methodology blindly to both digital and MS. Instead, we need to check each project and align with the customer. This is in line with the literature in that each project has its tailored methodology (Papadopoulos, 2015; Špundak, 2014) and that agile project management may not be the best choice for the project (Sharma *et al.*, 2012). He said: 'So I think that is a learning process when an organisation has to go through and more and more, it can be applied, but you need to also start selling a project or customer engagement in the way with that methodology'.

Finally, the head of the market area agreed to apply conditions such as equipping project managers with all needed tools, evaluating all legacy contracts, and involving the customer, as the customer is the critical factor in using agile project management from his point of view (Chow and Cao, 2008). He said: 'with the understanding of how to run projects in different ways based on the different clients that they serve. So the best thing

that we can do as a quicker project manager and architect, scrum master, with the skills to run projects in both ways'.

The interviews explain why not all survey respondents agree with one answer to this question, and why more respondents answered in the affirmative. A survey is a robust tool that gives a quick statistical explanation, but the qualitative method explains and triangulates the quantitative data.

In summary of research question 1, the answer is 'yes' with some conditions. These conditions are in line with the literature and enable the organisation to commence pilot projects rather than R&D.

5.3 Second Research Question

What are the primary critical factors associated with the application of agile project management that lead to project success?

The second research question was a question set to ensure whether the organisation would follow the literature or whether there was any new information to be gathered that would add to the knowledge that could be added value for future research. The answer to this question depends more on the qualitative method. In the quantitative approach, it is evident that the researcher cannot ask such an open question. Still, the researcher takes from the literature the critical factors that are valid for telecommunication and also non-officially shakes hands with some managers in the organisation to start with them.

It is essential to highlight that the researcher added a non-mandatory question to the survey to answer this research question directly. The information gathered from the survey using this non-mandatory question related to this research question is summarised in Table 25 below:

Information gathered from survey takers	Literature confirmation
The agile way of working and agile process	(Tam *et al.*, 2020; Chow and Cao, 2008)
Non-clear scope	(Tsoy and Staples, 2020)
-Customer onboarding **-Training** **-Tools**	(Bvani, 2009; Lebdah and Qasim, 2020; Bhavsar and Sha, 2020; Chan and Thong, 2009; Sheffield and Lemétayer, 2013; Gren *et al.*, 2017; Shakya and Shakya, 2020; Tsoy and Staples, 2020; Williams *et al.*, 2015; Totten, 2017; Tam *et al.*, 2020)
Contract and executive sponsor	(Nguyen, 2016; Easton, 2010; Gill *et al.*, 2018; Diegmann *et al.*, 2018; Campanelli *et al.*, 2018; Tam *et al.*, 2020)
Transformation in digital services	(Zhbajnova-Mircheska and Antovski, 2018; Diegmann *et al.*, 2018; Shaughnessy, 2018; Paasivaara *et al.*, 2018; Fuchs and Hess, 2018; Dikert *et al.*, 2016)
Following an agile framework	(Ebert, and Paasivaara, 2017; Balaji, 2013; Chan and Thong, 2009; Misra, *et*

	al., 2009; O'sheedy and Sankaran, 2013; Chow and Cao, 2008; Conboy and Carroll, 2019; Uikey and Suman, 2012; Diebold, 2019; Gustavsson, 2016; Totten, 2017; Paasivaara *et al.*, 2018; Azanha *et al.*, 2017; Chiyangwa and Mnkandla, 2018; Kalenda and Rossi, 2018; Vlietland, *et al.*, 2016; Shaughnessy, 2018; Garousi *et al.*, 2019; Nurdiani et al., 2019)
Management commitment	(Totten, 2017; Nguyen, 2016; Shakya, and Shakya, 2020; Tsoy and Staples, 2020; Lalsing, 2012; Lei *et al.*, 2017; Tam *et al.*, 2020; Gandomani *et al.*, 2020)

Table 25: Summary for the Primary Critical Success Factors Associated with Applying Agile Project Management Methodology As per the Survey

Returning to the survey and the direct questions asked related to this research question, the researcher asked whether the application of agile project management can lead to project success and achieve project value. The statistical summary is provided below:
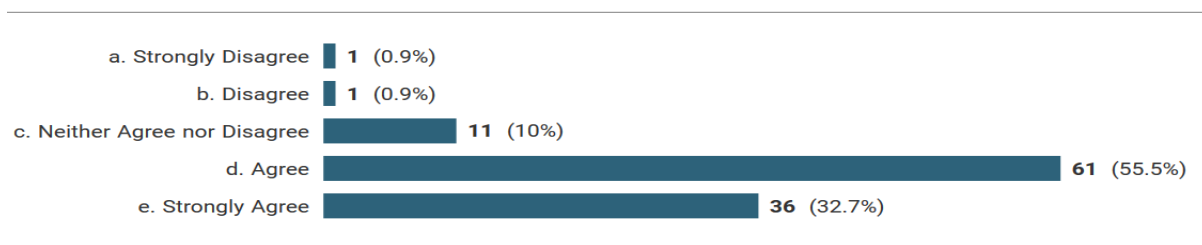
Figure 11: Using An Agile Project Management Methodology, Can this Achieve Project Value

A total of 55.5% of the survey takers agreed that using an agile project management methodology can achieve project value. In comparison, 32.7% strongly agreed with this proposition, leaving 10% neutral and almost 1% not agreeing. This sums to nearly 88.2% consenting to the proposition. This is in line with the interviews and the literature in that people are starting to believe in agile project management methodology and its effect on the success of the project (Diegmann *et al.*, 2018).

Concerning the framework and project definition, there was a direct question on that as described below:
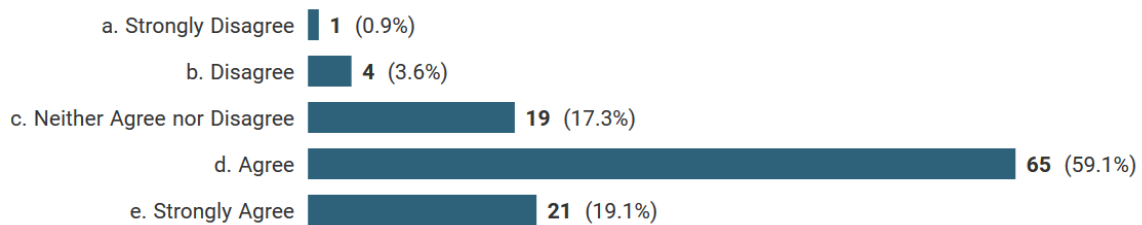
Figure 12: Do you Agree that Project Definition Achieves Project Value when Moderated by the Agile Method rather than the Traditional Method?

A total of 78.2% agreed that the framework and project definition can achieve project success, of which 59.1% agreed and 19.1% strongly agreed, which is in line with the above table in which the agile framework was mentioned. Therefore, Project definition was confirmed here by survey takers as one of the primary CSFs (Ebert, and Paasivaara, 2017; Balaji, 2013; Chan and Thong, 2009; Misra, *et al.*, 2009; O'sheedy and Sankaran, 2013; Chow and Cao, 2008; Conboy and Carroll, 2019; Uikey and Suman, 2012; Diebold, 2019; Gustavsson, 2016; Totten, 2017; Paasivaara *et al.*, 2018; Azanha *et al.*, 2017; Chiyangwa and Mnkandla, 2018; Kalenda and Rossi, 2018; Vlietland, *et al.*, 2016; Shaughnessy, 2018; Garousi *et al.*, 2019; Nurdiani et al., 2019).

Agreeing with the above table on training, the survey takers also confirmed that training is one of the primary CSFs, as shown below:

a. Strongly Disagree	1 (0.9%)
b. Disagree	0
c. Neither Agree nor Disagree	6 (5.5%)
d. Agree	41 (37.3%)
e. Strongly Agree	62 (56.4%)
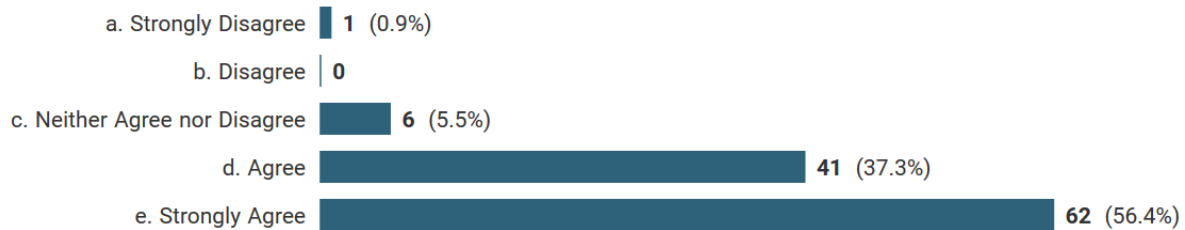
Figure 13: Proper Training on the use of an Agile will have a Significant impact on implementing that methodology by the team and Achieve Project Value?

a. Strongly Disagree	0
b. Disagree	1 (0.9%)
c. Neither Agree nor Disagree	20 (18.2%)
d. Agree	58 (52.7%)
e. Strongly Agree	31 (28.2%)
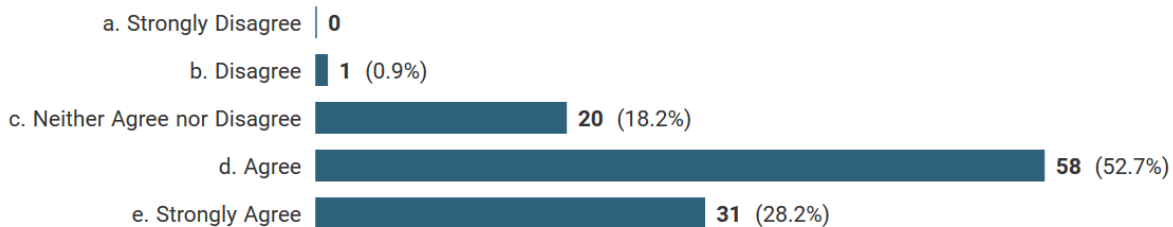
Figure 14: Provide Training to the Team

In the statistical output for survey takers, it is found that almost 93.7% from the first question and 80.9% from the second question agreed that training or proper agile project management training is one of the primary success factors leading to achieving project value when operating an agile project management methodology (Bvani, 2009; Lebdah and Qasim, 2020; Bhavsar and Sha, 2020; Chan and Thong, 2009; Sheffield and Lemétayer, 2013; Gren *et al.*, 2017; Shakya and Shakya, 2020; Tsoy and Staples, 2020; Williams *et al.*, 2015; Totten, 2017; Tam *et al.*, 2020)

In line with the above table and one of the CSFs, which is the framework, the answers to a direct question also answered by survey takers agree with the literature, as described below:
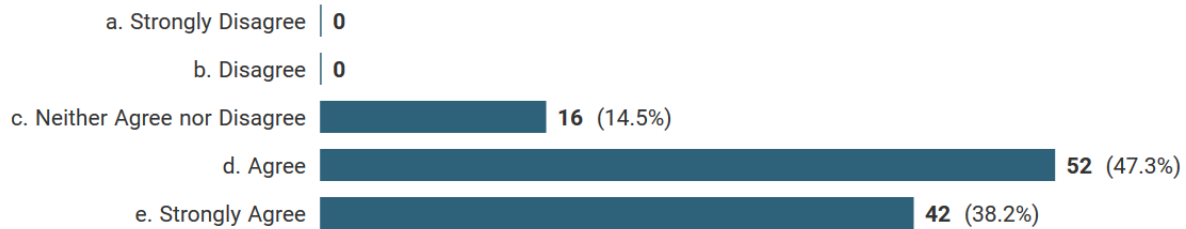
Figure 15: Having a Complete Methodology Implementation Strategy will Significantly Impact Implementing that Agile Methodology and Achieving the Project Value.

Almost 85.5% of the survey takers agreed that following an agile framework is one of the primary CSFs for applying agile project management methodology (Ebert, and Paasivaara, 2017; Balaji, 2013; Chan and Thong, 2009; Misra, *et al.*, 2009; O'sheedy and Sankaran, 2013; Chow and Cao, 2008; Conboy and Carroll, 2019; Uikey and Suman, 2012; Diebold, 2019; Gustavsson, 2016; Totten, 2017; Paasivaara *et al.*, 2018; Azanha *et al.*, 2017; Chiyangwa and Mnkandla, 2018; Kalenda and Rossi, 2018; Vlietland, *et al.*, 2016; Shaughnessy, 2018; Garousi *et al.*, 2019; Nurdiani et al., 2019).

In order to relate and explain what was achieved by the quantitative method, the following direct question was given to the five survey takers during the semi-structured interview:

What do you think might be other critical factors that contribute to the project success in terms of achieving its value when applying agile project management methodology?

The respondents agreed that people, culture, team size, the collaboration between different departments, customer involvement, management involvement, team size, team communication, team performance, clear acceptance criteria, and scope and contract are

the most critical success factors. The interviewees explained why those are the most important factors, and they also explained why survey takers scored high in those factors. This enables further research, especially in two important factors that could be critical to the organisation, which are culture and contracts. Table 26 summarises the answers of the interviewees regarding this specific question, which were found to be in line with the survey takers and the literature.

Interviewee	Part of the interview related to this question
M.S	"What I think what I think is that what we need in order to make sure that we have successful Agile implementation… first one one point, you know, it is the collaboration between different departments across the organisation. Because so far what we see in most of the organisation that we are still working in some sizes, so everyone is looking for his target or whatever which the target is not fully aligned. So maybe in order to make sure that we take this Agile methodology to the next level and implement these one across all the board, we should have, first of all, collaboration between all the departments in the organisation and, that one can be achieved by having common

	target for all, you know, across all the projects."
E.A	"I will stress on one of those factors that you … definitely, one of the factors is is the you need to have your aaa your risk assessment or your risk like management one of one of the most important factor. But what I need to stress on, Ahmed, here is the customer engagement or the customer involvement."
K.A	"Strong team Alignment and good development quality, so you can have good software drops. clear acceptance criteria to know what you are accepting and what you are working for. This is the main"
K.M	"I Think that's actually a a good question because umm aaa what danger of Agile methodology is that you get lost in the details. That is because projects are so, aaa let's say, umm detailed layout aaa in tools like aaa Geerah and others. Umm and you're very keen to have your tasks fulfilled to get your sprints done, and

	everything worked out that sometimes the big picture goes missing, yeah? I think it is very critical that you do series retrospectives. It should be part of the schedule, but sometimes I think it's it's it gets lost that after every release. You do a retrospective aaa take a little bit of a helicopter view and says"
L.R	"And… and what I will say is that there is some scope that doesn't lend itself that well to Agile. Hardware roll outs, side bill or something like that. And… so so scope still one of those variables."

Table 26: Interviewees Response to other Critical Factors in Applying Agile Project Management Methodology

As a summary of this research question, the primary data collection through the survey takers and the interviewees gave all possible Critical Success Factors from their point of view. Most of the CSFs are in line with the literature and some factors considered to be new or we can say specifically to the organisation table 27 represents the critical success factors:

Critical Success Factor	Comment
1. **Agile way of working**	New Factor introduced by primary data collection
2. **Non-clear scope**	Matching Literature

3. **Customer involvement, training, tools**	Matching literature and research project
4. **Contract and executive sponsor**	A new factor to be considered for future research
5. **The transformation from waterfall to agile**	Broad Factor matching the Literature
6. **Agile framework**	Matching the literature
7. **Management involvement**	Matching the literature and the research project
8. **People**	Matching the literature and part of the research project
9. **Culture**	New Factor worth future research
10. **The collaboration between different departments**	Matching the literature and the research project
11. **Team size**	Matching the literature and the research project
12. **Team communication**	Matching the literature and the research project
13. **Team performance**	Matching the literature and the research project
14. **Clear acceptance criteria**	Matching the literature
15. **Scope**	Matching the literature

Table 27: CSFs as per primary data collection

5.4 Third Research question

Is there a correlation between successful agile project management and a team's communication, size, and performance?

This question can be answered directly through the quantitative method, and the addition of the qualitative method adds an explanatory stage and a triangulation stage. Correlation statistical tests were applied to the independent variables and the dependant variable. The output of the correlation tests is shown below:

Variable	Pearson Correlation
Team size (TEAM_SIZE_INDVAR1)	0.255
Team communication (TEAM_COMM_INDVAR2)	0.392
Team capability (TEAM_PER_INDVAR3)	0.538
Management involvement (MANAGEMENT_INV_INDVAR4)	0.482
Customer involvement (CUSTOMER_INV_INDVAR5)	0.312

Table 28: Correlation Test for Five Independent Variables

It is evident from the above table that there is a positive correlation between the five independent variables and the dependent variable, which is project value.

The above table statistically confirms acceptance of the null hypothesis, described below:

$H1_0$: There is a relationship between team size and project success (value)

$H2_0$: There is a relationship between team communication and project value

$H3_0$: There is a relationship between team capability and project value

$H4_0$: There is a relationship between management involvement and project value

$H5_0$: There is a relationship between customer involvement and project value

The most significant two correlations are team capability and management involvement, followed by team communication, customer involvement, and finally team size.

All the tests performed on the variables in the previous chapter show that $p < 0.01$. This confirms that there is a correlation between each variable and the dependent variable.

The correlation coefficient represented in the above table indicates that there is a large correlation between team capability and project value as the coefficient is > 0.5.

Team communication, customer involvement, and management involvement are all of the medium correlation as the coefficient is > 0.3, leaving team size with a small correlation as the coefficient is > 0.1 (Field *et al.*, 2013, p.173). All correlations are positive.

These results quantitatively answer the research question directly, but an explanation is needed here. Team capability must be one of the critical factors when applying agile project management methodology. Still, it was found to have the highest value in relation to project success, leaving team communication with a medium value in relation to the project success.

Looking at each variable alone before explaining them by the qualitative method, we found the following.

5.4.1 People Factor

Team size, communication, and performance are variables related to the people factor, which is one of the factors besides organisation, process, and technical ones that have been agreed in the literature to be the most critical factors.

Chow and Cao (2008) study failed to find evidence for all people factors rather than people performance being CSFs. This research is one of the leading studies that almost all researchers refer to it. This enables further research, especially regarding the people factor. The results agreed with the present researcher's findings that team performance shows the highest correlation.

The above results have been corroborated by Misra et al. (2009), who also add team communication and team size as CSFs favouring team communication over the team size, while Wan and Wang (2010) confirm team capability, as confirmed by Dikert *et al.* (2016).

Further, to succeed in applying the agile project management methodology and reach project success, the organisation must choose the appropriate people and size (Ahimbisibwe *et al.*, 2015; Lalsing, 2012). Aldahmash *et al.* (2017) found that team capability is one of the CSFs related to the people factor. Still, they enable future discussion to find the weight for each critical variable. Tsoy and Staples (2020) agree with this research in that team size and team communication are critical, but no quantitative testing was done in their research. Er Meenakshi (2020) highlighted team communication, and team performance enables future research for more critical factors.

This research project considers all literature recommendations for more research, and this was demonstrated by researching three variables from the people factor, which were team size, team communication, and team performance. As there is a scarcity of literature related to telecommunication field even in DS and MS, the researcher depends on the

qualitative method to triangulate, explain, and confirm the quantitative approach. It is essential to confirm at this step that the three variables – in descending order of correlation, team capability, team communication, and team size – are in line with the literature. The analysis above confirms that team capability is the most important factor, followed by team communication and team size.

By observing the output from the qualitative research, it was found that the interviewees agree that there is some kind of correlation between those three people factor variables and the project success when using an agile project management methodology. M.S. highlighted that from his point of view, there is a correlation, but it is not a one-to-one mapping, which explains why the statistical results do not reflect a high correlation for those three variables. He confirms that team communication is a primary CSF, also stating that team performance is necessary to succeed under agile methodology.

When the interviewees were asked to explain why there was a low correlation between the project value as a dependent variable and team size and medium correlation with team communication, the interviewees explained that it would not be suitable to take each variable alone and test correlation, giving the example of an adequately sized team with poor communication and medium performance not succeeding. K.M from his point of view suggested the researcher consider the people factor as a single combined variable, which agrees with Er Meenakshi (2020).

The researcher then followed the interviewee's advice. Unfortunately, the result was a medium correlation as shown in figure 16 when combining all people factor variables into a single variable, but the explanation merits further research.

Correlations

		Project Value	People
Project Value	Pearson Correlation	1	.470**
	Sig. (2-tailed)		.000
	N	110	110
People	Pearson Correlation	.470**	1
	Sig. (2-tailed)	.000	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 16: People Factor Correlation

E.A. explains in the interview that from his point of view, there should be no correlation of the variables of team size, team performance, and team communication with project success when operating an agile project management methodology. He explains that the organisation should not depend on the team, which is surprising and raises questions. Specifically, the study did not agree with the literature. Therefore, the researcher found this point to be unexplained from the interviewee's point of view.

K.A. explains that team communication should be the primary critical factor and that all three variables must have a significant correlation with project success, leaving the same question of why the three variables do not have a considerable correlation, which is aligned with (Tsoy and Staples, 2020).

K.M. explains that there must be a correlation between the variables of team size, team capability, and team communication. He explained that the size of the correlation is not a concern because the nature of the agile projects by default support the correlation of those three variables, which is in line with Tam *et al.* (2020). The interviewee was highly knowledgeable, adding that a highly capable team with the right level of communication ensures the success of delivery, as confirmed by Chow and Cao (2008). Misra *et al.* (2009), and Ahimbisibwe *et al.* (2015).

