Exploratory study on the influence of Agile on Project Management of Outsourced Software projects in India.

Dissertation submitted in part fulfilment of the requirements for the degree of

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DECLARATION

I, Shrey Sinha, declare that this research is my original work and that it has never been presented to any institution or university for the award of Degree or Diploma. In addition, I have referenced correctly all literature and sources used in this work and this work is fully compliant with the Dublin Business School’s academic honesty policy.

Signed: Shrey Sinha

Date: 22 May, 2017
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ABSTRACT

The global demand for more efficient and usable software is constantly growing with a high attrition rate of outdated software. The software industry has grown exponentially over the last decade and operates globally in a distributed, geographically dispersed environment. These developments present newer challenges to the software industry especially in the area of project management of software development projects. The growth of the outsourced software development model with vendors and clients engaging globally to provide software solutions has received attention from researchers and research in the areas of Global Software Development and distributed development of software.

There is however, gaps in the areas of knowledge pertaining to project management of software projects in the current scenario and how the existing project management methodologies are able to justify the requirements of managing outsourced projects. One of the leading outsourced software service providers in the world, India, has established its position in the global market, however faces a high rate of failure.

This research explores the challenges and the influence of software development methodologies like Agile and Waterfall on the project management of outsourced software development projects in India. The research brings to light several characteristics of the Indian software industry and the current practices and processes that the industry is progressing towards. The research reveals some interesting insights and exposes areas for further research.
# TABLE OF CONTENTS

1. INTRODUCTION .................................................................................................................. 7
   1.1 SOFTWARE DEVELOPMENT INDUSTRY ......................................................................... 7
   1.2 PROJECT MANAGEMENT ................................................................................................. 8
   1.3 GLOBALLY DISTRIBUTED DEVELOPMENT ................................................................... 8
   1.4 AGILE METHODOLOGY ................................................................................................. 8
   1.5 RESEARCH QUESTION .................................................................................................. 9
   1.6 ORGANIZATION OF THE DISSERTATION ................................................................... 10
   1.7 SCOPE AND LIMITATIONS ......................................................................................... 10
   1.8 CONCLUSION ................................................................................................................ 11

2. LITERATURE REVIEW ......................................................................................................... 12
   2.1 THE BUSINESS OF SOFTWARE DEVELOPMENT .......................................................... 12
   2.2 SOFTWARE ENGINEERING ........................................................................................... 13
   2.3 CURRENT TRENDS ....................................................................................................... 14
   2.4 GSD AND OUTSOURCING ............................................................................................ 15
   2.5 OUTSOURCING ............................................................................................................ 18
   2.6 INDIA ........................................................................................................................... 19
   2.7 PROJECT MANAGEMENT .............................................................................................. 20
   2.8 SOFTWARE DEVELOPMENT METHODOLOGIES – WATERFALL (TRADITIONAL) AND AGILE .......................................................... 22

3. RESEARCH METHODOLOGY .............................................................................................. 27
   3.1 RESEARCH APPROACH ............................................................................................... 30
   3.2 RESEARCH STRATEGY ................................................................................................. 31
   3.3 TIME HORIZONS .......................................................................................................... 33
   3.4 SAMPLING .................................................................................................................... 33
   3.5 DATA COLLECTION INSTRUMENTS .............................................................................. 34
   3.6 DATA ANALYSIS PROCEDURES ................................................................................. 37
   3.7 ETHICS .......................................................................................................................... 37
   3.8 LIMITATIONS ............................................................................................................... 38

4. RESEARCH FINDINGS AND ANALYSIS ............................................................................ 39
   4.1 RESEARCH OBJECTIVE 1 ............................................................................................ 42
   4.2 RESEARCH OBJECTIVE 2 ............................................................................................ 45
   4.3 DISCUSSION ................................................................................................................ 47
   4.4 CONCLUSION AND RECOMMENDATION .................................................................. 48
4.5 RECOMMENDATIONS ........................................................................................................... 50

5. SELF-REFLECTION .................................................................................................................. 51

REFERENCES .................................................................................................................................. 54

APPENDICIES .................................................................................................................................. 57

PROJECT MANAGER INTERVIEW QUESTIONS ........................................................................... 57
SOFTWARE ENGINEER QUESTIONS ............................................................................................ 57

TABLE OF FIGURES
Figure 1. Information Technology Industry .................................................................................. 13
Figure 2. Success Factors for SPI .................................................................................................. 17
Figure 3. Barriers to SPI ............................................................................................................... 17
Figure 4. Indian Software Industry trends. Source: NASSCOM ....................................................... 20
Figure 5. Waterfall model ............................................................................................................ 23
Figure 6. Waterfall vs. Agile ........................................................................................................ 25
Figure 7. The research Onion ........................................................................................................ 28
Figure 8. Research Philosophies .................................................................................................. 29
Figure 9. Research Choices .......................................................................................................... 32
Figure 12. Types of Interviews ..................................................................................................... 36

TABLE OF CHARTS
Chart 1. Distribution of participants against channel used for interview .................................... 40
Chart 2. Experience of Respondents ............................................................................................. 42
Chart 3. Distributed/Centralised Projects .................................................................................... 43
Chart 4. Challenges In PM ........................................................................................................... 44
Chart 5. Awareness of Agile/Waterfall .......................................................................................... 45
Chart 6. Agile/Waterfall in Practice ............................................................................................... 46
Chart 7. Key Areas of Influence ................................................................................................... 47
1. Introduction

Software engineering in the present day is categorised as a global process with collaborations working toward common goals across the globe. This has been made possible with the innovations in technology and globalization. The reasons for geographically distributed collaborations are several, outsourcing being one of them. The current business world relies on software and almost all industries are moving toward a technology-based operating environment. There is currently a huge demand for software products and these demands are not only for stand-alone products but also newer and improved versions of older software. This demand for software is reflected by the recent growth of the software industry and the increased competition. This competition has led organizations to develop strategies to cut costs and expand operation by outsourcing software development projects. The nature of software is such that modern technology eliminates certain limitations with development like centralised work places for development. The advent of cloud technology makes information sharing across the globe convenient. (Dzerzhinskiy and Raykov, 2015; Ozer and Vogel, 2015; Ghani and Seung Ryul Jeong, 2016; Kudaravalli, Faraj and Johnson, 2017).

India has emerged as one of the leading offshore third-party service providers in the world. The software industry in India is huge and attracts clients from across the globe with USA being the most significant client for India, followed by European organizations. Until recently, while software and technology has advanced at a rapid rate and the size of operations and software projects has grown, the area of project management has not received due attention, especially in the software industry. The traditional sequential approach to development, derived from early mechanical engineering disciplines continued to be the norm for software projects as well until the recent popularity of Agile methods. (Öztürk, 2016; Kerzner, 2012; Sunny and Ablin, 2015).

Project management is a significant contributing factor to the success of a project. The high rate of failure of software projects has led researchers to address issues related to project management of software projects. This research aims to understand the relationship between software development methodologies and the influence Agile has had on project management of outsourced software products in India while trying to establish a relationship between the Waterfall model and Agile methods analysis the benefits and challenges associated with them.

1.1 Software Development Industry

Software has become an indispensable part of our lives and the modern world runs on software. Spending on software has exponentially increased and the demand for new and improved software is on a steady rise. The software industry is also categorised with a high rate of failure of projects. Currently over 60% of software projects fail to achieve 100% success. This has resulted in increased costs of development and often projects don’t see completion with the projects being cancelled immaturely. This leads to losses either by the client or the vendors. These costs are expected to rise as software becomes more complicated and newer developments make it to the mainstream. (Ebad, 2016).
1.2 Project Management

In context to the software industry, only recently project management has seen innovations in the traditional approaches to project management. The size of software undertakings is growing and more and more organizations are outsourcing or getting involved in collaborations to develop software on large global scales. This has created a need for more robust project management practices, however, this growth has been slow. (Sommerville, 2016).

1.3 Globally Distributed Development

The growth of the software industry influenced by globalization has evolved in a global process with collaborations being established across global geographic boundaries. Some key players have emerged in this process and India has emerged on top as one of the leading software service providers. However, this globalization of the development process has introduced challenges that were not apparent in centralized development. There are issues of cultural differences, time zones, expertise, management, etc. There is now an increased need for more effective management of projects in software and a consequent need for advancements in approaches to project management. (Khan and Keung, 2015; Iacovou and Nakatsu, 2008; Jabangwe, Šmite and Hessbo, 2016).

1.4 Agile methodology

The traditional approach to development of software has been the sequential approach, the most common form of which is the waterfall method. The more flexible, iterative Agile approach offers benefits to software development teams. There are however, arguments in favour and against in application with factors like size of the teams and communication channels playing a role in determining the suitability for application of Agile methodologies. The size of the project also factors in when devising a strategy for execution of the project plan. (Rasnacis and Berzisa, 2015).