L.R. too confirms that there must be a correlation between those variables and the project success when operating an agile project management methodology. He puts team communication as the primary critical factor (Shakya and Shakya, 2020) and also agrees with other interviewees M.S., K.A., and K.M. on this point. He also adds that team size is a crucial variable, together with team capability or performance.

As a summary of this research question, the answer is 'yes', there is a correlation between team size, team performance, and team communication. The correlation coefficient varies among the three between a high, medium, and low correlation, explained by the interviewees and confirmed by the literature.

It is essential to highlight that the literature lacks research for the three variables together, which means that this present research is of particular value to knowledge in the IT telecommunication field. The study highlights why the correlation coefficient is not high for all variables, more research should be conducted on why the variables, when combined, did not show a high correlation.

5.4.2 Organisation Factor

The researcher chose two variables from the organisation factor to be examined in this research project. The two variables are customer involvement and management involvement. Some of the interviewees understood management involvement to be micro-management and others as governance. Judging by the correlation coefficient, most of the survey takers understand management involvement as governance as the correlation value is medium.

The correlation coefficient for customer involvement and management involvement is > 0.3, putting both as of medium correlation. Further, both correlations were positive. Chow and Cao (2008) confirm that customer involvement is one of the primary CSFs. Still, the

authors failed to find a correlation for management involvement, which was also confirmed by Misra et al. (2009). Wan and Wang (2010) were able to confirm both variables under customer and leadership management to be among the CSFs. Sheffield and Lemétayer (2013) found that customer collaboration, interaction, and involvement besides management leadership involvement were among the most critical factors for the project success under an agile project management methodology, as confirmed by Hummel and Ep (2015).

Tsoy and Staples (2020) found that customer involvement is the most critical under organisation factor. Their research considers customer involvement as either governance and support or micro-management, and this is entirely in line with the interviews here, as considered later in the analysis. Both customer involvement and management involvement were critical for the success of the project. These two variables were examined during the interviews, where it was found that they are not of particular relevance in the literature. Still, the literature highlighted the importance of both under the organisation factor, which all inherit from Chow and Cao (2008).

The question was explicitly asked the interviewees to gather their opinion about customer involvement and management involvement as CSFs.

M.S., in his interview, said 'In general, micro-management is not preferred during the implementation of the project', from which it is clear that the interviewee understood management involvement as micro-management. However, the interviewee proceeded to state, 'But of course we should have a strong governance, but we should leave the people on the ground to do such agile methodology in a proper way ', which means he also understood governance and support to the project operated by an agile project management methodology.

The answer of this interviewee highlighted that they understood the question correctly, so the researcher was keen not to include this mistake in the survey questions. The correlation coefficient shows that the survey takers understood the final question correctly.

From the individual questions in the survey related to customer involvement, it was found that:
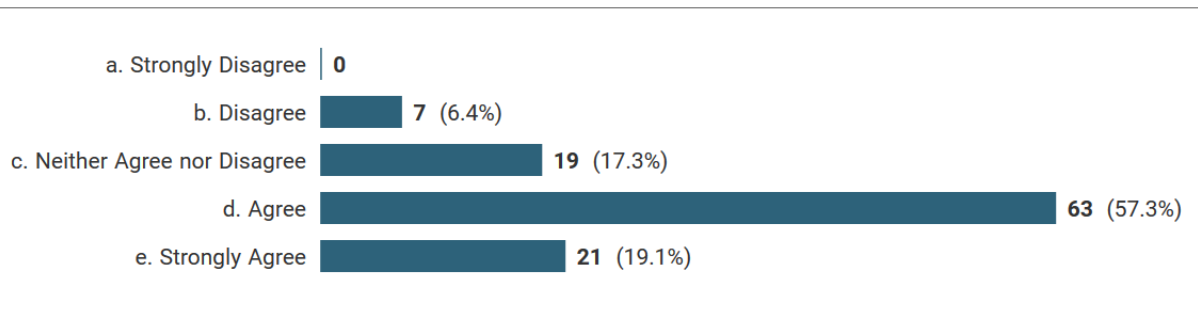
Figure 17: Management Involvement Using the Agile Method Achieves Project Value rather than a Traditional one?
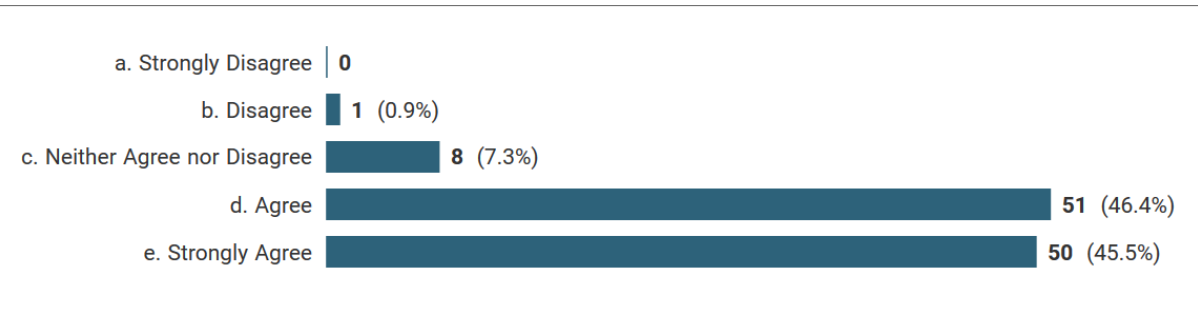
Figure 18: Active Management Involvement and Support

a. Strongly Disagree	**0**
b. Disagree	**1** (0.9%)
c. Neither Agree nor Disagree	**22** (20%)
d. Agree	**59** (53.6%)
e. Strongly Agree	**28** (25.5%)
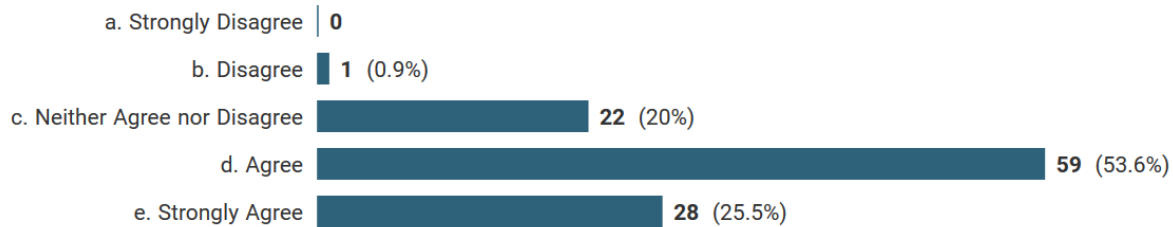
Figure 19: Management Involvement has a Significant Impact on the Application of the Agile Methodology

It is clear from the above graphs that almost 80% to 90% of the survey takers agree that customer involvement is a CSF, and this is why it shows a more significant correlation coefficient compared to other factors.

K.A., in his interview, said that 'Customer involvement and management involvement [are] very important because most of the projects have two sides'. His words confirm the survey results, triangulate them, and also explain the importance of both involvements. He explained more by saying 'and again you lose the momentum also management will help you to get attention and resolve many issues'. K.A explanation is in line with Tsoy and Staples (2020).

E.A. confirms what other interviewees said. In regard to customer involvement, he explicitly states, 'I mean that the customer is aware with each step and we are ta … we are taking feedback from the customer about each step before taking the next step', which is in line with (Chow and Cao, 2008).

K.M. was very specific in confirming Chow and Cao (2008) by saying 'customer involvement is crucial'. He highlighted the importance of customer involvement as a

cornerstone for success, which is absolutely in line with the literature (Tam et al., 2020; Tsoy and Staples, 2020; Nguyen, 2016)

L.R., with an interesting explanation for management and customer involvement, said, 'Everyone is governing because you're all swimming towards the same end objective, regardless of the spring that you're working upon. And because you are communicating daily, because you have full awareness of what happening in Egypt springs as an example. But I think that governance works at all levels. And that's why I say that management involvement; you called it management involvement … need[s] to be less anyway, even the micro-management'. Concerning the explanation of the customer involvement, he said, 'one of the differences between Waterfall and agile is the customer involvement [is] actually a little bit more, and that's why I said the customer must buy-in because the customer plays a far more active role'. Therefore, he highlighted that there should be less management involvement and more customer involvement. This represents added value as the literature did not highlight this in this way, instead stating that customer involvement is among the primary CSFs. The higher correlation score for customer involvement raises a question for this organisation that merits further research.

Observing the questions generating the customer involvement from the survey angle, the following was found:

a. Strongly Disagree — 1 (0.9%)
b. Disagree — 1 (0.9%)
c. Neither Agree nor Disagree — 15 (13.6%)
d. Agree — 51 (46.4%)
e. Strongly Agree — 42 (38.2%)
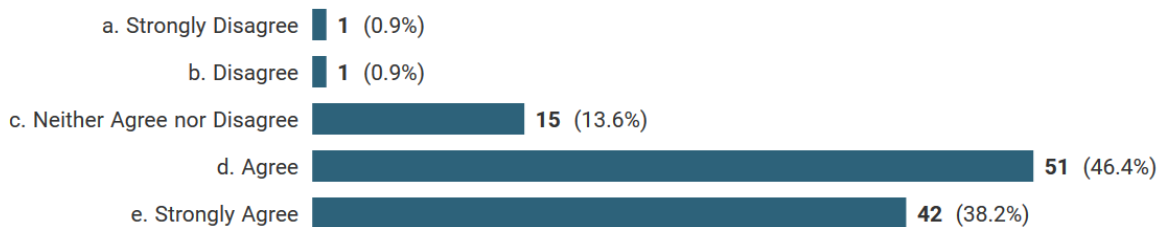
Figure 20: Customer Involvement has a Significant Impact on the Application of the Agile Methodology
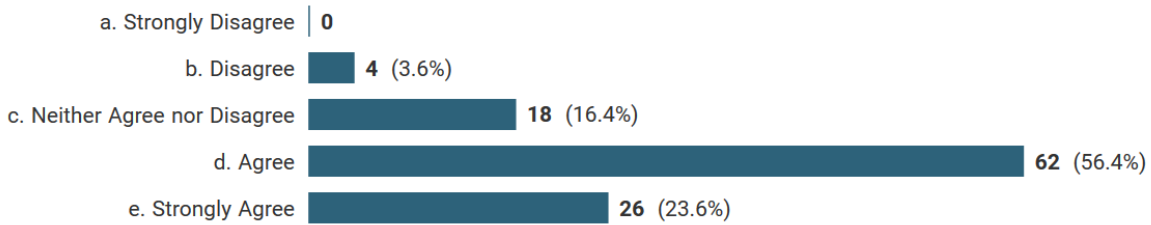
Figure 21: More Customer Involvement Achieves Project Value When Moderated by the Agile Project Management Methodology

It is also clear that from the survey that almost 90% of the survey respondent confirmed customer involvement as a success factor, which shown a medium positive correlation. This result merits further in-depth research on customer involvement beyond team communication to investigate why the correlation is not a highly positive one.

5.5 Summary

As a summary for the research questions, see Table 29 below:

Research question	Answer	Notes
Can the application of agile project management techniques prove successful for the DS and MS departments?	Yes	Confirmed statistically by the survey and triangulated by the interviews

What are the primary critical factors associated with the application of agile project management that lead to project success?	1. Agile way of working 2. Non-Clear Scope 3. Customer involvement, training, tools 4. Contract and executive sponsor 5. The transformation from waterfall to Agile 6. Agile framework 7. Management involvement 8. People 9. Culture 10. team size 11. The collaboration between different departments 12. Team size 13. Team communication 14. Team performance 15. Clear acceptance criteria 16. Scope	Collected through the survey open question and secondee by the interviews

Is there a correlation between successful agile project management and a team's communication, size, and performance?	Yes	Strong, medium and low correlation coefficient found and stated in the question section having team capability and management involvement as the highest correlation coefficient

Table 29: Research Questions Summary

Both primary data collection contributed to answering the three research questions and fulfilling the Aim and Objective of this research project. The survey takers as quantitative data collection contributed to the confirmation on the correlation between the independent variables and the dependant one as per the Conceptual framework. The survey takers using the free questions also contribute to answering the second research question, and also the first research question. The quantitative data analysis based on the interview transcripts complement, validate and triangulate on the answering of the research questions. As the quantitative analysis enriches and explains what has been collected during the quantitative data phase collection, it confirms what has been collected during the survey. Moreover, it explains some of the points collected during the survey. Both quantitative and qualitative have direct answers to questions one and three. And, for question two all the identified CSFs have been explained by the interviewees. Important to say that the methodology used confirmed the variables and was in line with the literature as stated in this chapter.

5.5.1 Extra analysis

The researcher did an extra analysis to check the regression of the variables and see whether the dependant variable can be predicted from the independent one.

The results of the regression tests are shown in Table 30 below:

Variable	R square
Team size (TEAM_SIZE_INDVAR1)	0.065
Team communication (TEAM_COMM_INDVAR2)	0.152
Team capability (TEAM_PER_INDVAR3)	0.290
Management involvement (MANAGEMENT_INV_INDVAR4)	0.233
Customer involvement (CUSTOMER_INV_INDVAR5)	0.098

Table 30: Regression Results

The above table for regression presents R-squared for each variable, which represents the degree to which the dependent variable can be predicted from the independent one. Therefore, team size shows 6.5% and therefore cannot predict 93.5%; team communication, with 15.2%, cannot predict 84.8%; team capability, with 29%, cannot predict 71%; management involvement, with 23.3%, cannot predict 76.7%; and finally, customer involvement, with 9.8%, cannot predict 90.2%. These results lead to rejecting the null hypothesis, as described below:

$H1_0$: There is a causal relationship between team size and project success (value)

$H2_0$: There is a causal relationship between team communication and project value

H3[0]: There is a causal relationship between team capability and project value

H4[0]: There is a causal relationship between management involvement and project value

H5[0]: There is a causal relationship between customer involvement and project value

These results again show that there is a correlation, but the dependent variable cannot be estimated from the independent ones. In other words, we cannot predict project success operated by agile project management methodology through any of the independent variables, which prompts further research. Both survey takers and interviewees agreed that agile methodology could be applied to testing and quality assurance, which is in contrast to the results of Kaur et al. (2015), and Akerele et al. (2014). Which also merits further research.
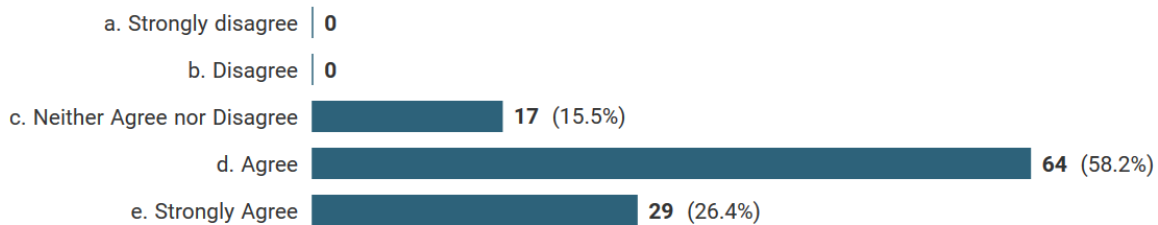
Figure 22: Agile Methodology Success if used in Testing Phases

Almost 93% agreed that agile methodology can be applied to quality assurance (unit testing: acceptance testing procedure and user acceptance testing) which is in line with Akerele et al. (2014).

5.6 Pilot Projects

It is essential to mention that the researcher, over the past 2 years, undertook a pilot action research to prove that the application of agile project management methodology

on MS and DS could be successful. This was discussed and presented on a small scale inside the organisation. The pilot project was a success, and the customer benefitted from the application of agile methodology. The researcher focused on one project success metric, TTM, as discussed in the introduction to the methodology chapter.

In the coming sections, the researcher will represent the value of applying agile project management methodology on the two pilot projects. Please refer to Appendix I for full information.

5.6.1 Pilot Project 1 (Findings and Results)

The location of this project was the Middle East. The department was DS before being moved to MS after 1 year of research, so both departments are here considered to have been involved.

The project operating under agile methodology achieves a 24.7% decrease in TTM, which was acknowledged by the customer and confirms project value. The methodology was the kanban methodology, and Customer Involvement and adequate governance were key factors for success. Team competence and daily stand-up meetings as team communication were also cornerstones for success, all the team members are certified agile project managers and integrators which confirm the team performance too. As stated above the project reaches the time to market reduction by 24.7% which confirms the success of the research project and the reach of the aim of this research project. The team size was 5-9 resources, tools and communication style have been mentioned before.

Due to confidentiality, no more information can be shared here, but the necessity of acknowledgement from the customer for success is evident. And also the confirmation of the CSFs variables was evident. So, in summary, Team communication daily stand up,

Agile project management used is the Kanban, Team size from 5-9, Team performance all are certified. Management involvement was on weekly governance and monthly steering meetings. Customer involvement was daily, weekly meetings and monthly steering meetings too. So, this pilot project can be considered as proof of the findings of the research project and can be considered as success adding to the knowledge of IT telecommunication in both departments DS and MS.

5.6.2 Pilot Project 2 (Findings and Results)

The location of this project was the Middle East, the department is the MS department, and the researcher included the same variables and constraints to have one reference for a decision. It is clear that both projects have the appropriate team size, competence, and communication. Both customer involvement and management involvement were in line with the literature and what was found through the primary data collection.

The result was a 17% reduction in TTM. Due to confidentiality, no more information can be shared here, but the necessity of acknowledgement from the customer for success is evident. So, in summary, Team communication daily stand up, Agile project management used is the Kanban, Team size from 5-9, Team performance is very high full of seniors with an excellent experience. Management involvement was on weekly governance. Customer involvement was daily as people are sitting in customer premises, weekly meetings and monthly steering meetings too. So, this pilot project can be considered as proof of the findings of the research project and can be considered as success adding to the knowledge of IT telecommunication in both departments DS and MS.

5.7 Recommendation for further research

There are a number of areas worthy of further study and investigation. The current research project has involved choosing five variables to apply the research to, and a recommendation from the researcher is that further research to be done, especially on people and organisation factors. It is important to ascertain why team communication does not score the highest correlation coefficient, although we know that communication is the factor most critical to any project's success. It is also essential to check in details the effect of customer involvement and management involvement in more significant projects as the researcher has here applied them to two medium-sized projects. Still, due to confidentiality, no further information can be presented. If there is more time, the researcher also will undergo a longitudinal survey rather than a cross-sectional survey for more details and more data reliability over time.

The researcher also recommends that the organisation conduct various pilot projects using different agile methodologies, primarily Kanban and Scrum, in order to stand on the efficacy and show TTM as obtained from the two pilot projects.

From the findings of this research project the researcher finds Kanban as agile project management methodology fits under IT telecommunication domains DS and MS, also find that daily standup meetings are crucial, the team size should be from five to nine people, not more not less, and the more competent the team the more probability to succeed. Also, the researcher finds that customer involvement on daily basis is a critical key to success, while management involvement must be governed and not a micro-management type. The researcher also opens the door for future research for correlation and causality testing on those variables as this research project was not able to find causality between independent and dependant variables.

This chapter is the result of the research project where the researcher discusses the output from the data collection chapter and relate them to the literature highlighting the findings of the research project. The chapter starts with a general reflection followed by three sections each one represents one of the research questions. At the end of the chapter, it highlights two pilot projects done as small action research, followed by a recommendation for future research.

5.8 Future Work

It is important to highlight that the organisation is working on Artificial Intelligence and Machine Learning and is investing considerable effort and finance into these fields. This organisation needs to work on research for the future under those two points AI and ML by applying the Agile project management methodology, especially since the organisation is away from its competitors regarding this field. The researcher recommends also searching two of the variables which are contract type and people culture as it was obtained during the interview that it may be a point of go or no go when it comes to applying agile project management methodology. The researcher also suggests the organisation undergo different pilot projects with different agile methodologies mainly Kanban and Scrum to stand on the effectiveness and prove TTM, as obtained by the two pilot projects, ran by the researcher on the organisation.

5.9 Contribution to Professional Practice

This research project focuses on the IT telecommunication field, as applied to DS and MS. The results of the research project demonstrate that agile project management methodology is thriving in the two departments. Moreover, the research project also extends success to testing and quality assurance. No research project has previously

been applied to these two departments in the field of IT telecommunication, which adds to the value of new research. The five CSFs had also not been applied before in one project and proved to be successful. The research project also highlighted that there must be in-depth research for some of the variables under people and organisation factors to be emphasised further. The research project can also be applied to any other industry that runs both or any of the departments, DS and MS. Which also added a new paradigm to the body of knowledge. It is essential to say that the research applied to the IT telecommunication field is very minimal in the literature regarding those two departments.