Agile methodology propagates flexibility and adaptability to changes with accepting change being at the core of the philosophy. The process involves breaking down the entire scope into smaller deliverables and developing the software in sprints lasting for about 4 weeks each. These sprints consist of development of usable software modules as decided in the scope for each sprint. This allows a continuous feedback loop to be established with the client as there is a demonstration of the developed software at the end of each sprint. This makes it possible to identify issues and modifications at early stages making it possible to develop more usable software throughout the process as the project advances. It relies on effective communication, however, it may not always be possible to establish effective communication due to infrastructure or budget constraints. (Haig-Smith and Tanner, 2016; Vrhonec et al., 2015).

It has however been observed that Agile methodologies are gaining popularity. The adoption of Agile is much more prevalent now than about a decade ago. This makes it an interesting topic to be explored. The need for more robust and usable software and the need for improved project management practices in the current environment,
characterised by a high rate of failure, makes it an important area to explore. The influence of Agile methods on project management of outsourced software development projects in India.

### 1.5 Research Question

How has the adoption of Agile methodologies by Indian software development companies influenced project management of outsourced software development projects?

The researcher aims to find out the relationship between the practices of Agile methods and the performance of project management duties drawing a contrast and comparison with the traditional Waterfall approach.

The primary objectives the research aims to achieve are:

- To identify the key challenges to project management of outsourced software development projects within Indian software vendors.
- To explore the limitations and benefits Agile offers to management of projects in offshored software vendors in India.

The rationale behind the research arises from the need to address the gaps in information that addresses the challenges in project management of outsourced projects in India, considering that India is an important global software service provider. Agile being a relatively new methodology is gaining popularity in adoption across organizations including software vendors in India. Agile is based on a philosophy that aims to deliver more robust, usable software in a more efficient way which results in customer satisfaction. These methodologies address certain key areas of project management and it makes it an important area to explore. Therefore, this study aims to explore the influence of Agile on project management of outsourced projects in India assessing the current scenario.

The newness and relevance of the research can be attributed to several factors. There exists significant literature in the area of projects and project management. The fields of software development and the popularity of Agile methodologies have also received significant attention from researchers. A significant body of literature addresses the high rate of failure among software projects globally owing to several factors. (PMI, 2016; Gollner and Vitolina, 2016; Md Nasir et al., 2015; Özdemir Güngör and Gözlü, 2016; Öztürk, 2016; Saeeda et al., 2015; Ghani, Bello and Bagiya, 2015).

There is research in the areas of global software development and outsourcing as one of the branches of GSD and India has been recognised as a key player in the offshored software service industry. (Vrhovec et al., 2015; Khan and Keung, 2015; Iacovou and Nakatsu, 2008; Sundararajan, Bhasi and Vijayaraghavan, 2014). There is however, a gap in literature that addresses the challenges of project management in India and the recent adoption of Agile methodologies as observed widely across organizations in India. This makes it important to explore how the adoption of Agile methods has influenced project management of outsourced projects in India.
1.6 Organization of the dissertation

The dissertation has been divided into sections and subsections to give it a hierarchical structure. Section 2 examines the existing literature in the areas of Software Development and the Industry perspective, the current trends in project governance and management of globally distributed projects and the global software development market. It explores the relevant literature to identify gaps in key areas of interest.

The next section addresses the Research Methodology and Methods applied in this research. It discusses the philosophy behind the research and addresses key areas of research approach and strategy. It addresses concerns regarding ethics in relation with research and this study in particular.

The 4th section elaborates on the data collected in the primary research and goes on to discuss it in an analytical manner. Emerging themes and theories are identified and conclusions are drawn. Recommendations based on the outcomes of the research are reflected in this section and areas for future research are identified. The Next section is a reflection by the researcher on the research process, the learnings and observations from the experience of the course of the MBA through its duration. The last two sections comprise of the bibliography and the Appendices.

1.7 Scope and Limitations

The main objectives of this research are to satisfy the requirement for a dissertation to be submitted as a part of the MBA course at Dublin Business School as a requirement by the Quality and Qualifications Ireland (QQI). The research aims to add to the body of knowledge within the software development industry specifically in the area of project management and its evolution with the adoption of Agile methodologies among organizations in India. The research aims to explore a specific market which is that of the globally distributed outsourced software development industry, examining an important contributor to the industry, India.