The researcher urges the management at the organisation undertaking this research to give serious consideration to the five CSFs in this research project, especially customer involvement and team capability or performance because they are from the highest-rated correlation and regression obtained through the survey. At the same time, the interviewee added team communication to be one of the most CSFs for this organisation. From the two pilot projects, the researcher also advised the organisation to make sure the right team size is available to serve each project according to the project scope and requirements as it was found that the right team size obtained the project value. So, customer to be heavily involved in the project phases to achieve success. Standup meetings daily to be done as part of team communication. The organisation must ensure the competence of the team in regards to agile project management. Management involvement to be limited only to governance, and micro-management will fail the project. The right team size according to each part of the project and according to the methodology used, The organisation must ensure the right team size no more and no less. The organisation had to look at the existing contracts and how they can be achieved using agile and make sure that new contracts fulfil the agile project management methodology way of working.

In summary, this research project highlighted five of the critical success factors for the Application of Agile methodology on IT Telecommunication in DS and MS departments in the Middle East and Africa. Project managers, program managers, project directors, IT directors and managed services chief operating officers had to give high consideration to these five CSFs. This research project, considered to be the first in this field, which is IT Telecommunication. Also, under those two departments DS and MS to apply these CSFs. Moreover, this research project is a unique piece of work searching these CSFs together in one research project and proves to be successful.

Limitations of the research project

The research project has been extended to the field of IT telecommunications. It has been extended to two departments, Digital Services and Managed Services. The research project was unable to predict the dependent variable from the independent five variables, leaving space for more focused research. The research project due to time limitation was not able to take the longitudinal survey rather than the cross-sectional one. The research project was not able to take more independent variables such as the contract type which have been emerged from the interviews as one of the critical success factors for project success under Agile project management methodology. Due to time constraints, the research project could be used to do in-depth research on a broader project under Digital Services, which would add more benefits to the company that undertakes this research. Still, the two pilot projects have at least highlighted the importance of Agile project management to the organisation management in this region.

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Appendix I: Pilot Project
Pilot Project 1

Agenda

Introducing Agile management techniques & replacing traditional waterfall based planning is becoming increasingly important for our customer.

In this presentation, we'll describe and explain some of the pros transformation from waterfall to agile approach. We'll share some of the enhancements and gains as an outcome from this transformation.

Project Types

Waterfall:

Plan
Build
Review
Test
Deploy
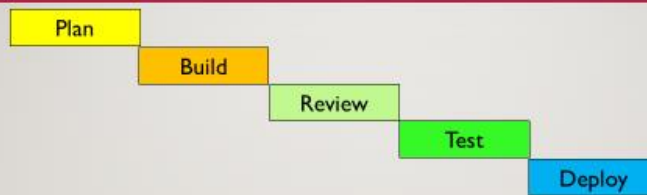
o Requirements are known and fixed at the outset
o Changes can be expensive or impossible
o Different skills and resources are needed at different times
o Delays in one area have a knock on effect
o Testing is towards the end of the project
o The end date and cost are not 'fixed'
o Benefits typically not realised until the end

Agile:
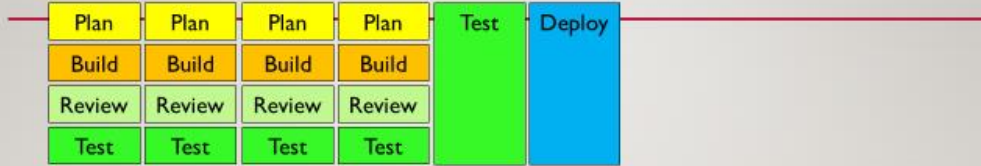
- Requirements don't all have to be fixed at the outset
- Developments are time-boxed
- Focus is on delivering sets of independent features
- Changes can be incorporated at a later stage
- Resources used more efficiently
- Slippage is much more obvious
- Delays in one area not as critical
- The end date can be fixed..
- ..by deployment of what has been signed off at a given time.

ADM Agile Main Key Benefits:

- Enhanced time to market by 24.7%
- Improved Quality.
- Faster Delivery.
- More Flexibility Accepting Changes.
- Low Amounts of Risk and Zero Uncertainty.
- Business Value Gain at Every Release.

Vs. Waterfall Main Pain Points:

- Much More Time to Market.
- Long Waits for Releases.
- Cannot Accommodate Changing Requirements.
- High Amounts of Risk and High Uncertainty.
- Business Value Gain at Very End of the project.

THE WATERFALL PROCESS — 'This project has got so big, I'm not sure I'll be able to deliver it!'

THE AGILE PROCESS — 'It's so much better delivering this project in bite-sized sections'
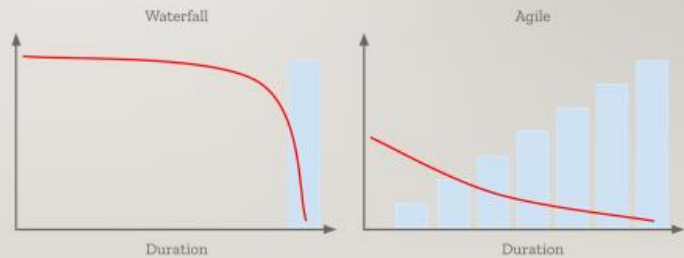
ADM Agile Techniques:

- Daily Stand Up Call
  - Aligning team members to their daily task(s).

- Kanban
  - SDM is heavily relying on Kanban (Trello tool) for E2E CR lifecycle & Iteration(s).

1) Backlog	2) Design	3) Development	4) Testing	5) Delivery
1497 Shamel Family	943 Enable Redirection for Online Payment/Recharge - Drop 2	3037 Prepaid Special SKD Bundle MNP Kit	999 Mobile App Push Notification IM	2631 Add HLR Announcement to Whitelist
1510 ESM Renewal Revamp	1438 Building Ana Experience on Legacy	2990 5G New Promotions - New Scope	3038 Prepaid Xpress New Data Addon	1454 International Topup API
	1440 Prepaid Revamp - Channels Adaptation	3039 eShop Device Bundling Offer Update	1475 Store Order No. in BSCS	1424 Self Care Revamp
		1491 Fun Friday H2 2020	1376 CVM 2.0 OLM-IN-ESM-SBP-EMM	1667 Online Prepaid Sales Reporting Fix
		3001 Prepaid WBB 30GB SM Changed		1416 ADN Logic in MTX
		2424 / 2496 / 2951 SGSN IPs Addition		1429 Post2Pre Conversion Causing CCN file Corruption
				1449 Employee Special Discount
				1463 Postpaid SS AddOns Revamp

ADM – Waterfall vs Agile (2017 – 2019):

Waterfall - 2017	Agile - 2019
446 CRs Received	617 CRs Received
TTM/CR → 2.5 – 3 Weeks (Complexity Based)	TTM/CR → 1.8 – 2.3 Weeks (Complexity Based)
QA Success Rate → 91.3%	QA Success Rate → 96.8%
47/446 CRs Change Req.	101/617 CRs Change Req.
Live Bugs → 5.4%	Live Bugs → 2.7%

WATERFALL MODEL: Conception → Initiation → Analysis → Design → Construction → Testing → Deployment

VS

AGILE: Conception, Initiation, Analysis, Design, Construction, Testing, Deployment

Pilot Project 2

Project management life cycles types & traits
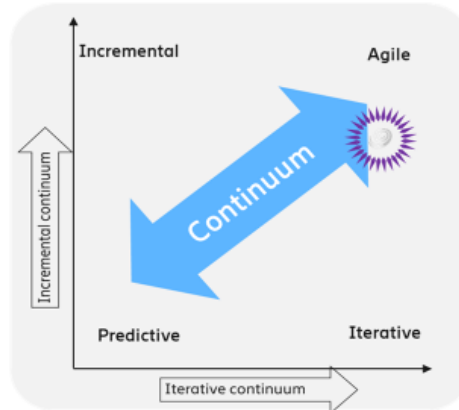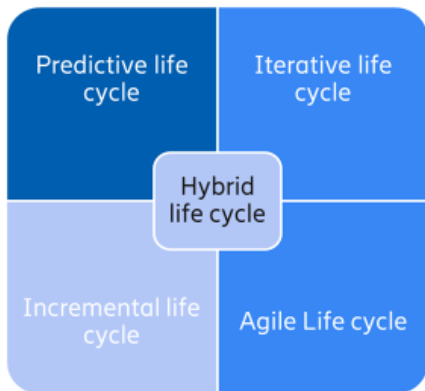
Each project finds a spot on the continuum that provides an optimum balance of the characteristic for its context

Transition from Predictive Lifecycle

Waterfall life cycle

Iterative lifecycle
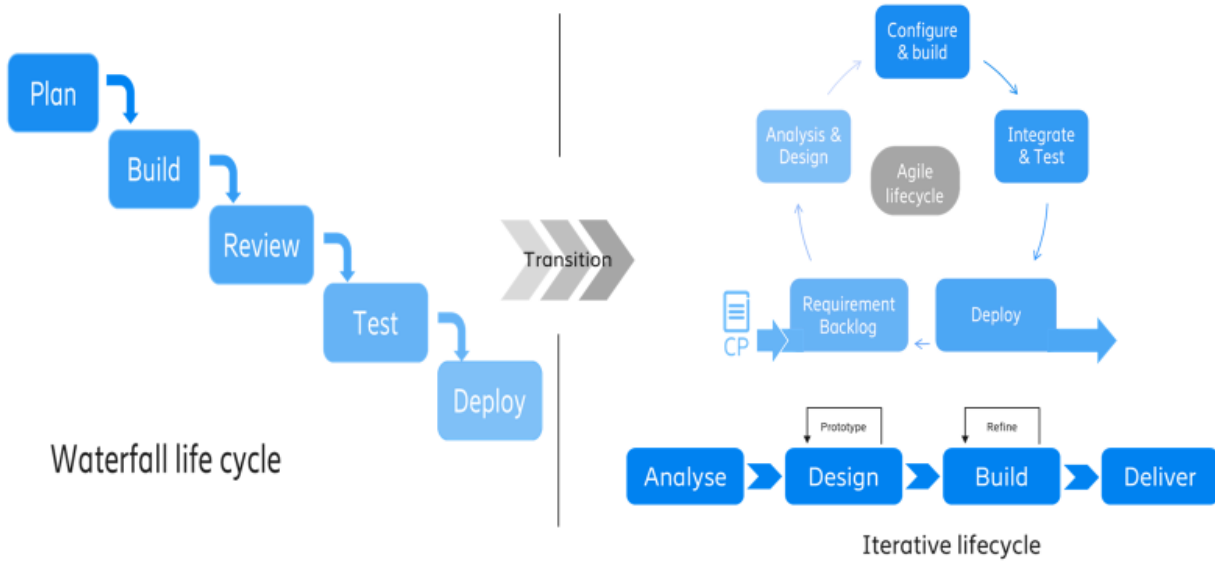
Agile Manifesto — Agile roles & responsibilities

The Agile Manifesto		
Individuals and Interactions	Over	Processes and Tools
Working products	Over	Comprehensive Documentation
Customer Collaboration	Over	Contract Negotiation
Responding to change	Over	Following a Plan

Product Owner
Servant Leader

Team Facilitator
Scrum Master

Cross Functional team members
Skilled team members

I-Shaped Agile Team

Deep Expertise

T-Shaped Agile Team

Broad Skills

Deep Skills

Agile Methodology breakdown

Build the right Product

Build the Product Right

X 2

Pool Of resources

Product Owner

Development team

CP SMEs

X 6 teams

X 5 members

Build it on time
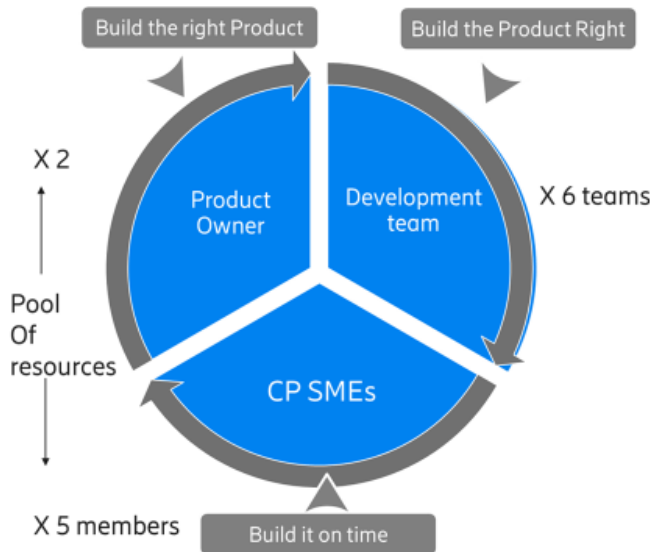
Product Owner
The person with vision who breaks down project intro tasks, prioritize & integrate end to end

CP SMEs team
The team who makes sure project is following plan, priority then test, verify, support ATP & manage changes with ownership to achieve results

Configuration & development team
Back end team dedicated for product development who execute project design and make sure it fulfils requested requirements

Execution notes & Highlights

1 backlog **2** decomposition **3** development **4** development **5** Testing

- For each concept paper it is being decomposed to sub-tasks (usually it will be Task per domain)
- Each Task will have their own cycle & timeline where several tasks are running for some cases (depending on case specific requirements up to the point where integration is required
- When changes in requirement takes place during domain implementation changes are executed to concerned domain and the owner will reflect impact to others accordingly under product owner custody
- Similarly product owner might propagate changes to CPM SMEs (second input for changes in requirement)

✓ Jira is used to manage CP development life cycle which servs the purpose
✓ Other tools were tested in the past such as Trello & each tool has its own benefits & constraints
✓ Product Business Catalogue will improve performance & type of delivery quality and CPs performance

Execution Highlights

Q1-Q2 2019

234
CP delivered

11.5 days
Average Time to Market

> 17%
Enhancement Time to mark

Q1-Q2 2020

211
CP delivered

9.5 days
Average Time to Market
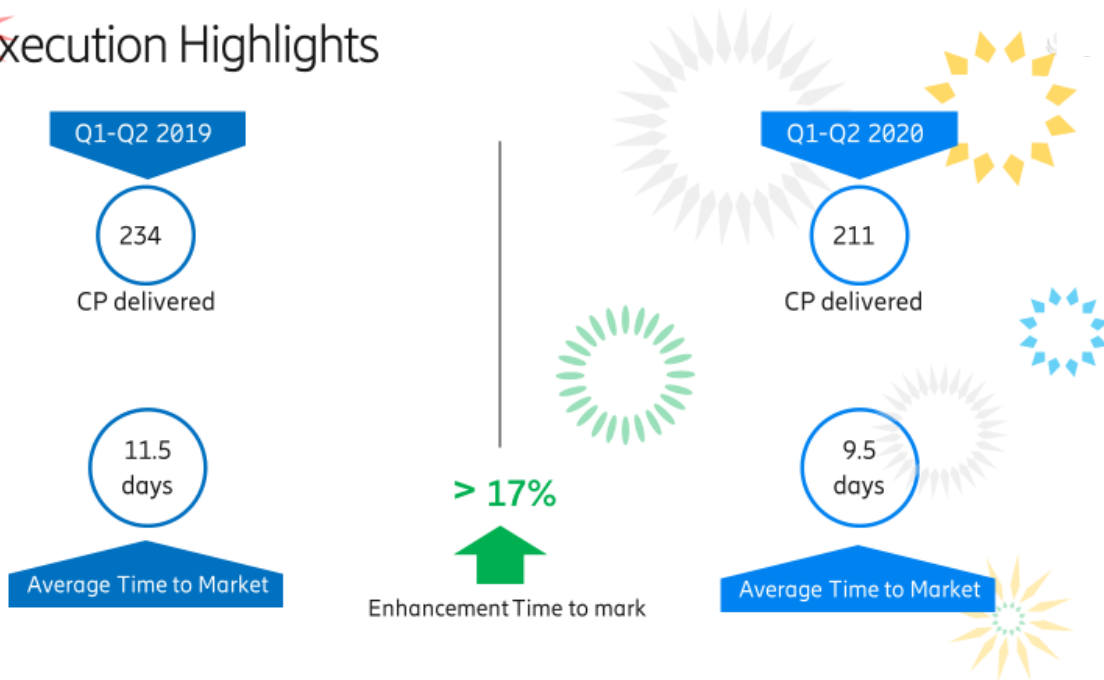
Appendix II: Comparison between Agile Methodologies

Method	Advantages	Disadvantages	Supporting Practice
Scrum	More transparency and project visibility. Increased team accountability Easy to accommodate changes Increased cost savings Commitment to goals in the Sprint. Courage to do what you think is right.	Risk of scope creep Team requires experience and commitment Scrum Master can fail the project if used in a wrong way Tasks must be defined accurately to overcome inaccuracy Poor documents Product owners cannot control the project	

		Rapid shift in specifications allows consumers space to continue demanding more features.	
	Focus on the details inside the current Sprint Visibility on work challenges Trusting the work of everyone		
XP	Communication. Simplicity. Feedback. Courage.	Less focus on documentation Difficult to obtain customer interaction Hence some other team member (such as sponsor / Project Manager) plays the role of the	Planning Creating small releases Involving customer in acceptance Design with Simplicity Pair programming

	Respect	client. Thus, lack of discipline has been noted at times	Collective code ownership Coding standards Metaphor Sustainable pace
	End users (customers) are directly interested in the development of applications. The product produced is also similar to what the consumer needs. Team feedback is always constructive and there is a great deal of focus on self-improvement. Best practises are widely known and religiously followed		

	throughout the departments.		
Kanban	Increases flexibility Reduces waste: Easy to understand Improves delivery flow Minimises cycle time Visualisation. Limiting on-going jobs. Flow control can be accomplished either by managing queues or by limiting work in progress.	Outdated board can lead to issues Teams can overcomplicate the board Lack of timing	

	To make policies clear. Use feedback loops. Experimental evolution.		
FDD	Modeling of domain objects Developing features Content and Class Possession Feature teams Inspections Configuration management Continuous builds Visibility of change and consequences	Complexity is so high that there is no use in using this approach for smaller tasks. Less contact inside and beyond the squad. Teams benefit little about other people and teams.	

Crystal	Teamwork	Planning and growth do not rely on requirements; thus, traceability is a matter for Crystal.	
	Communication		
	Simplicity		
	Reflection		
	Frequent adjustments		
	Improve processes		
lean	Stress on learning		
	Delay decisions		
	Deliver fast results		
	More empowerment for the team		
	Construct integrity		

	End to end vision on the whole project		
DSDM	Value Active user involvement Team with more power Frequent delivery Stakeholder involvement	Documentation is complex and time-consuming	

Table 31 (Comparison between Agile methodologies)

Appendix III: Survey and Interview questions

Survey

Section 1: Demographic data

1.Gender

1. Male

2. Female

3. Others

4. Undisclosed

2. Age

1. less than or equal to 30

2.31 - 35

3. 36 - 40

4. 41 - 45

5. 46 – 50

6. Above 50

3.Department

1. Digital services

2. Managed services

4. Position

   1. Project/Program Manager

   2. Program Director

   3. ADM Head/Manager

   4. PMO/DS Head/MS Head

   5. MS Director

   6. MS COO

5. Location in Ericsson

   1. Middle East

   2. Africa

Section 2: The agile project information.

1. Using an agile project management methodology, can this achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

2. Do you agree that project definition achieves project value when moderated by the agile method rather than the traditional method?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

3. Do you agree that team capability using agile project management methodology can achieve project value better than using traditional project management methodology?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

4. More customer involvement achieves project value when moderated by the agile project management methodology rather than a traditional one?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

5. Management involvement using the agile method achieves project value rather than a traditional one?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

Section 3: Agile success factors.

6. To what extent do you agree that team size is a critical factor to apply agile project management?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

7. To what extent do you agree that team communication is a critical factor to apply agile project management?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

8. To what extent do you agree that team performance is a critical factor to apply agile project management?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

9. Proper training on the use of an agile will have a significant impact on implementing that methodology by the team and achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

10. Active management involvement and support will have a significant impact on applying the agile methodology and achieve the project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

11. Having a complete methodology implementation strategy will significantly impact implementing that agile methodology and achieving the project value.

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

12. To what extent do you agree that providing the development team access to external resources such as off-site, training sessions, journals, consultants, books and online resources will have a significant impact on agile methodology implementation and achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

13. To what extent do you agree that the size of the corporation or software development team will have a significant impact on agile SDM implementation and achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

14. Collocating the development team will have a significant impact on the agile methodology and achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

15. Will management involvement have a significant impact on the application of agile methodology and achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

16. Will Customer involvement have a significant impact on the application of agile methodology and achieve project value?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

Section 4: Perception of success.

17. Agile project management will be successful in Digital Services compared to the traditional approach?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

18. Agile project management will be successful in Managed Services if applied?

a. Strongly Disagree

b. Disagree

c. Neither Agree nor Disagree

d. Agree

e. Strongly Agree

Interview Questions

1. Do you think that Applying Agile project management methodology on both DS & MS department will lead to achieving project value?

2. From your point of view, what are the critical factors that lead to achieving project value by applying Agile project management methodology?

3. Do you think that there is a relationship between team size, communication, performance, and agile project management methodology?

4. What do you think about customer involvement and management involvement in projects operated by agile methodology?

5. What is your opinion if the organisation fully applies agile project management methodology in all its domains under DS & MS?

7. What do you think might be other critical factors that contribute to project success in terms of achieving its value when applying agile project methodology?

Appendix IV: Consent Form

Consent form

Critical Success Factors for the Application of Agile Methodology in IT Telecommunication Projects: A Mixed Method Research Approach

Please read each statement below and then confirm that you agree or disagree by placing your initials in the appropriate box.

	Yes	No
I have read and understood the information provided to me in the information sheet.		
I have had an opportunity to ask questions about this research.		
I agree with the interview being audio recorded.		
I understand that I can decline to answer any questions.		

I understand that I can withdraw my answers in part or full, anytime up until one week from data being collected.		
I agree to anonymised quotations being used in any academic presentations or publications of this work.		
I agree to my data being used in any subsequent work that builds on this current project, such as Organisation presentations, University Conferences, and Academic Journals.		

Signature and date of the person giving consent (the participant).

Signature and date of the person obtaining consent (Ahmed Adel Mohamed).

Ahmed Adel Mohamed

Doctorate Researcher

University of Northampton, UK

Mobile: +965- 60045586

Email: ahmed.mohamed@northampton.ac.uk

Appendix V: Participant information sheet

Participant Information Sheet

Study title

Critical Success Factors for the Application of Agile Methodology in IT Telecommunication Projects: A Mixed Method Research Approach

Why have I been invited?

You are being invited to take part in this research study on *Application of Agile Methodology in Telecommunication Projects.* You are invited because you are one of the following stakeholders (Project manager, Program Manager, Program Director, IT director, Chief operating officer, head of project managers, PMO) who have direct interaction with either digital services or managed services on which this research project will take place in the organisation. Before you decide whether you wish to participate, you need to understand why the study is being conducted and what it will involve. Please take some time to read the information provided and discuss it with others if you wish. Please ask if there is anything that is not clear, or if you would like more information.

What is the purpose of the study?

The project aims to extensively assess the effects associated with the application of Agile project management techniques to BDGS and BMAS, and the critical factors that lead to project success.

Why have I been chosen?

Since we are talking about Agile project management and since you are part of the customer project manager, program director community and you are related to market middle east and Africa where the research is taking place then you are invited.

Do I have to take part?

Taking part is entirely voluntary. If you decide to take part, you will be asked to sign a consent form to confirm that you understand the project and are happy to participate. If you decide to take part and then change your mind, you are free to withdraw from the study or withdraw any data you have given within 30 days of participating.

What will my participation involve?

Once you have agreed to take part in the study, then the data collection method will be complete anonymous survey/interview where no information personal rather than demographics and age for the sake of the analysis only. You will be asked a certain amount of questions that will not take more than 60 minutes of your time. The significant advantage of this survey/interview is that we will know how you think about applying the aim of this research on XYZ organisation, and the factors affecting this success. The disadvantage is that we will miss your opinion and views for doing this change.

For interview you will be asked to sign the consent form, then you will be asked to take face to face interview which will be voice recorded, and you will be asked to answer interview questions with some interactions in between from the researcher to be able to collect all critical information about the point of research. After the interview finished, we may continue chatting with each other for some time and will be asked to leave the voice recorder on in case for any important info that can add to the point of research.

For the survey, you will be asked to take the survey questions online, and you will be given the time to answer some questions categorised in some sections.

What are the possible benefits of taking part?

The information obtained from this study will be used for exploring a new area in telecommunication which is the application of Agile project management it will add to the organisation success and will add to the departments that will be applied on. It will also contribute to the knowledge knowing that there is a lack of information on this subject in the telecommunication field.

What are the possible risks or disadvantages of taking part?

There is no risk in taking part in this research, knowing that XYZ organisation both the legal department and Human Resources department, have consented the researcher to do the research. There is no disadvantage at all. There will be an advantage of participating and adding your valuable opinion.

What if something goes wrong?

If you have any concerns about any aspect of the way you have been approached or treated during this study, then please contact Dr Hala Mansour email: hala.mansour@northampton.ac.uk

Will my information be kept confidential?

All the information collected for this study will be anonymised and stored securely on a

password-protected computer. The survey results will be kept confidentially. Privacy and anonymity will be ensured in the collection, storage and publication of research material.

What will happen to the results of the study?

The results from this study will be taken, analysed and represented in a thesis; the data coming from you is very important as it is a source of primary data. Results will be

submitted to the University of Northampton and results will be too given to the head of digital services as well as head of managed services. It is up to management than whether to act according to the results or not. The results will not be published outside the organisation except for the university as stated before, or in an official academic journal. If you wish to have the results, a copy of the analysis can be sent to you upon your request, or it can be published on yammer so all digital services department and Managed services too can see the results and benefit from it. If you would like to receive a summary of the findings, then please indicate this on the consent form or contact the lead researcher.

Who has reviewed the study?

This study has been reviewed and approved by the Research Ethics Committee

Contact for further information

If you have any questions about this study or your possible involvement, then please contact me using the contact details below.

Researcher: Ahmed Adel Mohamed

Email: ahmed.mohamed@northampton.ac.uk

Mobile: +96560045586

Thank you for considering taking part in this study.

Appendix VI: Interviews Transcript
M.S Interview
Introduction

Ahmed: Mr. Mohamed! Before starting this interview, aaa just asking you for your consent for record for the sake of transcripting.

Mr. Mohamed: Yea, no problem, no problem. Go ahead!

Ahmed: Thank you very much! Okay, thank you, Mr. Mohamed!

In this semi-structured interview, I'm going to to ask you six questions, six predefined questions for application of Agile Project Management in IT telecommunication. There will be, a dialogue between each others for the sake of this aa of this aa conversation. Aa again, I'm trying to search for the application of Agile project management in IT telecommunication in the market of middle east and Africa, and specifically in the two departments; digital services and manage services.

Question 1

The first question will be… will be a question about your conception, so it is saying that do you think that applying Agile Project Management methodology on both digital services and manage services department will lead to achieve the project value?

Mr. Mohamed: I think applying this Agile Project Management methodology will be the silver bullet to improve the digital service project implementation, and also the manage services. It's a fact, you know, the one that we see every day. Implementing Waterfall model, I think, doesn't help because it's not fixable enough, but Agile Methodology… it's… it's the new trend that the customer is requesting us, all the CSPs are requesting from us to start to implement.

Question 2

Ahmed: This is very… this is very good news even in your… in your words, it's a direct and perfect comparison between Waterfall and Agile in the… in this areas under those two areas which are the digital services and aaa and manage services aaa do you think that it needs it needs manage… management or corporate intervention or shall we start it as pilot one project here and, project there. What… what do you think Mr. Mohamed?

Mr. Mohamed: I think it should work in both ways; the corporate, itself, should… should get advice from the management in each corporate to adapt and adopt this Agile Methodology as part of their DNA. And aaa and in order to reach that stage, we may need to do POC pilot here and there for some customers, and I'm sure that what we have done before, you know, it's… it will be successful pilot because you can improve the time to market, you can improve aa, you can have more efficiency even resource efficiency when we implement this Agile Methodology.

Question 3

Ahmed: Okay. Okay. From your point of view, aaa what are the critical factors that leads to achieve the project value by applying the agile project management methodologies? Just for your info from the research or from the literature review there are people factor, there are management factor, there are project factor, there are a lot of factors. For example, like team siz, like management intervention. I need to listen to your review about the most critical factors from your side that leads to the success of this methodology.

Mr. Mohamed: First of all, the culture in the organization, we have to make sure that the people mindset… they they are accepting to do such changes. This is number one. So in order for them to reach that stage, we have to show to them the benefit in the ground. This is number one. Number two is the competence of the resources which is very critical factor in order to change completely from the Waterfall model which is cascaded model

of… aaa cascaded model of doing the activity to be agile, it is that we need a high competence in source who understand… who has this mindset to change. At the same time, we need the management by end. So this is what I think the most important thing.

Ahmed: Thank you Mr. Mohamed there is no pre… aaa I'm putting this on the record. That there is no pre agreement about what you have said and actually what you have said is exactly the the the most critical factors that I looked to them aaa while while doing this research. So thank you! I'm thanking you so much for this.

Question 4

Ahmed: There is a direct question, do you think that there is a relationship between team size, team communication, team performance and Agile Project Management methodology?

(silence) Mr. Mohamed do you hear me?

Mr. Mohamed: Hello!

Ahmed: Yes. Do you hear me

Mr. Mohamed: Ah yea sorry I'm back.

Ahmed: No issue, No issue. I'm just a I'm just repeating what I have said. I'm saying that thank you so much for what you have said because exactly those are the aaa independent variables that I have chosen to do the research on as we think that those are the most important. From your point of view, do you think that there is a relationship between team size, team communication, team performance and Agile Project Management methodology?

Mr. Mohamed: Of course, there is a there is some kind of correlation between all these factors and the agile deployment. Whenever we… but a is not a one to one mapping in

my view a but for example team size for agile should be supporter team than waterfall. And we can have different teams and each team can have certain competence, then we can make sure that at the end of the critical part of the project we have lower time to market. The other factor you said team size and what is what is the others?

Ahmed: Team communication and team performance.

Mr. Mohamed: Team communication, you know, it's a basics, you know, for any… for any change in any methodology. Team communication it's a must, you know we should have a good team communication especially with such Agile communication because will have different teams and the communication should be enhanced and boosted between such different teams in order to insure that whenever we have, for example, any problem we should have the feedback the control in a very controled the way which will be achieved by having excellent communication channel between all of them aa and what is the third factor you said?

Ahmed: Performance, the team performance.

Mr. Mohamed: Performance of course you know we need the very high performing team in order to be able to achieve because again it is not the legacy part for the for the normal Waterfall model where the people can be hidden under the process, where the people can backup each other, no. Agile Agile for me it's a small team with very high skilled people who can do the activity on time and then cascade this activity to the other team and so on. So the three factor, the one that you just mentioned, are critical, you know, in order to have successful Agile transformation.

Question 5

Ahmed: Actually… actually, Mr. Mohamed. There is an explanation here because during the survey and aaa taking the output and analyzing these output through IBMSPS tool. We have find that there is a correlation, as you said, between team size, team

communication, team performance in and Agile Project Management methodology which is the very of the project, or project success. But as you said actually, Mr. Mohamed. You have said what we have found in the analysis that there is… it is not a big correlation. Do you have an explanation for this, sometimes when do a correlation test you will find that it's a one to one? It's a very big correlation, but here we are talking about 50% or maybe less as a correlation. Do you have an explanation for this?

Mohamed: No. In my view, I think, you cannot… you cannot take one factor and claim that it has one to one correlation for success of this agile methodology. I think you have to take one of them as combined factors in order to achieve the success. For example, if you have the good team size and they do not have a good communication then the whole delivery will be screw. If you do not have the… if you have good communication, but you don't have the competence for the team, again, you know, it will not it will not work. So you should have all of them combined together to have a strong correlation with the… with the success of this implementation of the Agile methodology.

Ahmed: Very very nice and very good explanation. Thank you very much! Maybe this will add to my analysis is to go back and group these variables in one variable and do the correlation again and see will it increase or not. Okay. aaa what… d…

Mr. Mohamed: Yes!

Question 6

Ahmed: Again, Mr. Mohamed. What about customer involvement and management involvement? Do you think that more customer involvement, more management involvement during the project operated by Agile methodology… this will lead to project success or it will not?

Mr. Mohamed: In general, micro-management is not is not preferred during the implementation of the project. Maybe it will… it should happen at the beginning of the

project just to make sure that everything is on the ground and on track, but after that, you know, we should leave the team on the ground to manage, and the management from both customer side and vendor side should do the government, and the government will be in monthly basis, by monthly or whatever. But of course we should have a strong governance, but we should leave the people on the ground to do such Agile methodology in a proper way. Because again you know the main idea, in my view, for the agile methodology is the time to market, so we need to leave the team to work, to innovate aa and our role should be only the government part in suitable frequency of such governance.

Ahmed: Okay. Okay. So you see that strong governance can be taken as customer and and management involvement rather than micro-management and leaving the team to work. Okay.

Question 7

Aaa this a broad question for you. From your opinion, if the organization, our organization, fully applies the Agile Project Management methodology in all domains under digital services and manage services. What is your opinion?

Mr. Mohamed: I think, you know, it is not an opinion. I think, part of this Agile methodology has been implemented in my current company which is Ericson, but it is implemented in the RND part, and the result was amazing. Ericson, you know, now they are in the front… forefront when it comes to technology for core, for the digital services despite the fact that we have a lot of fragmented supplier in the market.

So aa I was following them up couple of years ago when they started to implement that one in the RND and the result was amazing. So if we start to extent our wings for such implementation in in other functions, as well, as we said, for DGS and BDGS and for B Manage Service, for sure, you know, will be able to still with pride the success that has

been done in the RND and implement them, and I'm sure that the result will be… will be successful as well.

Question 8

Ahmed: Okay. This is direct answer. Thank you very much! Coming to the last question, and I would like you to to just think with me, so that I see whether I forget something or open something for future research. What do you think might be other critical factors that contribute to the project success in terms of achieving its value when applying Agile Project Management methodology? You talk about team, you take about management, you talk about competence, you take about communication. But from your point of view, you talk also about culture. Thank you so much for this, but what do you think maybe other critical factors?

Mr. Mohamed: Let me think. This not an easy question, you know.

Ahmed: Yeah! I can I can support you with aa with with literature and I can tell you there are a lot of researchers working in this field and there is aa one of the biggest aa article, I think, just one moment trying to open this article.

(silence)

Yes. This article is in 2008, Mr. Mohamed and it is for for two researchers; Chow and Cao, and this… we consider this as aa as the bible for aa for for Agile success factors. Actually, it's talk about organization. it talks about people, process and talk about technical. For example, in organization, it talk about lack of executive sponsorship, lack of management commitment organizational culture, organizational political culture, size of the organization, and Agile logistics. These are organizational. Do you think that one of these can be applied to us, from the organizational part?

Mr. Mohamed: I think, we have covered that part in our discussion because we mentioned the people, the culture, the team size. All these one is related to the organization. So it's covered, but maybe in different names. What I think what I think is that what we need in order to make sure that we have successful Agile implementation… first one one point, you know, it is the collaboration between different departments across the organization. Because so far what we see in most of the organization that we are still working in some sizes, so everyone is looking for his target or whatever which the target is not fully aligned. So maybe in order to make sure that we take this Agile methodology to the next level and implement these one across all the board, we should have, first of all, collaboration between all the departments in the organization and, that one can be achieved by having common target for all, you know, across all the projects. For example, you know, manage service team should should make sure that they have common target with the DGS, for both of them should be collaborated to achieve the the same target for the same goal for the organization. Another point that I may highlight, as well it is to have good speak up culture in the organization, because the Agile methodology… it's a new methodology, so we need to hear and listen to everyone in the organization about their feedback… how It is implemented, so because, you know, it's not just to mention everything is going well. No, we need to understand up to the level of the integrated part, you know. What goes wrong? How it is implemented? So what we will collect all such feedback, you know, we will be able to evaluate what is the next step. So that can be also one idea, you know, for future research. It's changing the culture in the organization in such a way of a of a understanding more what is going on, and then we can develop the next step for this one. Changing the process, of course, Agile… the basic of Agile implementation it's all about changing the process, right? So the process is already included in our previous discussion.

Ahmed: Yes, so I'm just repeating the five independent variables that already undergone in the research and thank you so much, you have already confirmed those five, and even

give more which is people factor. We chose team size, team communication, team performance because it's very important. You added culture also, but I will I will try to see how to put this in the research. It will be very difficult as of now. And for organization we looked to the management involvement and customer involvement. And aaa for… You covered most of the critical factors and thank you very much. You already … what you have chosen as critical factors are the same that I have chosen for the for the research. Aaa mm Do you need to say anything or do you need to add anything to this interview, Mr. Mohamed?

Mr. Mohamed: No, thanks a lot I think most of the questions are very relevant, and I think it's a very important topic which is very… also relevant to relevant to our daily way of working, and also our strategic thinking, so thanks a lot for you for choosing that important vital topic.

conclusion

Ahmed: Thank you. Thank you very much, Mr. Mohamed. One last thing because we we recor… … we forget to do this before the recording… just for the demographic information for the sake of the interview… just this should be an introduction in the beginning, but we forget to do this before recording… just name and position and your location in the market area.

Mr. Mohamed: Okay. My name is Mohamed El-Sokary. I am the head of the manage service for Gulf countries and Zein Group and Global Customer Account, Zein Group and this in account Al-Bahreen which is Egyptian.

Ahmed: Thank you! Which is in the middle east so because this this research is covering middle east and Africa, so Mr. Mohamed is based in in middle east. And I would like to thank you for your time Mr. Mohamed. I know that you have a very precious, time valuable time. And really really, I would like to thank you for these 30 minutes… actually 35

minutes. Thank you very much for your time., this interview is the last part of primary data collection, then we will do the analysis and the conclusion, and then thesis will be given to the… to the… university – I will try to do a very good presentation with the output where we can present this. Maybe our valuable organization can use it or maybe it's aa it's a start for something in middle east and Africa, especially in digital services and manage services. I would like to thank you very much Mr. Mohamed. Thank you!

Mr. Mohamed: Best of luck! Good luck! Thank you ياAhmed! Thank you!

Ahmed: Thank you! Thank you, sir! السلامعليكم

Mr. Mohamed: سالم

E.A Interview

Introduction

Ahmed: Emad! Aaa

Emad:.

Ahmed: Just I'm asking for your consent for recording for the purpose of transcripting.

Emad: It's okay, Ahmed. You can record. That's fine.

Ahmed: Thank you! Thank you very much! okay. this is a semi-structured interview as I sent it to you in in the email. Discussing the application of Agile Project Management methodology in the area or the market area in the middle east or Africa especially on digital services and manage services department. as I've stated in the in the email that I have sent to you, that this is the second part of the research which is mixed method research. and this is the second part of primary data collection which is through the

interview to explain what we have achieved through the survey. So let's let's start directly by three questions regarding demographic information just for the sake of the ser… of the interview. Could you, please, just state your name, your position and your location?

Emad: Okay. my name is Emad Mohamed Abdelhameed. I'm the manage service chef operation officer for the MAW account, middle east Zein tele… as telecom operator, the main… main main partner for this contract. It's in the middle east in Kuwait, actually.

Question 1

Ahmed: Thank you very much! Aaa we will star directly with the questions and the first question is; do you think, Emad, that applying Agile Project Management methodology on both digital services and manage services department will lead to achieve project value?

Emad: I see it's it can conf… or sure it can contribute in in such success for for both PGS and manage services, but if I talk about the manage services specifically I see it's it's it will add value since you are controlling the the main main pillars of the manage service like contracts. especially focus on the on the value and how to do like some changes in using the the the Agile method. Agile methodology.

Ahmed: And and specifically that in in manage services you are now managing the business for the customer or the customer business, right?

Emad: Yes. Yes. Mainly it's for two cust… you can say It's for the customer and we have but we have two type of customer here: we have the direct customer and we have the end user, as well.

Ahmed: Yes. Yes.

Emad: Sooo… Yeah! So… but I see it's it's going to be very beneficial when we apply this methodology through our manage service. And and somehow is… it's like overlapping somehow the current process we are following with some benefits that we can add on or we can like leverage from it on the on the current process.

Ahmed: Excellent! Aaa what about aaa quality assurance and testing, Emad. Aaa you you said that you see a very big positive potential for applying the Agile Project Management methodology on digital services and manage services. But what about quality assurance and testing? You know that some sometimes sometimes in digital services or even in manage services, we have a very big cycle of quality assurance and testing. Do you think that applying Agile Project Management methodology on testing also will lead to project success?

Emad: definitly, it cont… it contribute, as I said to you, Ahmed. quality is very the very good part in or the very important part when it comes to the aaa managing the whole life sides of of our business or our manage service. And I see it's direct, I see it's it's very simply to apply and I see I see as well it can what we can say! It can control our delivery quality and performance through simple simple control points.

Ahmed: Yeah! Specifically, Emad, that that nowadays, as you know that business is always changing and especially if you if you are working on with with marketing department or business department or even the the normal customer, even if you are if you are implementing Garham project not even IT project… the the abrupt change in the requirement… I I think that the Waterfall cannot cope with that now and we have to adopt the the the Agile methodology. Do you agree or not to this?

Emad: I fully agree on this. I'm frankly speaking following the tranden… traditional way of the CR methodology that's causing all the time conflict with the with the customer and even the scope you can it can be subject or it can be expose to scope creep most of the

time. But following this Agile or in parallel like small medium projects or we handle those in order to changes using this Agile methodology like you can apply it as medium or a small project in in different track that will definitely help in segregating this and avoid such conflict and scope creep

Ahmed: Yes.

Emad: that is happening nowadays. And that's the main main point for for any like aaa any vendor for the operators or the customers.

Question 2

Ahmed: Okay. Thanks for the clarifications on this point. and my next question will be from your point of view, what do you think what are the critical factors that lead to achieve project value by applying Agile Project Management methodology? From your point of view. Just from your point of view. … what do you think the critical success factors?

Emad: the critical success factor here, Ahmed, is the process simplicity this is…

Ahmed: Okay.

Emad: as long يعني and this is I think the aim of the agile project or agile program or methodology itself…

Ahmed: Okay.

Emad: every every every organization in every company they are applying different type of methodology. Some of them adapting…

Ahmed: Agree!

Emad: to some like international or standard methodology. Some they have their own methodology. But I think here…

Ahmed: Agree! Agree!

Emad: going directly to the points or going going to your ta… your target through the shortest path as I can see. This is what makes this methodology is like very beneficial. And I believe it will it will add success to the to any any customer project especially the area of PGS and manage services.