The topic of choice should be selected based on personal choice and interest. It is important for the researcher to have a personal interest in pursuing knowledge in the field of choice which is reflected by the background of the researcher. (Biłczynska-Wojcik, 2014). The researcher graduated with a Bachelors degree in Computer Applications and has worked in the software industry on global projects, offshore and onsite, in globally distributed teams for international clients with operations spread globally and nationally. The researcher is currently pursuing a Masters degree in Business Administration from Dublin Business School and aims to explore the important areas of Project Management, applying the skills acquired in the Research Methods modules and explore the field of International management through this research.

The limitations identified by the researcher address concerns relating to challenges in executing the research plan. The sample size chosen for the research does not reflect the population accurately due to the small size of the sample.
There exists a possibility of bias since the research studies personal experiences. Also factoring the personal interest of the researcher there may exist the possibility of a bias in the researcher’s presentation of data analysis although the highest degree of attention is given to representing data as accurately as possible.

Software development methodologies are implemented differently across organizations and sometimes even teams. The research assumes project managers use best practice, however, limitations from budget and infrastructure make it challenging to isolate variables that pertain specifically to Agile methods. The research however, provides a broad representation of the observations creating several areas for further exploration.

1.8 Conclusion

The major contribution of the research would be in the area of software development and management of projects in a global scenario. The constantly growing industry and globalization have created a need to examine the industry and address the challenges that have emerged through research and analysis of the findings. It opens areas of further research in the field of project management and significantly contributes to the body of knowledge on the Indian outsourcing industry which despite being one of the largest outsourced software service providers in the world, has received criticism for the high failure rate and challenges with project management.
2. Literature Review

2.1 The Business of Software Development

Software development has come a long way since its conception around four decades back. The area of software engineering has since then emerged as a mainstream business, which is evident from the recent massive growth of the software industry and organizations.

The world we live in runs on software and there is a constant need for better, improved, high performing products that are usable and offer future improvements and increased benefits. There has been a long standing debate about whether software engineering is after all an engineering discipline or not and while there are arguments for both sides, it is generally accepted that software development follows a lifecycle that is similar to engineering of physical products, applying the same principles. The industry has led to innovations in not just software but these developments have led to advancements in industries that are dependent or benefit from technological advancements. The demand for software and globalization in the recent years has led to globalization in the software industry as well. This has led to the development of Global Software Development and outsourcing. This implies that processes require to be managed in a suitable fashion, leading to the development of project management practices in the software industry. Project management practices have not evolved at the same rate as the software industry itself and only recently has the software industry realized the need for improved project management practices. This has led to the conceptualization of methodologies and practices like Agile, while traditionally, the sequential or the Waterfall approach to development has been the norm. (Dzerzhinskiy and Raykov, 2015; Ozer and Vogel, 2015; Ghani and Seung Ryul Jeong, 2016; Kudaravalli, Faraj and Johnson, 2017).

The software industry faces a very high rate of failure in projects, which continues to be one of the biggest issues with the industry. More than 60% projects fail to achieve 100% success rates. The advent of globalization and global software development increases the challenges faced by the industry due to the distributed nature of development owing to issues arising from difficulties in coordination, communication and management of such processes. In the recent years, among the various countries that have emerged as key players in the software industry globally, India has been identified as one of the leaders in software services. The industry has grown exponentially over the years and stands as one of the leading third party software or offshore service providers. However, the Indian software industry has faced criticism globally for the high failure rates, quality of product and management of projects. (Öztürk, 2016; Kerzner, 2012; Sunny and Ablin, 2015).

Project management has recently received importance as a key influential factor in success or failure of projects. The concepts discussed in the PMBOK need revisiting and there is a requirement for more dynamic and robust practices. The Agile methodology took shape when the Agile manifesto was written in 2001. This has brought about the required change in approach to project management in the software industry. While initially intended for software, Agile practices have found their way in other manufacturing and service industries as well. Agile emphasizes on people, interactions and communication besides just process. There is however, a gap in the
literature in the area of the influence of these methodologies on project management and their impact. (Heagney, 2011; Kerzner, 2013).