Ahmed: From the literature review, Emad, and from the researcher… from academic point of view and from also practitioner point of view, they have subdivided the critical factors into people factor, into organizational factor, into process factor. Thank you very much! You have already touched the the first part which is the process factor, but what do you think, from people factor and from organizational factor, from your point of view? would be the successful… success or critical factor?

Emad: people factor I that's one one of the most important part for the for any any organization success. and has has… maybe you can… you know that, Ahmed, that in our…

Ahmed: Yeah!

Emad: in our organization, we started to focus more on this… on this area.

Ahmed: Yes.

Emad: Through multiple… multiple programs even in our in our region in middle east. So that's… that become one one of the most important part we focused on which is people, so when the people needs to be recognized, needs to be like trained. Then they have to be well aaa updated on the changes happening around them. So they need to feel belonging to the organization. So that's that's very important part… definitely we cannot at all… when I talk about the process… when the program over all… maybe I focus on

the process, but definitely we cannot at all discard this part. Is is if it's not important than the process itself.

Ahmed: Agree!

Emad: It's equal.

Ahmed: what do you think about people culture? Does culture matter in implementing Agile Project Management methodology in the organization?

Emad: Aaa I don't think so, but I I believe we should not discard it, but I don't think because there was see in in in the aaa as long as the methodology itself is well structured and and it's it's really practical and it's been like tested somewhere in some practical projects and it's working, so culture culture cannot make a big difference, but we have to we have to to give it like to give it an attention, as well.

Ahmed: Okay.

Emad: Aaa that's not from… applying the the challenge of applying the process itself, but just to understand how people works from one geographical area to another.

Ahmed: Okay. Okay.. From the last point which is the organizational factor, do you see any critical success factor under the organizational factor? Management, aaa customer aaa higher management involvement, something like this. Do you see aaa one one of these factors could affect the the success of application of Agile Project Management methodology?

Emad: Aaa I see I see it it has pros and cons, Ahmed, here. involving the organization… definitely the organization itself, the contribution from the organizational like executive, definitely it's impacting the the methodology, but it it it's it's like you can say… it's aaa. It has its pros and cons, as well. So as long as you involve more people into the process or

into the aaa the methodology especially from executive and from the CEOs that make things complicated, so… but impact, another direct in this is you can like empower on your like project team or maybe account team the way you the way you name it the Agile methodology…

Ahmed: Okay.

Emad: it's going to be more simple and more effective.

Question 3

Ahmed: Great! Okay. I will I will move one to question number three and I will ask you; do you think that there is a relationship between the coming three variables and Agile Project Management methodology? The first variable is team size, second variable is team communication, and third variable is team performance. So I would like to listen to to you aaa and your view about the relationship between these variables and Agile Project Management methodology. Team size, team communication, and team performance.

Emad: Aaa I see (silence), but but the mythology itself should not should not be aaa like change it. That's why we call it Agile should not be when you when you have more or bigger size project, more complicated project.

Ahmed: Maybe maybe, Emad, you misunderstood my question here. I'm saying that do you think that team size: big or small will… not to change… will help aaa or there is a relationship between this variable and project management methodology? For example, the bigger the team aaa, for example, the methodology will fail. The smaller the team, the methodology will aaa will not fail. Here, there is a relationship. Or these variable doesn't have a relationship with this variable?

Emad: Okay. No. No. it does not. It does… it does not, for sure. Because we we we targeting Agile methodology and that's should be… should be applied on all type of aaa

of like complexity, or the mix of the aaa project complexity, the team size, even the aaa project performance, so that's why we call it Agile and we believe that that it will help in aaa in leading such project to success.

Ahmed: team communication. What what do you think? The higher the communication, the better will be applying the methodology. Or the lower the communication, the lower the methodology. What do you think when when we talk about team communication?

Emad: No it should… it should be aaa it should be as well aaa from my point of view, it should be working يعني even if the communication become more complicated or it has more channels and ways of communication between multiple teams: offshore and onshore, that should work.

Ahmed: Okay. Okay. what about team performance? in order to work Agile, do you need… do you need a higher team performance or normal performance can work?

Emad: I think it should be more. Sorry. It should be aaa both either lower or higher performance, it should work, as well.

Ahmed: So so you you see that

Emad: We should not depend on the… on the team that's what I'm trying to say.

Ahmed: So you you see, from your point of view, that there is no relationship between the Agile Project Management methodology and the team size, team communication and team performance. It doesn't matter. Team is bigger or smaller, team is communicating in complex or simple communication, team performance is high or low, there is no relationship with the project… with the Agile Project Management methodology, right?

Emad: Yes. Yes.

Question 4

Ahmed: Okay. Okay. coming to question number four. What do you think about customer involvement and management involvement in the projects operated by Agile methodology? You have a project operated by Agile, not by Waterfall and there are two variables: customer involvement and management involvet… involvement. Could you, please, tell me what do you think about this?

Emad: Aaa when you say customer involvement…

Ahmed: I mean that…

Emad: Aaa

Ahmed: customer involvement… I mean that the customer is aware with each step and we are ta… we are taking feedback from the customer about each step before taking the next step. So he can change his requirement or accept the requirement. I mean, more involvement and also for the management. What do you think?

Emad: I think is is great definitely. involvement your customer in in يعني aaa it's not… it's a kind of milestone what I understood from your aaa يعني aaa from your wo… your words here. Like aaa before we go from the milestone to another milestone that we…

Ahmed: Yes.

Emad: We need to involve that customer. We need to update them where are we now and where are we going. So we buy and their aaa like aaa acceptance or their aaa their feedback if they can see something moving onto onto the right track. Something need to be changed. That definitely will help the so…

Ahmed: Exa…

Emad: Very very important. And I think the same… the same we can apply it in our in the management. Definitely, not not to every level on the organization, but to an a certain level that this alignment has to be there.

Ahmed: Which is aaa right government. You have to have a government.

Emad: Exactly!

Ahmed: Right? And you involve the right people in the right time.

Emad: Exactly!

Ahmed: This what you want to say, right?

Emad: Yes.

Ahmed: Okay. here is a broad opinion. What is your opinion if the full organization… the while organization fully applies Agile Project Management methodology on all its domains under digital services and manage services?

Emad: I see that's that's a tricky point, as well. And I think… I think, that needs like if you want to… if you want to… to go onto this… yeah, like because it depends on your… on your organization, as well. So if your organization are u… are using very similar methodology or very near methodology to that one that can be aaa planned and maybe can be applied to every projects and and… But definitely needs to go into phases. But if the organization is using totally different like methodology on on managing their projects that aaa may have maybe… it will be somehow aaa complicated, but it needs to be applied aaa as well into phases, but in in more simpler project aaa before they they can go and apply it on a wide range or projects, more type of projects.

Ahmed: So to to repeat what you are saying here; you are saying that yes Agile Project Management methodology is a must nowadays, but for big organizations or big projects we may need to go for pilot first to test where we can go and how…

Emad: Something like that yes.

Ahmed: And then go to phases until we reach the whole Agile Project Management aaa.

Emad: Yes.

Ahmed: Aaa you know also, Mr. Mr. Emad, from the from the literature also, we found that… the researcher found that aaa there is no specific (phone ringing) there is no specific or one… there is no specific or one methodology that can be used and sometimes sometimes you need to mix between methodologies or tailor the methodology according to the project. Do you agree to this?

Emad: I fully agree! I fully agree! That's that's why I told you in the beginning that needs to be assessed from organization to another based on what which methodology that they are using currently… maybe they are… they are doing great using different methodology for longer time now. So aaa and we believe that the Agile process must be applied say in everywhere. We need to be Agile for for everything we do. But before going to this we need to understand the organization itself and we need to aaa to assist the change…

Ahmed: Exactly!

Emad: before we go and apply it.

Question 5

Ahmed: I have one last question before we close the dialogue. I'm saying that what do you think, Emad, might be other critical factors or critical success factors that contributes to the project success in terms of achieving its value when applying Agile Project

methodology? In simple words, you are going to apply Agile Project Management methodology in your organization to reach project success. We talk about team size, team communication, team performance, customer involvement, management involvement. What do you think other critical success factors, from your point of view, that you will take into consideration when you apply this?

Emad: I see I do not see something or I do not recall something in my mind now, but maybe I will stress on one of those factors that you … definitely, one of the factors is is the you need to have your aaa your risk assessment or your risk like management one of one of the most important factor. But what I need to stress on, Ahmed, here is the customer engagement or the customer involvement. This is for me based on like at least my my personal experience over the past like 17 years in different accounts, different region in the aaa in the middle east and Africa. It's it is really really important you engage your customer most of the time. That you need to be aligned with them and you need to address their real concern the real aim. And you work on that. Maybe as you said that you apply the methodology, the Agile methodology. You apply a mix of methodology in order to reach the target that they are really keen to achieve or the value they really want to have. So so maybe this is what we need to stress more and more. That makes every every makes any methodology success, your customer. And that's why many customer, many vendors, you can see that they put the customer first and all their like what do you call it! Their core values… their core objective, but but maybe they are written in paper, but they are not doing it in practical world.

Ahmed: In… in 2000

Emad: We need to be more practical in this.

Ahmed: In 2008, Emad, there's aaa a very good article which we we consider it as a bible for success fac… critical success factors. It's by Chow and Cao. They have put more than

36 critical success factors and they checked it and they found that corrected delivery strategy, proper practice of Agile software engineering technique, high caliber team, plus good Agile Project Management process, Agile friendly team environment and strong customer involvement are the most critical success factors, so it's almost almost equal to what you have said. all what have said during the interview…

Emad: Yes.

Ahmed: And specifically specifically customer involvement. you stressed also also on customer involvement rather than management involvement and they have found aaa this and they failed in their in their research to find a relationship between the other 36 variables. when we gave a survey, Emad, to the to the to the organization, we have taken 110 resource as a as a survey taker, of course they are they are random, completely random. And we have found the following and I need you to just to comment on it or explain it. We have found that there is a relationship between team size, team communication, team performance and project… applying project management methodology, Agile Project Management methodology to reach project success, so we find a relationship. This is number one. Of course we find the relationship between customer involvement and management involvement, but we when we did a regression test, we failed to find a causality. we we didn't find…

Emad: Ah!

Ahmed: They replay that, for example, management involvement cause project manage… there is a relationship, but we didn't find that it causes. What is the difference between relation and correlation is that you you can find a relationship, small medium or high relationship between two variables. But in order to to find a causality or a cause effect, you have to find at least more than 50% of this variable can cause this variable.

But most of the of the of the results we have find that it's not causing, so there is a relationship, but not causality. Do you have any any explanation on this?

Emad: Okay. Aaa I can tell I can tell you something Ahmed even even if you, what we can say! Even if you are applying very very tradn… traditional management methodology for any program you are applying for, maybe you have the three factors, maybe you have the team communication, you have the aaa

Ahmed: Team size

Emad: Team performance and team and team size are maybe they are very complicated or they are big in all. But may… and the the methodology is there and the methodology can can like it's proven. you can… you can see many projects with this bigger size, bigger communication are succeeding, but the the maybe the management team or the the people who are using the methodology… they are not well aware of how to apply the methodology, are not aware of how to go and when to stop, when to to review their track, where are we now, where are we going tomorrow. Maybe they fail in this, but others… other people with the same complexity, same team performance, high team communication, they are well very succeeding in in management, in managing the or applying the methodology. So somehow it depends on some … personality or the people who are applying this methodology. So that's why maybe you can have somehow the relation, but you are not able to reach the cause. Because we are not targeting maybe we are missing some factors related to the how how the people they apply… maybe they are using in in in nutshell, they are using the methodology, but practically they are applying it wrongly or they are not adapting to it 100%.

Ahmed: Actually, this is this is very very direct and and fair explanation aaa thank you very much! Really really very good explanation, is that yes people are following the process, by may may… they may not be… my not understand how to apply it. They are

following it, just following it. So so so they are, by name, they are doing the Agile Project Management methodology, but they don't know how to use it, when to use it, and when to stop. Thank you very much for this explanation Emad.

Ahmed: Aaa actually, I would like to thank you for this for this effective interview a lot of a lot of excellent knowledge taken explanation for the survey have been done. Aaa at last, and I would like to ask you if there is anything that you need to add. Maybe positive or negative for the for the research, so please. If you want to add anything at the end.

Emad: aaa frankly speaking, I do not have anything to add, but I aaa I wish you all best of luck and wish to the research it will be going to public and it will be applied very shortly that's one of the most important like research tackle the what we can say, the aaa the main aim of the aaa big… the biggest organization in in into our field when applying the process on either succeeding or failing in project management or different department management. So it's very important. I need to go to public very shortly . Wish you the best.

Ahmed: Thank you very much Emad. Again thanks for for your contribution. It's really positive and really it was an exciting interview. و and as we said, we exactly took the 30 minutes. We are about to finalize the 30 minutes within the 40 seconds. I would like to thank you very much. I will stop the recording now.

Emad: Okay.

K.A Interview

Introduction

Ahmed: Karim! Could you… could you, please, give me your consent for recording this session for the sake of transcripting?

Karim: Sure Ahmed. Please, go ahead!

Ahmed: Thank you very much! Aaa can… For the sake of demographic information, can you just, please, mention your name, your position and ee your your location in Ericson in middle east or Africa?

Karim: Aa ال position head of operation… Etisalat Group … my location is in UAE. I'm based in UAE. And what else? Information you need.

Ahmed: El aa just ال name… full name.

Karim: Karim Mohamed Adel Abd Elrahman

Question 1

Ahmed: Thank you very much! Thank you very much! Okay. Aa as as I sent you in the email, as an introduction for this research, Mr. Karim. This is an aa to check the application of Agile Project Management methodology on both digital services and manage services in the area of middle east and Africa. And we choose aa you as one of the decision makers or aa working closely in one of those the departments which aa which is the digital services, as you said. Aa I will start I will start with the first direct question which is do you think that applying Agile Project Management methodology on both digital services and manage services department will lead to project to achieve project value?

Karim: Yes, because it saves a lot of time. Aaa I think, it helps you to board and unboard resources when they are needed. It help you a lot to optimize the resource cost. And also the project when you have --- the Agile methodology is more aa dynamic respond to the customer changes and the customer requirements quicker.

Ahmed: A. From your point of view, Karim, aa if we apply Agile Project Management methodology also on quality assurance or testing, do you think also it I will be aa it will lead to success?

Karim: Yes. Yes. Of course! In many cases, it can lead to success because of the reasons are mentioned aaa.

Ahmed: Okay.

Karim: Aa It can be more dynamic… more quick, and you can respond to customer requirement quicker.

Question 2

Ahmed: Okay. Okay. So, I will… I will directly move to the second question which is, from your point of view, what are the critical success factors that leads for achieving the project value by applying Project Management methodology. You can… you can mention whatever success factors you you see, from your point of view. But if you can give me the critical success, from your point of view first, it will be valuable.

Karim: Aaa. I think, it's four main points. It's control; you have to control your coasts scope fine, with the customer. You have to have the right solution in place. First point, you have get buy in and aa good alignment from aa the the customer, and we need to stallholder in the customer organization, and we need the customer organization to be working with you, as well. And also you need alignment with in many projects, we need alignment with the business team, as well.

Ahmed: Excellent! Excellent! Business users.. Do you think that the culture, organization culture or people culture aaa is a success… is a critical success factor?

Karim: Yes, it is.

Ahmed: So so, you aa so we can consider that for each organization if you apply something new, like Agile or a new process or something like this. There will be a lot of opposes. There will be a lot of rejection from the people. So culture matters in this… in this regard, right?

Karim: Most people like to work in the way they used to and they always resist change aaa. That's why applying new rules of working and making people commit this - can be challenging in many cases.

Question 2

Ahmed: Okay. Okay. Moving… moving to the third question which is aa, from your point of view, do you think that there is a relationship between the coming three variables and project success when applying Agile Project Management methodology? First variable is team size. Second is team communication, and the third is team performance. So do you… do you find a relationship between these variables and project success when applying Agile Project Management methodology?

Karim: Yes.

Ahmed:. Can you just give me, from your point of view, small comments on these variables; team size and team communication and team performance?

Karim: Aaa I think, you need to have the right team size, and you have to have proper resource planning that is part of the team size, as well. Because if you are applying Agile methodology, aaa you need to make sure that you have good team size who can deliver this. Aaa Also this people in the team they have to be dynamic, because they have to be patient, they have to meet the customer requirements. They have to apply it quickly. They have to digest it the right way. Because if you don't have good quality, the whole concept of the Agile deployment will collapse. You have to repeat, you will keep doing things repeatedly you will lose momentum and time methodology.

Ahmed: Agree. Communication… I think communication is the is the the biggest variable in any Project Management methodology, right?

Karim: Yes.

Ahmed: And.. do you have a comment on team performance? what about team performance in relation in relation to success for for the project?

Karim: هم as I said team performance… part of it that you have the team dynamic. They are performing well. They are working with good quality, so can get the benefit of the Agile deployment. If you don't do that, and you repeating things and the quality was not good… you have getting… for example if it's a software different… software releases, we are not concluding acceptance of the drops you are doing, then you are not getting --- The performance of the quality of team is a very good factor.

Ahmed:. Okay. Karim, do you think that team collocation is a success factor? I mean that in Agile Project Management, do we have the team collocated with each others, or they can work virtually from offshore? They should not be with each others… what do you think?

Karim: Makes sense better, but it's not the key factor يعني lately… remotely is also fine.

Question 4

Ahmed: Okay. Okay. ، I I will move to the to the fourth question, Karim, which is what do you think about customer involvement and management involvement in project operated by Agile methodology? I I know that you… you have mentioned them at the critical factors at the above… at the second question, but could you, please, elaborate more on customer and a and a and aa management involvement?

Karim: One moment Ahmed

Ahmed: Please, Take your time

(Silence)

Karim: Aloo

Ahmed: yes

Karim: Yes Pasha

Ahmed: Yes.

Karim: .Ask the question again

Karim: Can you hear me

Ahmed: This is better. I'm just saying that; what do you think about customer involvement and management involvement in projects operated by Agile methodology, although you have mentioned both of them as critical factors in the second question, but I need you to just highlight more on customer involvement and management involvement.

Karim: Customer involvement and management involvement is very important because most of the projects have two side: we have vendor side and the customer side. When the customer is not progressing or giving you the input you needed--- and again you lose the momentum also management will help you to get attention and resolve many issues any project will be sponsor in both vendor side and management side. If this is not happening, we are not getting the priority and thus your project is affected, as well.

Question 5

Ahmed: Okay. Then, I will move with you with the fifth question the aa the question before the last one which is I need your opinion that our organization fully applies Agile Project

Management methodologies in all domains under digital services and manage services. What do you think?

Karim: No. it's not fully applied yet. We are trying to work in some projects with this, but I cannot say that this is ongoing in every project

Ahmed: do you… do you believe that it's right to fully apply on manage services and digital services if it's in your hand… you are decision maker… you will take this decision to fully apply?

Karim: In most of the cases, yes.

Ahmed: Excellent. do you think, Karim that in our organization, they still need for the Waterfall methodology to work on some projects?

Karim: Some projects are like this, due to the nature of the customer organization, yes, but mostly Agile would be more effective.

Question 6

Ahmed: Okay. aa from what you have said, you have confirmed on team size, team communication, team performance, customer involvement and management involvement as five of the critical factors, plus some of the critical factors that you have mentioned above. I'm just asking you on the last question; what, do you think, might be other critical factors that contribute to project success in terms of achieving the project value when applying Agile Project Management methodology? Other critical success factors.

Karim: Strong team alignment…

Ahmed: excellent!

Karim: And good development quality, so you can have good software drops. clear acceptance criteria to know what you are accepting and what you are working for. This is the main---

Conclusion

Ahmed: let me let me tell you really thank you so much for for for your words. And what you have said is exactly aligned with literature review and exactly aligned with other researchers in this domain., you highlighted really the most critical success factors. There are a lot of other factors related to organization, related to documentation, related to people, related to politics, related to a lot of things, but you have just touched really what have been highlighted in the literature about success factors. Aaa and I would like to thank you very much, and I would like to ask you; do you need to add anything at the end, Karim?

Karim: No, thank you, Ahmed! Thanks a lot.

Ahmed: I would like to thank you for your time. For you time, Karim, and your effort. and aa your valuable information. And aa I would like also to just to record that you are one of the of the survey takers. Thank you very much. In the survey, just to give you a small feedback, Karim. In the survey, we have found a relationship between team size, team communication, team performance and the and the Project Management methodology in Agile as a success factors. What we did not… and the team involvement… sorry, and management involvement and and also customer involvement. We have find relationship… a correlation, but what we cannot from the survey find a causality. for example; we cannot find that team size cause success. Manage… Management involvement cause success. There is a correlation, but there is no causality. Do you… do you need to comment on this or what is from your opinion can be the the result of this… or the reason of this?

Karim: can you repeat as i did not understand the question

Ahmed: we find from the survey… when we take the survey and analyze the results of the guys… we find that there is a correlation or a relationship between, for example; team size and project success in terms of Agile Project Management. Okay. There is a correlation… relation, but when we did a regression test… statistical… more statistical test, we didn't find that the team size cause. There is a relation, but it's not a cause. Okay! Okay! Did you get it?

Karim: Yeah!

Ahmed: So…

Karim: is related, but it's not the main reason.

Ahmed: Yes. Yes. The five… the five variables which is team size, team communication, team performance, management involvement and customer involvement… we find a correlation, but they are not the main. Do you have any feedback on this, or you want to comment on this?

Karim: Aaa. No. I think, just the the team size as I said if you have proper resource planning, if you have proper resource alignment, it should be fine. It's all about planning the --- resources and then resources on time, aaa you know!

Ahmed: Okay. So … so maybe maybe maybe the combination…

Karim: planning more than the size.

Ahmed: Maybe the combinations of these variables together can can make a cause, but each variable alone is not a cause. Maybe something like this. Maybe.

Karim: Yeah! Yeah!

Ahmed: .Again, Karim. I would like to thank you very much for your valuable interview. Aaa, it will add to the research a lot. Thank you very much, and much appreciated.

Karim: Thank you, Ahmed. Thanks a lot! Thank you!

K.M Interview

Introduction

Ahmed: (background noise) okay. So, aaa, aaa, Klaus, this is Ahmed Adel aaa, first of all before starting the introduction for this interview, I would like to take your consent for recording this session for the sake of transcription.

Klaus: ah yes, you have my consent.

Ahmed: thank you, Thank you very much. Aaa I will start with a small introduction. Actually, , we a-are doing a research of applying Agile Project Management Methodology on IT telecommunication, and I choose the middle east and aaa and Africa, which is our market area in order to run this research project on, and I choose two of the departments which are digital services and management services. And of course you are aaa you are already relating to one of those departments. Aaa, two of the big departments that we can do the research on. aaa j-just for your info that the research for agile in IT telecom is aaa is limited in the literature. Aaa, researchers are always going for software development, which is part of our journey in digital services and management services, but in- as an IT telecom researches not is not aa so huge or so big and. Aaa, I will start with demographic question for the sake of transcript- descriptive transcription. So, just I would like to start by asking your your name, your position and your place in Middle East an- or Africa.

Klaus: umm yeah Klaus Meddler, umm I was heading strategy Business development digital services and then business operations, before I now joined the aaa Lighthouse Ten

which is one of Erickson's digital transformation initiatives umm towards umm umm software and software management.

Ahmed: you are located in Middle East or Africa Mr. Klaus?

Klaus: I am located in umm Dubai.

Question 1

Ahmed: Middle East. Thank you very much. Actually, it is important to say, for the sake of transcription, that Klaus is one of the, if not the only interviewee, who is already working with Agile in a very big project in Agile transformation in the organization. So, this is important to be aaa transcripted or informed in this in this interview. Aaa I have… aaa this is called a semi structured interview aaa, Klaus. Interview is three aaa different parts: either it is unstructured, so it's a chat between each others, or semi structured where we have some broad questions, and then we have a chat in between or a structured interview. But, I think structured is when you are interviewing presidents or kings or something like this so you have only 3 4 5 questions. Actually, I have six questions, but in between, we may we may open some of aaa of the questions within the 30 minutes. So I will start directly by the first question, aaa, Klaus saying that, do you think that applying Agile Project Management Methodology, on both digital services and management services department, will lead to achieve project value?

Klaus: aaa yes, for sure, because umm Agile umm Methodology provides umm two main umm benefits for projects., on the one side it's a very very clear structure, so you have good control about the resources you hire or engage umm for your project there's very high visibility. And then the other side, when you have umm aaa an open scope, it provides you a lot of flexibility in the outcome, and the need of shifting demands. Agile might not adapt aaa for any customer requests, for example, even for internal requests

some benefit from a classic waterfall project, when it's absolutely clear what the scope is in the beginning and the end.

Ahmed: excellent.

Klaus: But aaa that is not always the case. Very often we have shifting costumer needs, and aaa during the project ration, this needs might shift, which in classic waterfall project destroys a lot of value which has been created via Agile Project is, as the name says, Agile enough to adapt. So, and and and it's much more resources efficient creating a much higher value for for the customer and for us internally, because we can work with our resources in a more, aaa let's say, in a more efficient manner.

Ahmed: a-actually I would like to thank you for the for the aaa answer. Actually is is very fruitful, full of information and this will allow me to ask extra question on… This aaa question is that, do you think… you know that of course we have a quality assurance and testing departments within the digital services and management services, do you think that we can apply also project management methodology on testing or quality assurance department? And will it be successful?

Klaus: Umm I would see that at the moment critical, because testing follows and aaa umm very very strict procedure. Umm, costumers are not yet… I think there that they would accept umm a more open approach to testing. They have used cases; aaa they have to be umm fulfilled, and they might be automated, but that requires also quite aaa structured framework. So that's why I would say for for testing requirements, I would see Agile, not at the moment, a first choice, because we cannot run faster years than the customer. Nonetheless, I think both, the costumers and ourselves, will develop and mature in that area, and sooner or later even those projects umm will benefit from agile approach.

Ahmed: this is an excellent answer. Will will add another small question is that f-from your point of view just from your point of view, do you believe that it will be successful, when we apply on testing? If we are reaching an optimum aaa Agile Methodology or Agile Project Management application on ground on IT telecom. Do you think, from your point of view, it will be beneficial of applying this on testing?

Klaus: umm I have difficulty to see that as of now aaa umm as I said, because it's it's a very restrictive schedule when you when you test in application. So usually, the test cases are quite strict. And aaa what umm testing will benefit from aaa is on how we approach testing cases umm. That's for sure, because when we see, for example, that during the test we face an issue with Agile Project Methodology; we have the chance aaa faster to aaa mitigate the problem why the test fails, while a test as such need to be fulfilled. Umm mitigation will benefit from Agile, so maybe that makes it more clear.

Question 2

Ahmed: excellent excellent. Thank you very much. I will move to the second main question, which is… I need also from your point of view and your experience. What are the critical success factors that lead to achieve project value by applying Agile Project Management methodology? Of course you can talk about organizational aaa critical factors, people whatever you see as critical success factors.

Klaus: yes, I think that is a few of them actually. First of all, umm a project classic waterfall project umm aaa, I would say very known from the organization very known by the practitioners and even, if I am not mistaken, when you do certificates today umm like your PPM aaa, they aaa… even project management institute they apply Agile Methodology in the testing only by next spring. So, you see how how how new that is. So, that's why when you apply an Agile Project, I think it's it's important that you umm aaa take people in the team who have already experience aaa in Agile Project Management, so they can guide the rest of the team. The team needs to be umm trained in that methodology and

guided through the process. And it's important to have an open mind set, because Agile ways of working will take away some of the freedoms where we had normal project management less spot checks; by Agile methodology, you have very very fast, almost daily, spot checks on on work. So, people need to be open-minded umm and aaa and trained. So, I think that umm that's very very critical.

Question 3

Ahmed: okay. okay thank you very much for this I will move to the third question. And before the third and fourth question, I would like to tell you that in my research I have chosen five independent variables to aaa aaa aaa, statistically quantitatively and qualitatively, check their effect on the aaa project success, which is the project value, when applied by Agile Methodology or Agile Project Management Methodology. I would like to listen… on the third question, do you think that there's a relationship between the coming three variables which is team size, team communication, team performance which… and the Agile Project Management Methodology.

Klaus: umm yes, so umm the first one was umm team size. Was that correct?

Ahmed: yes, correct.

Klaus: Team size, team communication…

Ahmed: and team performance.

Klaus: and team performance. Yes.

Klaus: yes, there is a relationship. aaa the nature of Agile Project is a very tied communication of the team and there's only so much, especially now in Covid times aaa. There's only so many people you can put into one team, listen to each other, understand what the other one is doing umm aaa and at one point in time you might face a situation

that your team becomes too big. In this case you need to split up the team, create for example aaa a different stream, a different epic aaa have teams work on on on different umm streams of your project to keep the size in a in a certain manner. And even we now, here in the Lighthouse, have for example split some teams because they became too big and then they become (background noise) not Agile enough anymore. So, there's a correlation, but this is something each team needs to find. It might… some people might find teams of 10 people already too big; other might be able to handle 15. But this natural size due to the frequency of the communication on how big the teams can aaa work on one topic.

Ahmed: excellent. So, you're confirming that yes, there's a correlation between time size, team communication, team performance and Agile Project Management Methodology. And you're saying that team size is depending on the project; sometimes 10 maybe big maybe small maybe excellent. and also you said that the project is on tight communication, so you see that communication, and for sure you choose the performance as one of the critical factors of question. And you also related to this.

Klaus: yes yes.

Ahmed: I would like.

Klaus: I I I confirm that yes.

Ahmed: I would like to add something, Klaus. maybe I'm not intending by it to compare between two methodologies, like the two big methodologies which is Scrum and Kanban, but Scrum and Kanban are the most used methodologies nowadays in IT. Do you think that the organization should stick to one methodology or it ca- it have to tailor the project, their methodology according to the project and sometimes you can use mix of methodologies to finalize the project? What do you think, Klaus?

Klaus: I think you can actually within bigger projects umm aaa, for example aaa w when you when you when you aaa aaa… let's say a lot of big projects are run in a in a in a Kanban principle, yeah?

Ahmed: yes.

Klaus: and aaa I mean it's very old aaa system, if I remember, I think that was invented in the 50's, yeah?

Ahmed: yeah.

Klaus: to to streamline productivity no automotive industry but aaa I'm not…

Ahmed: yes, yes.

Klaus: a 100% sure anymore.

Ahmed: you are right.

Klaus: and it create, of course, very big picture, yeah? Aaa because it starts from the supplier and ends up with the customer, yeah? And within that, aaa you have certain aaa topics and aspects which you definitely, could give to an agile team, yeah? To improve that aspect. I think it would be very difficult to do it vice versa. Having your whole shop floor organize an Agile team, yeah? and trying to do Kanban haha.

Ahmed: I see I agree.

Klaus: yeah aaa and that does not work, but very much you can look at… If you look at aaa aaa whatever aaa aaa engine manufacture of Volkswagen or even even aaa aaa aaa let's say how Erickson manufacture its products and and processes. You can run that in Kanban yeah, but then you can definitely, for example, say: "hey this process needs to be digitized" yeah, then you give this to an Agile team.

Ahmed: ok.

Klaus: so I think that both systems can live aaa together.

Question 4

Ahmed: excellent. Excellent. Now I will return back to the aaa forth question, which is the rest of the five variables that I told you, and I would like to aaa to know your opinion about those two variables customer: involvement and management involvement in projects operated methodology. What do you think about those two variables?

Klaus: aaa one is crucial the other one is toxic. Aaa umm so haha. I would say…

Ahmed: haha.

Klaus: aaa aaa customer involvement is absolutely crucial. aaa you need to aaa… And that's the whole idea of Agile. You need to test frequently with your customer whether you still on the right track whether what you just did. This the whole idea why you started you MBB. You test up for a customer; you have your first release of a test to the customer, so there's a lot of customer interaction. While interaction of the management should be limited umm to umm, do not talk about the management in umm Agile project, talk about the overall management. They should be limited to the touch points aaa of the guidance, which have been established as governance before. For example, you have a steering boat; you meet a steering boat on a monthly or quarterly basis; umm you report your your releases; you report your sprints necessary and your planning, but day to day involvement of management in your project is is toxic, so you need to have your Agile team running. It needs to be a trustful environment; it needs to be open speech environment, and you don't do that when top management is always looking. and then you start becoming politically correct things do not move forward.

Ahmed: Excellent, d-d-do you think that umm management, higher management, by in is important and crucial for a a Agile methodology to be successful in the organization?

Klaus: oh yeah yeah, but If I did not mention that yet. I mean umm aaa the first comment I make of is course aaa frequent involvement, which I said is toxic. The other one, which is absolutely vital, is top management support, simply because digital transformation, when we take that as an example for Agile project or any development in that area, is 20% Agile, 80% transformation. So, for example digital transformation management by in is absolutely vital, yeah? Because they need to work.

Ahmed: okay.

Klaus: change.

Ahmed: okay.

Klaus: while when you have an Agile development of a software tool, I mean the only thing you need is a budget.

Ahmed: okay.

Klaus: and somebody to accept the results, yeah? So there's a difference between agile (Mobile ringtone playing in the background) aaa software development, yeah? And agility when you do digital transformation. Digital transformation goes top down, it needs sea level backup and funding, while aaa software development you just need somebody with a budget umm who owns an output.

Ahmed: excellent, aaa aaa actually there's something in my research, Klaus. I used something called aaa aaa sequential explanatory mixed method design, which is to do a survey and then bring the reasons of the survey and then do the interviews, as I am doing now, and then bring the results of the interviews and the interviews to explain what is

happening in the survey. Actually, أنا I would like to give you something that I found in the first part which is the survey, and I would like you to explain it. I find that there is a correlation between team size, team communication, team performance, customer involvement, management involvement, in terms of top management of course, and Agile project management methodology in order to reach project success. But, unfortunately, I didn't find a causality for example, I didn't find aaa aaa aaa that a team size cause project success or co- reaching project value or customer involvement cause the project value. Do you have a do you have an explanation for this?

Klaus: I think aaa it's easy for the costumer involvement, because aaa the nature of Agile project management is is that you react very very adaptive to changing needs, yeah? So the customer has an idea what he wants aaa, then you do your first MVP minimal viable product presentative of the customer and that might take 4, 6, 8 weeks. In the meantime, within the costumer there was a certain dynamic, yeah? Aaa aaa that idea has been presented to other units everybody knows, suddenly, that "oh we do this, with this company". but you have not considered my need; I am from customer support; I am from sales umm. I want to have that in as well. So, and then you need to have that feedback loop into the development team um. Saying: "hey I am the customer; I have umm an additional demand." So and that happened sometimes on the daily basis, on weekly basis. and that is why customer interaction is an absolute crucial part. Aaa touch points with aaa the ones who actually pay the bill at the end, yeah?

Ahmed: yeah.

Klaus: While in size, is more practicability, yeah? Umm…

Ahmed: umm.

Klaus: you have daily standups in an Agile Project, in the morning 15 minutes.

Ahmed: yes yes.

Klaus: you go through the tasks, and you ask your colleagues, "What have you done yesterday?" "Did everything went according to plan?" aaa "what is your plan today?" "Are there any impediments?" "Do you need somebody else to finish something so you can start working?" and "what's your plan tomorrow?". So and that is fifteen maximum half an hour routine in the morning. So that has to start limits because in 30 minutes you can have only, whatever, usually 15 to 20 people talking, otherwise it gets confusing, yeah?. If everybody is super strict and has no impediments you might do it for bigger team, but I aaa we had standup meetings in the beginning of 25 people, and that was borderline because aaa then you are listening listening listening, and then you have no idea what they've actually said, yeah? It needs to be manageable and aaa also the smaller the team, the more visible your performance, yeah? Umm and aaa aaa if we have a 25 people team, aaa it's easy to hide, yeah? When you have a 7, 8 people team then it is extremely visible what you have done and contributed to the project.

Ahmed: Actually, this is this is an interesting explanation, thank you very much, because actually it was very embarrassing for me when I run the regression and aaa and run the correlation test, and I found that there's a correlation, but I didn't find a regression. And your answer I think it was interesting and explaining why there's no cause-effect. I agree to you I agree to your explanation. I will move now to…

Klaus: there is even an example of this…

Ahmed: yes, complete.

Klaus: all company structures umm and one of the biggest, maybe the biggest player umm in digital transformation aaa and Agile methodology reply, it is an Italian billion dollar company. Whenever the company aaa reaches fifty people I think 50 or 70…

Ahmed: okay.

Klaus: they split it up; they split up aaa the legal entity.

Ahmed: yeah.

Klaus: so so you have two managers running that team in Agile fashion, and they start with 3, 4 people and they're successful. If they are not successful, then they die fast. If they are successful, they grow, yeah? And they grow up to 70 people. When 70 people, they split the company, yeah? So to have, now, two units which are allowed to grow again, and aaa they are one of the most successful players in that area, and they are complete business, let's say, company structure applies Agile thinking, which I think is is… they grow super-fast. They are very successful, and I think that is a very intresting methodology.

Ahmed: actually, this is a very interesting example actually ha-ha really. Aaa aaa by subdividing yourself in order to give the breed of growing. This is very good example to be honest.

Klaus: and that applies for small projects as well. When you have a project of a hundred people, and it is not working, you need to split it up for sub-projects, yeah?

Ahmed: Agree.

Klaus: or use cases, or whatever you call it, so you then have again manageable units.

Ahmed: agreed. Agreed.

Klaus: and and, Agile teams I think… I found in the work of now, I found 7 to 10 people aaa aaa manageable size.

Question 5

Ahmed: agree. 100% agree with you. I will move to the aaa aaa fifth question. What is your opinion if our organization fully applies Agile Project Management Methodology in all its domains under digital services? (Pause) (Background noise)

Klaus: I I I could not understand.

Ahmed: actually, I am saying that, what is your opinion if, suddenly, our organization take the decision to fully apply Agile Project Management Methodology on all its projects under digital services and management services?

Klaus: (pause) Oh haha no, I do not think that would be possible because umm you would need to… First not all projects are actually I would say aaa applicable for an Agile Project Methodology, not yet, umm because it needs something to be working with the customer. That itself is a transformation process, yeah? You start with few costumers with your projects; aaa you start with certain teams, and we do not have yet our practitioners trained in that Agile methodology; they have no experience in it. So you cannot reach from one day to another. So I think that is a learning process when organization has to go through and more and more, it can be applied, but you need to also start selling a project, or aaa customer engagement in the way with that methodology. You cannot sell it as waterfall project…

Ahmed: agree.

Klaus: with all the governance and places of the customer, and then suddenly surprise him with Agile Methodology.

Ahmed: agree.

Klaus: umm that's why it's a transformation process.

Question 6

Ahmed: agree 100% agree with you. And now, I will move to the last question (pause). What do you think might be other critical success factors that contribute to the project success in terms of achieving its value, when applying Agile Project Management Methodology?

Klaus: I Think that's actually a a good question because umm aaa what danger of Agile methodology is that you get lost in the details. That is because projects are so, aaa let's say, umm detailed layout aaa in tools like aaa Geerah and others. Umm and you're very keen to have your tasks fulfilled to get your sprints done, and everything worked out that sometimes the big picture goes missing, yeah? I think it is very critical that you do series retrospectives. It should be part of the schedule, but sometimes I think it's it's it gets lost that after every release. You do a retrospective aaa take a little bit of a helicopter view and says…

Ahmed: okay.

Klaus: "yes we did a very successful release. But are we still heading in the right direction?" And that of course help you get back to the customer, huh? Have that feedback group understand where are we. So I think we need to do both things aaa. You still need umm people who can have that aaa helicopter view and important what we see aaa here now in the project, where I am part of, is we need a mixed H-structure in an Agile team. Agile is not only for… let's say 35 and below, young engineers, aaa high performance umm high capable umm; you need to have people with a lot of experience who understand how the rest of the organization is coping. We need to have that people who can bridge the Agile world with a slow moving more, aaa I would say, traditional part of the organization, because otherwise the Agile team runs so fast, nobody is able to follow, and nobody is actually able to execute, actually, what they come up with, yeah? So that

is what we released that the Agile teams span of different diversity with experience, age, even culture background, yeah? So the more diverse in Agile team is, I think, the more successful it can be.

Ahmed: actually, another interesting answer to this question, which adds a lot to the researches. R-really I would like to thank you very much for such information that have been gained through the interview, aaa really adding to the knowledge, adding to the literature. I think one of the most interesting interviews as far. This is the aaa the fourth interview and to be honest one of the most aaa fruitful and have a lot of information. Thank you very much it seems… It's obvious that you have a lot of hands-on and you're giving really information from the real life working on projects with Agile Methodology, aaa thank you very much, and I would like to ask you if you need to add anything at the end that maybe adding value to the research, Or adding value to the interview. Please, anything you want to add?

Klaus: I think, first of all, congratulate you to that very interesting topic, because aaa I think that aaa what we see now and the next, let's say almost decade I would bet, is a shift on how we work with customers and and how we deliver value to customers. I think Agile is aaa rather new methodology. and aaa it will aaa require a lot of attention and and training sometimes in patience to see that happening. But I think that's a very interesting topic at a very interesting time because our, not our industry, but our industries will definitely change their approach and as I know from experience Kanban might be seven years old, but still there are many many companies that never heard of it yeah?

Ahmed: I agree.

Klaus: so the same with Agile. Agile will not necessarily aaa replace everything else but it will grow; it will become more important, and umm I think it's a very interesting piece of work you do now at a very crucial time.

Ahmed: thank you very much Klaus. I would personally thank you for this interview, and the information that I have gathered through this interview. Again, I am confirming to that this is the most fruitful interviews I have done. aaa I have … I think only two interviews left me for me, which is Lucky and Eva. I hope that they will add also value like the value that you added, and thank you very much for your time.

Klaus: I was I was more than happy to help it's a very interesting topic to talk to, and I wish you all the best with your with your work, and aaa when you are done send me your business card register PhD then I can say I contributed one per mil to your success haha.

Ahmed: thank you very much, and aaa I will tell you something in the preface I will write thanks for you. Thank you very much.

Klaus: Haha! Thanks a lot. It was a pleasure.

Ahmed: thank you. Thank you. Thank you, Klaus.

Klaus: bye bye.

Ahmed: thank you, bye.