In the current day, where software is being developed globally there is a need to understand the processes that govern the various functions of the software industry and that leads to the choice of topic for this study, which is to understand the influence of Agile methods in managing software development in one of the largest providers of global software services in the world, India. The themes that follow have been identified in order to assess and discuss the current literature available on the aspects that comprise the basis of the chosen study. A short introduction to software development enables readers from an unfamiliar background develop an understanding of the software industry. The further subsections go on to discuss in detail the effects of globalization on the software industry, Global Software Development (also referred to as GSD in this paper) and the outsourcing industry. A further analysis of the current trends and growth in the industry leads to identification of some key geographical player in the industry, discussing the role of India and the adoption and impact of Agile methods on project management of outsourced software development undertakings.

2.2 Software Engineering

The Information Technology (IT) industry has two main branches. Software and hardware. The hardware enables the software in executing the functions intended while software controls the hardware and its operation. (Sunny and Ablin, 2015).

![Information Technology Industry](image)

**Figure 1. Information Technology Industry. (Sunny and Ablin, 2015).**

The modern world runs on software. (Sommerville, 2016). “Software Engineering” has been defined by IEEE as “the systematic application of scientific and technological knowledge, methods, and experience to the design, implementation, testing, and documentation of software”. The term “software engineering” however, is often used as a synonym for “software development”. The function of the software industry goes beyond just creating software and extends to the areas of operation and maintenance of software and is thus captured in the term “Software Development”. (Dzerzhinskiy and Raykov, 2015).
Software development is a complex process and has evolved exponentially since its origin about forty-five years back, operating on global, large, industrial scales. (Lutz, Naveda and Vallino, 2014; ‘IEEE standard glossary of software engineering terminology’, 2013). The modern software industry is considered a part of the engineering profession characterized as a society which follows industry standards, practices, a code of ethics and is taught as a discipline with its own set of texts, curriculum, accreditations and certifications. (‘IEEE standard glossary of software engineering terminology’, 2013).

Just like any other field of engineering, there are certain key areas or knowledge areas that encompass the various aspects of software engineering as an industry practice. The key areas of knowledge as defined by IEEE for the purpose of software industry are Software Requirement, Software Design, Software Construction, Software Testing, Software Maintenance, Software Configuration Management, Software Engineering Process, Software Engineering Models and Methods, Software Quality, Software Engineering Professional Practice, Software Engineering Economics, Computing Foundations, Mathematical Foundations and Engineering Foundations. While this not an exhaustive list, there are other areas like Project Management, Quality Management and General Management that govern the processes and influence the process of developing software. (‘IEEE standard glossary of software engineering terminology’, 2013).

These key areas of knowledge identified above play a key role in the software development process at various stages of the lifecycle. These are not independent of each other and the decisions made at one stage of the software development lifecycle (SDLC), influences the decisions made at later stages. These areas of knowledge form the basis for making such decisions and identifying appropriate approach which leads to best practice.

Since the earlier years, software development or engineering has been approached in a fashion similar to traditional manufacturing practices. This led to a sequential approach being followed for several years until the recent introduction of newer approaches to project management. Project management has not evolved at the same rate as software has.

2.3 Current Trends

Software development is a business characterized with risk and complexity which also implies that it is constantly evolving and at a very high rate, experiencing a high rate of innovation and improvement in best practices. The software market is huge and generates revenues in excess of three hundred billion dollars in the United States alone. The industry has been a major contributor to economic growth and opportunities for employment. (Ozer and Vogel, 2015). The modern challenges faced by the industry compel organizations to constantly device methods to ensure quick and timely delivery, ensuring the satisfaction of the stakeholders while employing effective risk management methods. This involves making sound decisions based on cogent theoretical frameworks and selection of suitable methodology from the huge number of variants. (Jacobson et al., 2012; Ghani and Seung Ryul Jeong, 2016).
Despite the exponential growth in the software industry and the available tools and methods, the industry still faces a very high rate of failure with about 68% of the projects undertaken being written off as failed. (Öztürk, 2016; Sommerville, 2016). The impact of these failures leaks into the associated industries. In 2014, a software issues caused Toyota to recall its Prius vehicles as the problem could cause the cars to stall. (Ebad, 2016).