L.R interview

Introduction

Ahmed: Aaa so aaa Mr. Lucky, can you please give your consent for recording this session for the sake of transcripting?

Lucky: Consent granted.

Ahmed: Thank you very much. Thanks for your support. Actually, it may be… may be one of… of the least or maybe the first PHD non-technical in Erickson and regarding Agile Project Management methodologies and on digital services and manage services. So in simple words, we are trying to apply Agile Project Management methodology on digital se… application of course… application of Agile Project Management methodology on the project of digital services and manage service in the middle east and Africa. Region of middle east and Africa. Because in PHD, you have to go down… you cannot do the research on the whole world or the whole globe.

Lucky: Aha

Aaa I choose middle east because I'm live in the middle east and it is easy for me to do the research. I choose digital services and manage services because they are really concerned about aa about this methodology, and it's a future of digital transformation, of artificial intelligence, machine learning… a lot of things stars with Agile methodology. Aaa so this is… I'm going through something called sequential explanatory mixed method design. This is, Lucky, my methodology where I started by the surveys first, then the interviews. And the interview will explain what happen in the survey. This is a semi struc… this is a semi-structured where I have six main questions. Why it's called semi-structured? Because it have a structure of aa of an interview, but it opens the door for me and you to interact in between, if there is something needs to be explained. So… aaa just for the sake of transcripting also, I would like just you to mention your name, you position and your location, in middle east or Africa, please.

Mr. Lucky: Aaa Lucky Richard and digital services, based in Dubai in ---

Question 1

Ahmed: Thank you very much. I will start directly directly by the first question which is do you think, Lucky, that if we apply Agile Project Management methodology on both digital services and manage services department, this will lead to achieve project value?

Lucky: Yes. I'm… I say yes, but I need to quantify., it needs be in the right project circumstances, as well.

Ahmed: Yea.

Lucky: We need to talk about Agile. Agile has, you know, particular enhancements on Waterfall if you recall.

Ahmed: Okay.

Mr. Lucky: Yeah!

Ahmed: Okay. Yes!

Lucky: Umm Waterfall for telecom, in some circumstances, makes sense, and Agile… Agile far better now as we moved to… I would say much more of a software based project scope. Yeah, where we can essentially aa, you know, move on the go… adapt on the go. We can have our spirits and we can have minimum valuable products that can get us to market and be quicker. However, yeah, however, you have to be conscious of your target audience, as well. Because if your customers are not ready to work with Agile, and… which is also because traditionally they worked with Waterfall, then it's aaa it's not a way it's going to be successful. And that's why I say to you it really does depend on the situation on when we can really truly get Agile to work.

Ahmed: Yeah! Actually I agree 100% with you and what you are saying is definitely equal to what have been said in the literature by other researches. researchers. Yes. You… I agree with you. Do you agree, Lucky, that, you know that in digital services and manage services, we have projects. We have… we have software projects.

Lucky: yeah!

Ahmed: If ii… do you thin… and we for sure, we have… we have quality assurance w… or quality assurance: UET, SIT whatever we call it. Do you think if we apply Agile Project Management methodology also on testing, It will be successful?

Lucky: Absolutely! However, again…

Ahmed: Okay!

Lucky: Think about the legacy that we're trying to get over.

Ahmed: Yes.

Lucky: I will give you an example. When we can set up a project and we can set up the scope for the project, so it's buckets yea, and we can strip it to springs umm together with the customer, and, you know, we can develop a minimum valuable product as an example.

Ahmed: Okay!

Lucky: And so we can work on that fashion. However, my contractual constructs, my test of – with the customer, is too very much legacy because that was the frame contract that we had with the customers for years. So if I have to do acceptance… if I have to do a frame agreement contract that I've had legacy for many years, and it doesn't allow me to accept the scope in Agile banana. Then I'm back-- and and this is one of the problems

that we had in the… you know, with that default fine test frameworks. We we can very much – testing aa in an Agile fashion which is absolutely brilliant but the problem is that we default back to the old type of contracts that we have. Umm if we default back to oh no no no, but we still have to… You'll only get acceptance, whether it's preliminary acceptance or final acceptance. You'll only get acceptance once it's all done. Then we have kind of shot ourselves in the foot, if you what I mean.

Ahmed: Yeah! Yes. Understood. Understood.

Lucky: It doesn't support the methodology.

Ahmed: Yeah!

Question 2

Ahmed: Actually, you have touch… you have touch base aaa one of the most important points in the reach who actually which will lead to the second question. The second question is something like you can… you can see it from broad angle aaa, but of course we need to narrow it down. So it's it's saying that, from your point of view, what are the critical success factors that leads to achieving project value by applying Project Management methodology?

Lucky: The first one for me is the customer.

Ahmed: Excellent!

Lucky: The customer needs to… to be able to…yeah, first have the ability, and second to have the interest and the motivation to work in this way.

Ahmed: Excellent!

Lucky: Without a doubts. Aaa the second piece is aaa you need to have contract to construct. You need to have an agreement with the customer, that will support this mode of Agile work. You cannot apply the existing legacy contracts, the frame contracts, the contracts that the customers have had for many years in the same way. Aaa because it's a… it's just fundamentally different. The third piece is obviously aa obviously you have to have the hygiene correct and what I mean by the hygiene is that you need to set up the right project team… project fundamentals… scrum masters… people to run the screens… stand ups, etc. Aaa you have to have that structure internally correct, as well. And you can't have one or two people understanding it, and then the rest of the team is, you know, could completely oblivious to it.

Question 3

Ahmed: This is… this is amazing actually. I'm very interested with this interview, Lucky. Actually, you are… your words are moving equally to the literature, and moving equally to what we have got through the… through the survey which I will… I will tell you by the end in the last minute. Aa I will give you three… three variables… aaa, Lucky. Aaa we can call them independ… independent variables, and you can… and you have to tell me what do you think about the relationship between Agile Project Management methodology for project success. The first variable is team size, Then team communication, then team performance. I would like to listen from your point of you, about the relationship between these variables and Agile Project Management methodology success.

Lucky: So tell again! One is team size…

Ahmed: Team size… team comm…

Lucky: Team communication…

Ahmed: And team performance.

Lucky: Okay. And when you say… when you say what is the relationship of the variables…

Ahmed: I mean that… I I mean that is there a relationship between a team size and a successful project applied by Agile methodology?

Lucky: Aaa. Let me… Let me put it in a different way then.

Ahmed: Okay.

Lucky: Because I think, all the three elements have a relationship to the success of Agile projects. However, I will say the most important is the second one: communication.

Ahmed: Communication. Thank you!

Lucky: Aaa so for me… I think, for me, Agile starts to address something that Waterfall maybe wasn't the best at. And the number one thing is the communication phase actually.

Ahmed: Agree!

Lucky: So in terms of the success of the model, I think that the highest… the highest… the aaa… what is it? The highest aaa yeah, the highest aaa linkage to the success of Agile is communication.

Ahmed: Yeah!

Lucky: You know! Because you have to have, you know, when you essentially doing by braking up waterfall and you you can… you know, you breaking up into springs and different springs etc. but then requires you to have a far higher level of communication, and far higher number of times you need to come back checking. Find… you know; you have to do your stand ups. You very much have to be fully integrated as a team even though they work on separate things.

Ahmed: Yeah! Yes. So so actually, Lucky. You have… you have replied to the three variables, actually, one directly and two indirectly. So you said that the communic… Yes, there is a correlation of course for the three variables. You said that communication should be the first and the biggest correlation. And in the previous question, you talk about performance when you said that everyone should be aware what they are doing… not one is is knowledgeable for… for doing Agile and others are not. So you are talking about performance in a different way, and of course coming the team size. Of course… of course sizes is is mutual by the project يعني if I have a small project, I should… I will not go for hundreds, b… so… but in in somehow you replied like this. I will give you more two variables.

Question 4

Ahmed: Lucky, in the fourth question which is customer involvement and management involvement.

Lucky: Okay. Customer involvement again quite high.

Ahmed: Okay.

Lucky: And management involvement far less.

Ahmed: Far less.

Lucky: Okay. Yeah, please!

Ahmed: Just to understand you, when… when I… when I told you management involvement because different people in interviews understand it in different way. Do you… do you understand here micro-management or you understand governance?

Lucky: Aaa micro-management or governance I would say that… in Agile, my… my view, yeah, when you make it successful. In Agile, everyone is managing.

Ahmed: Okay.

Lucky: Everyone is governing because you're all swiming towards the same end objective, regardless of the spring that you're working upon. And because you are communicating daily. Because you have full awareness of what happening in Egypt springs as an example. But I think, that that governance works at all levels. And that's why I say that management involvement, you called it management involvement, is need to be less anyway even the micro-management… aa for for sure project leaders and project managers will need to do aaa, you know, the the level of project management they always needed to do. I don't doubt that. But in the… when you come Waterfall as an example.

Ahmed: Okay.

Lucky: aaa my project manager is the Dabio Lanendo well, for me, when it comes to Agile each… each spring now starts to kind of self-govern. and each spring is quite responsible for what is expected from that spring. So the project manager here is a little bit different, as well. Everything together, for sure. But aaa, you know, I think that this is more active involvement from the entire project team. And that's why I say just general management involvement should be less.

Ahmed: Okay. Okay. And for customer… customer involvement… it's speechless. It's must. Because we are doing Agile for this, right?

Lucky: Exactly! And that's why I say the diff… one of the differences between Waterfall and Agile is the customer involvement actually a little bit more, and that's why I said the customer must buy in because the customer plays a far more active role of, you know, what kind of teaching, what the teachings have made and which points and why? And how does, you know, each deliverable relay to what they want to achieve in their business

far earlier than the legacy of the traditional model which has been… I will wait until I've signed of my UAT and then I will see what I get, if you know what I mean.

Ahmed: Okay.

Lucky: We want Agile process to get away from that.

Ahmed: Yeah!

Lucky: So you need the customer to be far more involved. Then wait till you see what's on the hood of the car

Question 5

Ahmed: Understood. Understood. Actually, since this interview is explanatory, Lucky, there is something that have been achieved statistically when… when we get the surveys, and when we do statistical analysis for the surveys, we find that there is a correlation between those five variables: team size, team communication, team performance, customer involvement management involvement… there is a correlation between these variables and project success when it apply… when we apply Agile Project Management methodology. Of course, there's a statistically difference in correlation, as you said, team size was the highest. Customer involvement also was highest in numbers, but there is a correlation. What… what happened when we did something called regression… regression statistically is a causality effect which means that this variable cause this variable. We did not find… we did not find any causality between these variables and the project success, for for example; team communication doesn't cause project success when we apply Agile Project Management methodology. Do you have an explanation to this, Lucky?

Lucky: Do I have an explanation! Aaa so maybe I will ask the question in a different way. If if these variables don't contribute to the success, what does?

Ahmed: Actually! Actually, statistically we find that there is a correlation. Correlation means that these variable, if it's positive, this variable which is project success is boosted. This is… this is obvious from the correlation. But regression…

Lucky: Yeah!

Ahmed: But regression means that… means that I cannot… I cannot predict the output from the input. It doesn't mean that it doesn't contribute, but I cannot predict. Why, do you think, it cannot predict? Do you think that I have to put the whole variables together in order to predict the project success or aa manage or merge two … two variables together and search again or or actually it's a concept… conceptual for the guys that took the survey? Something like this.

Lucky: Aaa look! I think, by the end of the day, it might be a mix of few different things. One thing that I will say is aa if you get all five of them correct, then they will give you the success.

Ahmed: Okay.

Lucky: So they need to be combined. I don't think that you can say… I don't think that you can say one will be responsible for the rest.

Ahmed: Okay.

Lucky: aaa and I say that because, at the end of the day, humans are still involved in the process.

Ahmed: Agree! Agree! Agree with you! You are a decision maker, but we will… we will consider you now as, let's say, the CEO of Ericson. And are you going to take a decision to apply Agile Project Management methodology in all your domains under digital services and manage services?

Lucky: aa where it makes sense. So I go back again. I think, what you need to do is you need to equip your project leaders.

Ahmed: Yeah!

Lucky: with the understanding of how to run projects in different ways based on the different clients that they serve. So the the best thing that we can do as a quicker project manager and architect, scrum master, with the skills to run projects in both ways. And…

Ahmed: Okay.

Lucky: That… that will give the flexibility to work with different clients in different ways. Now, maybe what I would say to answer you in a diff… in in another ways. Maybe what we should do is all internal projects should be run in Agile fashion, yeah, because we are the ones driving, and the ones receiving, yeah. And when it comes to end customers, end clients project, I really want to have the buy in of the clients and the customers that this is the right methodology and they will contribute to the success when we go ahead.

Ahmed: Agree! Agree with you! Agree and it's so wise. To be honest, it's a wise answer to start pilot or to start internally. Make sure that your leaders are ready, your process is ready, then take the buy in from the customers and go. Agree! Agree with you!

Question 6

Ahmed: Last question, Lucky. do you think there are… might be other critical factors that contribute to the project success in aa when aa to achieve its value by applying project… Agile Project Management methodologies? Other critical success factors do you think?

Lucky: I think the scope. You didn't talk about the scope as a variable. Aaa I think, that's a critical item.

Ahmed: Okay.

Lucky: And… and what I will say is that there is some scope that doesn't lend itself that well to Agile. Hardware roll outs, side bill or something like that. And… so so scope still one of those variables. Aaa

Ahmed: Aaa do you have any any feedback about collocation of the team يعني mean that when you apply Agile… is it… is it mandatory to have the team in one place or different places it's okay?

Lucky: Yeah, look! It's great if you can do it.

Ahmed: Yeah!

Lucky: It's great if you can do it.

Ahmed: Okay.

Lucky: It's not absolutely mandatory though.

Ahmed: Okay.

Lucky: Yeah! It's not absolutely mandatory, but it's great. There is an advantage if you can do it.

Ahmed: Okay. Okay.

Lucky: --

Ahmed: Understood.

Conclusion

Ahmed: Actually, at at the end of the interview, I would like to thank you for your valuable contribution. Actually, this… the interview, especially we are using it for purposing sampling. We are going to special people by themselves because either they are decision

makers or they are people working in Agile by themselves. And you, Lucky, you are…
you are having both. You already worked with Agile before and you are already the head
of digital services which is a decision maker. Thanks for your contribution to my to my
interview. Aaa thanks for your time. And thank you very much!

Lucky: You always welcome! Always good to catch up with you!

Ahmed: Thank you! Thank you, lucky! Appreciate it! I will stop the recording now and
then I will… I will stop the recording and.

Appendix VII: Summary of Literature Review

Theme	Summary	Authors
Project success factors.	This theme summarise the literature success factors associated with the projects adopting agile technique	(Davis, 2014) (Cooke-Davies, 2002) (Barclay and Osei-Bryson, 2010) (Chow and Cao, 2008) (Stankovic *et al.*, 2013) (Lindsjørn et al., 2016) (Kaur *et al.*, 2015) (Joslin and Müller, 2015) (Lalsing, 2012) (Mohammad, 2013) (Wan and Wang, 2010) (Drury-Grogan, 2014)

		(Lindgren and McAllister, 2014)
		(Aldahmash *et al.*, 2017)
		(Tsoy and Staples, 2020a)
		(M, 2020)
		(Tam et al., 2020)
Project management methodology and project success.	The theme summarises the agile project management methodologies that lead to project success	(Conforto et al., 2016)
		(Serrador and Pinto, 2015)
		(Joslin and Müller, 2015)
		(de Carvalho *et al.*, 2015)
		Kalenda *et al.*, (2018)
		(Itai and Shtub, 2019)
		(Tam *et al.*, 2020b)
		(Ikram and Dev, 2020)
		(Jarzębowicz and Sitko, 2020)

Agile project management and project success.	This theme in general highlights the lead to project success using agile	(Misra et al., 2009)
		(Sheffield and Lemétayer, 2013)
		(Conforto *et al.*, 2016)
		(O'Sheedy and Sankaran, 2013)
		(Livermore, 2008)
		(Sheffield and Lemétayer, 2013b)
		(Hummel and Epp, 2015)
		(Aldahmash *et al.*, 2017)
		(Ahimbisibwe *et al.*, 2015)
		(RamadanDarwish and M. Rizk, 2015)
		Nasir and Sahibuddin (2011)
		(Dikert *et al.*, 2016)
		(Boehm and Turner, 2003)

		(Chiyangwa and Mnkandla, 2018) (Tam *et al.*, 2020b)
From traditional to agile.	This theme sheds light on the pros and cons faced by organisations when they transform from traditional project management to agile project management	(Papadopoulos, 2015) (Špundak, 2014) (Abdalhamid, 2019) (Sharma *et al.*, 2012) (Robbins *et al.*, 2016) (Paasivaara *et al.*, 2018) (Alqudah and Razali, 2017) (Misra *et al.*, 2010) (Conboy and Carroll, 2019) (Bick *et al.*, 2018) (Ciric *et al.*, 2019) (Reddy and Kumar, 2020) (Nurdiani *et al.*, 2019)
Implementing agile and the affecting factors.	This theme highlighted the affecting factors associated	(Livermore, 2008)

	with implementation of agile methodology on the organisation's projects	(Rasnacis and Berzisa, 2015)
		(Rasnacis and Berzisa, 2016)
		Kaur *et al.,* 2015)
		(Abdalhamid, 2019)
		(Fuchs and Hess, 2018)
		(Livermore, 2008)
		(Bavani, 2009)
		(Melo *et al.*, 2011)
		(Hummel and Epp, 2015)
		(Lindgren and McAllister, 2014)
		(Livermore, 2008)
		(Barash, 2013)
		(Amir *et al.*, 2013)
		(Garousi *et al.*, 2019)
		(Gren *et al.*, 2017)

		(Vishnubhotla *et al.*, 2020)
		(Zaitsev *et al.*, 2020)
		(Lebdeh *et al.*, 2020)
		(Shakya and Shakya, 2020)

Table 32 Summary of Literature review

Appendix VIII: SPSS & Nvivo diagrams

Statistics

		Gender	Age	Department	Position
N	Valid	110	110	110	110
	Missing	0	0	0	0
Mean		1.14	3.69	1.32	2.07
Skewness		2.149	.154	.792	1.063
Std. Error of Skewness		.230	.230	.230	.230
Kurtosis		2.665	-.439	-1.399	.152
Std. Error of Kurtosis		.457	.457	.457	.457

Table 33: Statistics

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	95	86.4	86.4	86.4

		Frequency	Percent	Valid Percent	Cumulative Percent
	Female	15	13.6	13.6	100.0
	Total	110	100.0	100.0	

Table 34: Gender

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than or equal to 30	2	1.8	1.8	1.8
	31 - 35	15	13.6	13.6	15.5
	36 - 40	33	30.0	30.0	45.5
	41 - 45	34	30.9	30.9	76.4
	46 - 50	17	15.5	15.5	91.8
	Above 50	9	8.2	8.2	100.0
	Total	110	100.0	100.0	

Table 35: Age

Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Digital Services	75	68.2	68.2	68.2
	Managed Services	35	31.8	31.8	100.0
	Total	110	100.0	100.0	

Table 36: Department

Position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Project/Program manager	53	48.2	48.2	48.2
	Program Director	25	22.7	22.7	70.9
	ADM Head/Manager	10	9.1	9.1	80.0
	PMO/DS Head/MS Head	17	15.5	15.5	95.5
	MS Director	3	2.7	2.7	98.2

MSCOO	2	1.8	1.8	100.0
Total	110	100.0	100.0	

Table 37: Position

Gender * Department Crosstabulation

Count

		Department		Total
		Digital Services	Managed Services	
Gender	Male	65	30	95
	Female	10	5	15
Total		75	35	110

Table 38: Gender by department

Gender * Age Crosstabulation

Count

		Age						Total
		less than or equal to 30	31 - 35	36 – 40	41 - 45	46 - 50	Above 50	
Gender	Male	0	13	27	30	16	9	95
	Female	2	2	6	4	1	0	15
Total		2	15	33	34	17	9	110

Table 39: Gender by age

Gender * Location in the region Crosstabulation

Count

		Location in the region		Total
		Middle East	Africa	
Gender	Male	71	24	95
	Female	9	6	15
Total		80	30	110

Table 40: Gender by location

Correlations

		TEAM SIZE	Project Value
TEAM SIZE	Pearson Correlation	1	.255**
	Sig. (2-tailed)		.007
	N	110	110
Project Value	Pearson Correlation	.255**	1
	Sig. (2-tailed)	.007	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Table 41: Correlation Team size & Project Value)

Correlations

		Project Value	TEAM COMM
Project Value	Pearson Correlation	1	.392**
	Sig. (2-tailed)		.000
	N	110	110
TEAM COMM	Pearson Correlation	.392**	1
	Sig. (2-tailed)	.000	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Table 42: Correlation Team Communication & project value

Correlations

		Project Value	TEAM PER
Project Value	Pearson Correlation	1	.538**

			.000
	Sig. (2-tailed)		.000
	N	110	110
TEAM PER	Pearson Correlation	.538**	1
	Sig. (2-tailed)	.000	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Table 43: Correlation Team performance & project value

Correlations

		Project Value	Management involvement
Project Value	Pearson Correlation	1	.482**
	Sig. (2-tailed)		.000
	N	110	110
Management involvement	Pearson Correlation	.482**	1

	Sig. (2-tailed)	.000	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Table 44: Correlation Management involvement and Project Value

Correlations

		Project Value	Customer involvement
Project Value	Pearson Correlation	1	.312[**]
	Sig. (2-tailed)		.001
	N	110	110
Customer involvement	Pearson Correlation	.312[**]	1
	Sig. (2-tailed)	.001	
	N	110	110

**. Correlation is significant at the 0.01 level (2-tailed).

Table 45: Correlation Customer Involvement & Project Value

Descriptive Statistics

	Mean	Std. Deviation	N
Project Value	4.0742	.50259	110
TEAM SIZE	4.0955	.58848	110

Table 46: Team Size descriptive

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.255ᵃ	.065	.056	.48822	.065	7.511	1

Table 47: Regression Team Size & Project Value
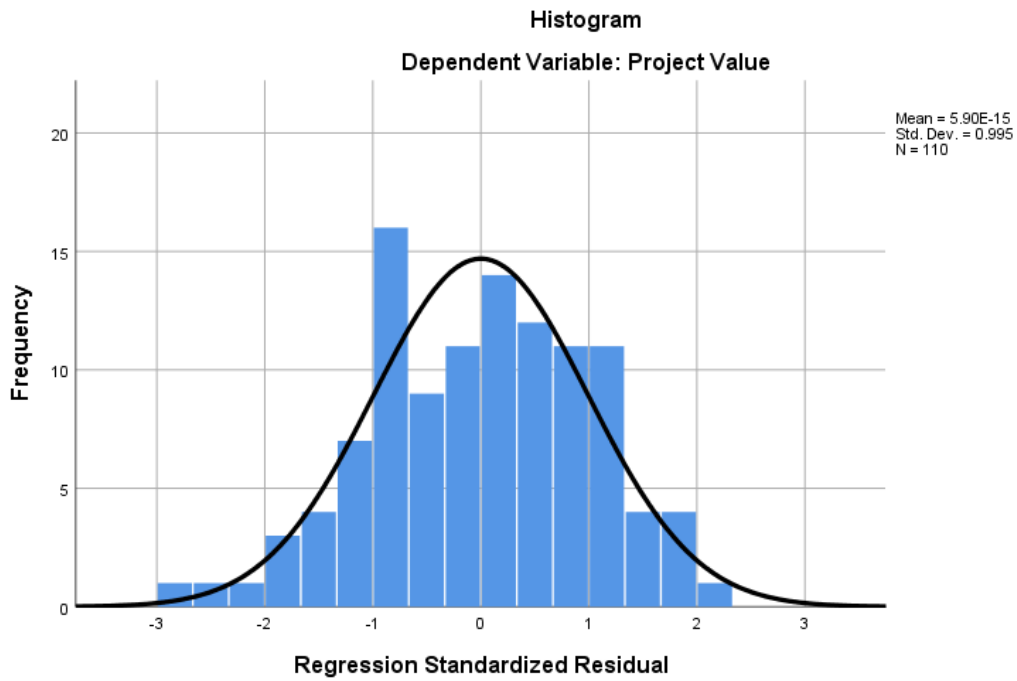
Figure 23: Histogram Team Size

Descriptive Statistics

	Mean	Std. Deviation	N
Project Value	4.0742	.50259	110
TEAM COMM	4.4864	.42002	110

Table 48: Descriptive Team Communication

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.392[a]	.154	.146	.46442	.154	19.652	1

Table 49: Regression Team Communication & project Value
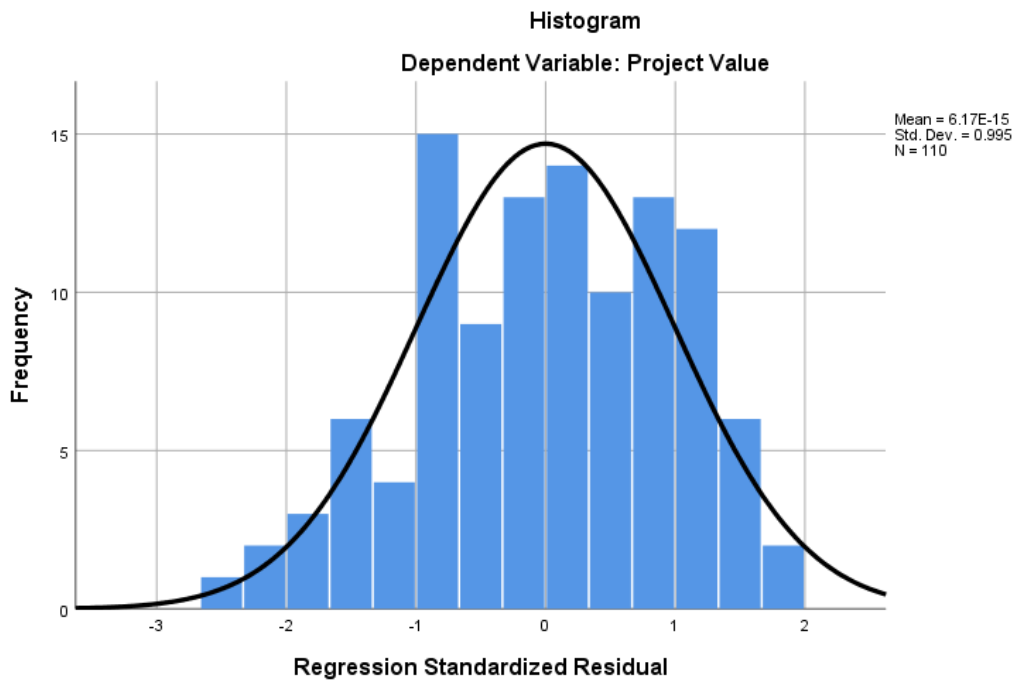
Figure 24: Histogram Team Communication

Descriptive Statistics

	Mean	Std. Deviation	N
Project Value	4.0742	.50259	110
TEAM PER	4.3932	.39703	110

Table 50: Descriptive Team Performance

					Change Statistics		
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1
1	.538ᵃ	.290	.283	.42555	.290	44.036	1

Table 51: Regression Team Performance & project Value
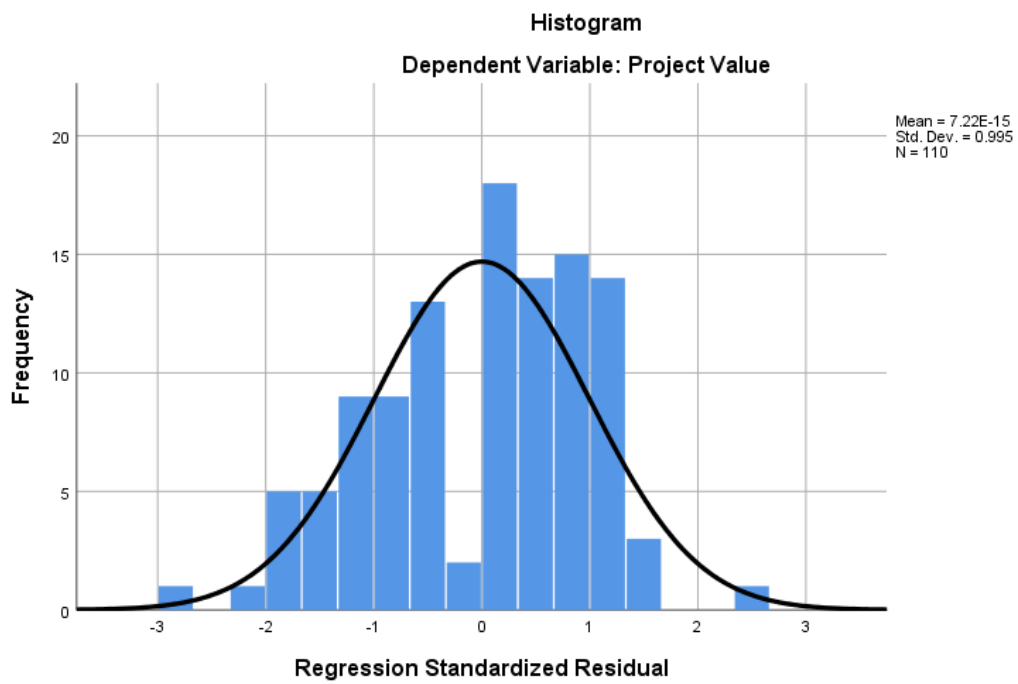
Figure 25: Histogram Team performance

Descriptive Statistics

	Mean	Std. Deviation	N
Project Value	4.0742	.50259	110
Management involvement	4.2389	.45218	110

Table 52: Descriptive Management Involvement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1
1	.482ª	.233	.226	.44226	.233	32.762	1

Table 53: Regression Management Involvement and project value
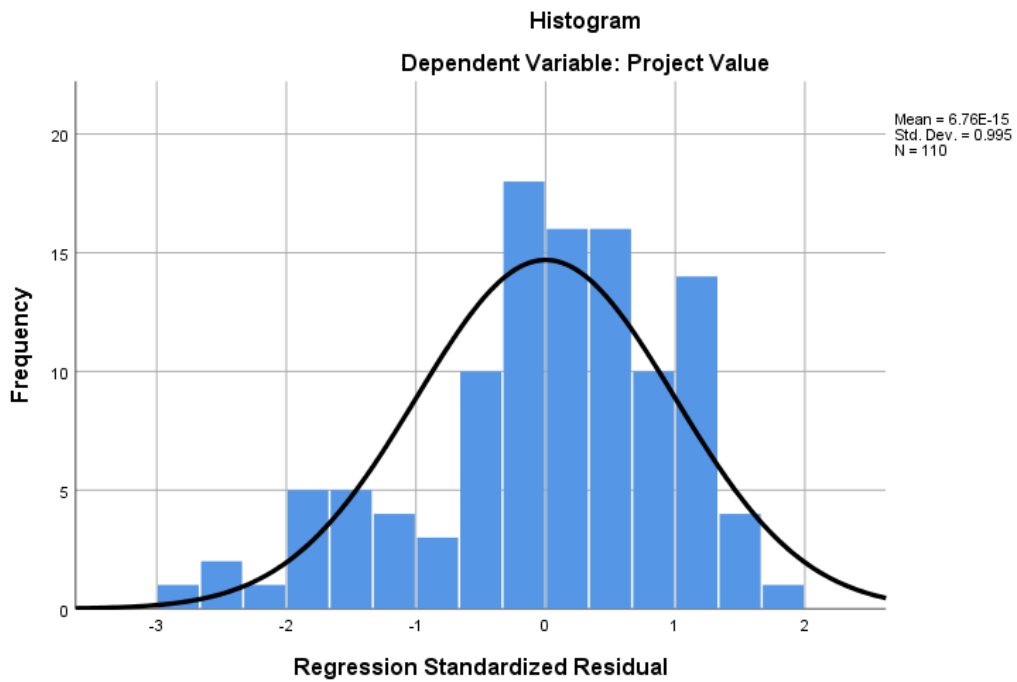
Figure 26: Histogram Management Involvement

Descriptive Statistics

	Mean	Std. Deviation	N
Project Value	4.0742	.50259	110
Customer involvement	4.2364	.50552	110

Table 54: Descriptive customer involvement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1
1	.312ª	.098	.089	.47963	.098	11.685	1

Table 55: Regression Customer involvement & project Value

Histogram

Dependent Variable: Project Value

Mean = 5.61E-15
Std. Dev. = 0.995
N = 110
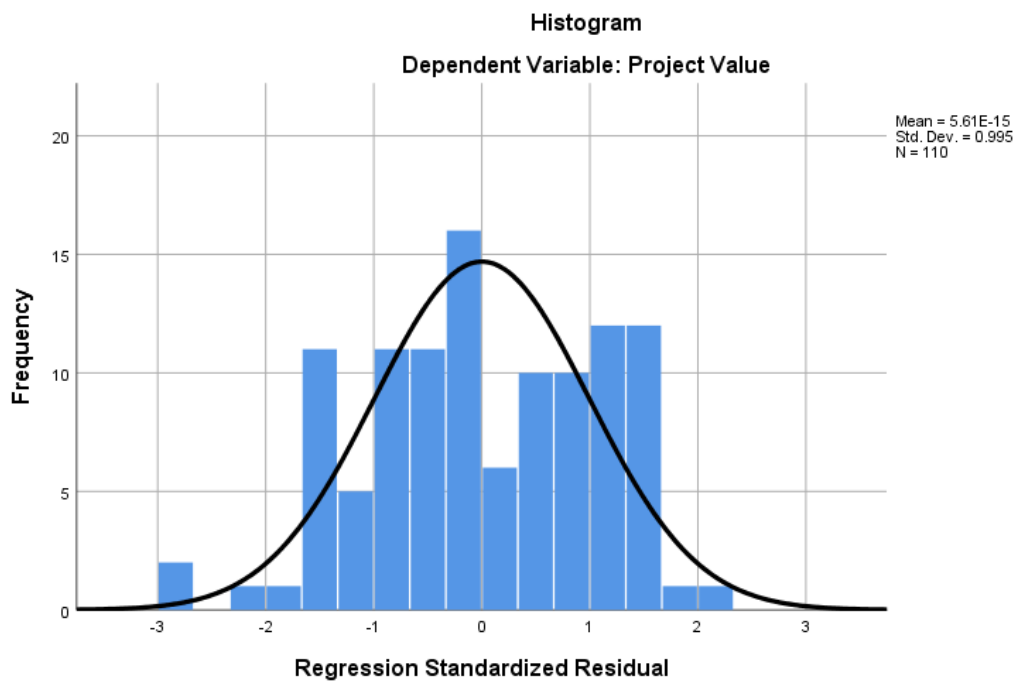
Figure 27: Histogram Customer Involvement

Figure 28: Nodes in NVIVO

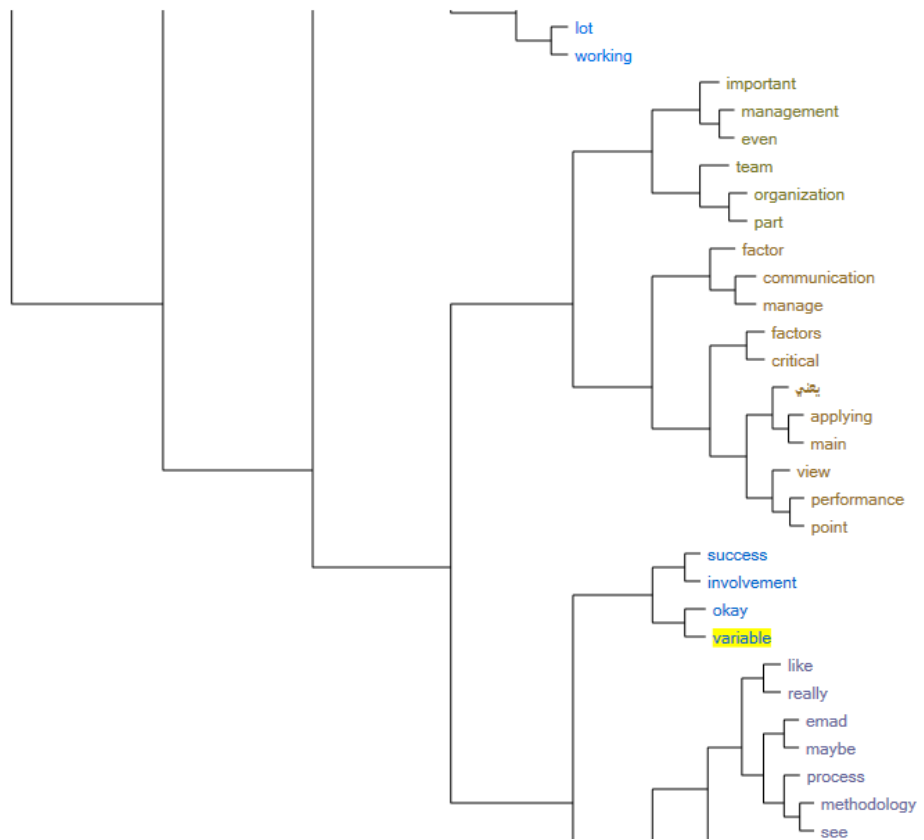| Code A	Code B	Pearson correlation coefficient
Nodes\\Org	Nodes\\Critical Factors	0.825316
Nodes\\INDVAR1	Nodes\\Critical Factors	0.815929
Nodes\\Org	Nodes\\INDVAR2	0.78156
Nodes\\INDVAR2	Nodes\\Critical Factors	0.732036
Nodes\\Org	Nodes\\INDVAR1	0.731957
Nodes\\INDVAR2	Nodes\\INDVAR1	0.708333
Nodes\\Org	Nodes\\Agile success	0.689128
Nodes\\Critical Factors	Nodes\\Agile success	0.66032
Nodes\\INDVAR2	Nodes\\Agile success	0.650079
Nodes\\INDVAR1	Nodes\\Agile success	0.51322
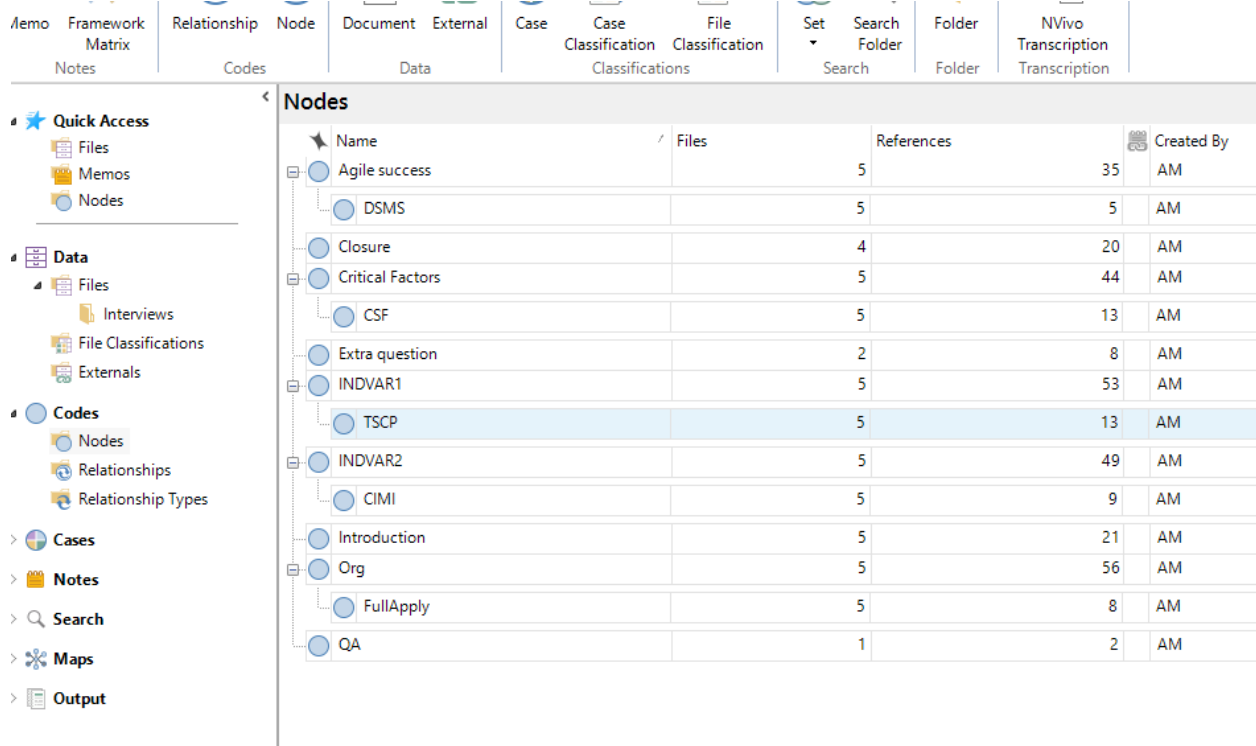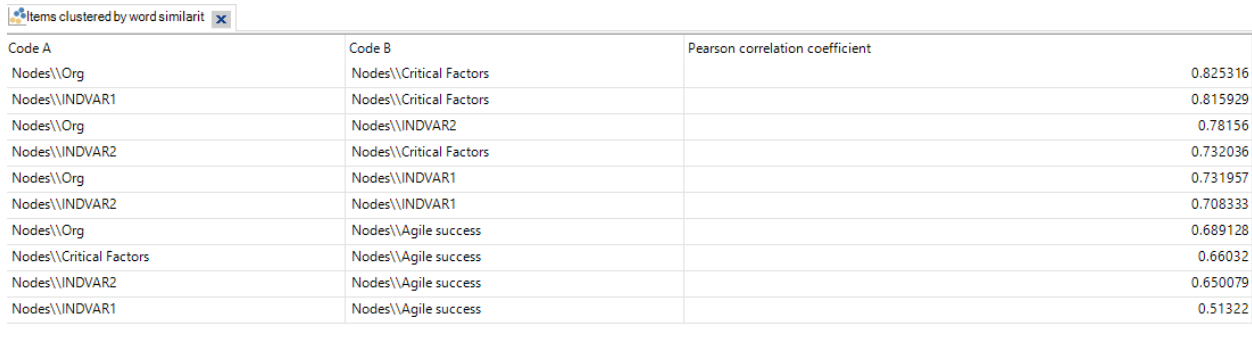
Figure 29: Cluster Analysis by words

Figure 30: Word Frequency