Modern large scale software development is an intellective process which requires high levels of coordination between individuals and teams with different expertise and skills. Since large scale software solutions are built through integration of various technologies, it requires experts in those various technologies and effectively coordinating them. This skill interdependency creates one of the major challenges in the form of coordination among teams and individuals which may be spread across an organization, across organizations and geographically dispersed teams or individual contributors. There is the added difficulty of gathering and stabilization of requirements. The constantly evolving technologies and tools also present a challenge as they present a need to be constantly updated and maintain compatibility between the various fragments of the software infrastructure. There are different approaches to coordinating the expertise of different contributors and the structures that emerge can be classified into two types, centralized or decentralized. While traditional approaches tend to favour centralized teams, modern approaches like “Agile” suggest a decentralized structure. The way these teams coordinate is very distinct and so is the way they interact and share information. (Ghani and Seung Ryul Jeong, 2016; Kudaravalli, Faraj and Johnson, 2017).

2.4 GSD and Outsourcing

The rapid growth of the software industry and globalisation, besides growing competition have led organisations to develop strategies that enable them to reduce costs while maintaining the quality of software developed. This has led to global software development. Global software development not only enables organisations to gain competitive advantage through specialisation gains but also cost-reduction. (Vrhovec et al., 2015).

It has been observed that over the recent years, there has been a shift from a centralized to a more distributed approach in software development in order to capitalise on the benefits offered by these unconventional methods like improved quality, development around the clock, reduced time taken to market, cheaper resources, reach to a wider body of knowledge and productivity. (Vrhovec et al., 2015; Khan and Keung, 2015; Al-Zaidi and Qureshi, 2017). “Global software development(GSD) is software development that is separated through two or more sites that are dispersed by national or continental lines.” (Al-Zaidi and Qureshi, 2017).

It has however been observed that the distributed nature of GSD comes with its own set of challenges out of which communication being the obvious issue keeping in mind the various time zones and levels of infrastructure available at various sites. Since the stakeholders are located in various geographical locations, maintaining an efficient communication system is essential. This is a challenge that needs to be addressed. Cultural differences are another key issue. Different corporations have different cultures and acceptable and unacceptable norms pertaining to behaviour, communication or quality standards, etc. These differences are important to look into in a global development scenario as there is not only the difference in corporate culture involved but also the
difference in the geographical backgrounds that are involved. These differences have a significant impact on how the process works. This can sometimes lead to unfair distribution of work and sometimes certain development centres can get overloaded while the others have relatively lower traffic of work coming in. (Haig-Smith and Tanner, 2016; Vrhovec et al., 2015; Khan and Keung, 2015; Al-Zaidi and Qureshi, 2017).

Spontaneous communication is often not possible in a global development scenario. Since the teams are dispersed across the globe, there are differences in time zones, besides the fact that most of the communication happens over channels that do not facilitate face-to-face interaction. This raises the issue of trust as people tend to develop better relationships face-to-face. This creates a more significant need for effective processes to eliminate such challenges. Informal communication is often emphasized in agile software development and is given importance above formal communication, however, chances to establish relationships to foster such communication are rare in a distributed environment where cultural and language barriers present further obstacles in establishing informal communication among dispersed teams or individuals. Intentions are often misjudged and can lead to conflict that may have occurred because of unclear or inefficient communication. Globalization has created new markets for the software industry and through global software development organizations are penetrating foreign markets which hold potential for business development and corresponding profits. Through establishing ties across borders, organizations are able to access local markets and operate on larger scale. Global software development has led organizations to markets which require them to adjust the way they operate besides how they procure resources. (Haig-Smith and Tanner, 2016; Vrhovec et al., 2015).

Software development has rapidly grown over the years with several countries emerging as key players. Several of these players come from economies in transition. The issues faced by these economies like scarcity and quality of resources also impact the process. Resources are also hard to find in the form of skilled professionals, which can be tackled by outsourcing less complex operations to such centres. People related issues still continue to be the major concern for organisations outsourcing work to transition economies. Some of the key issues that can be established with transition economies are traditions, organisational cultures and resistance to change. There is a significant difference between agile development and GSD particularly in the area of face-to-face interaction however the application of agile concepts in the context of global software development creates possibilities that can bring benefits to development of software. (Vrhovec et al., 2015; Khan and Keung, 2015; Al-Zaidi and Qureshi, 2017).

These challenges have led to the need for Software Process improvement or SPI. SPI allows organizations to review and evaluate their processes and identify their weaknesses and strengths. The most vital aspect of GSD is documentation. There is an emphasis on the documentation being comprehensive, updated and accurate. Documentation is an effective method to address the issue of communication and provides as a strong basis for decision making at various levels of the hierarchy. In the process of implementation of software process improvement programs there are certain success factors that Khan and Keung identify. (Khan and Keung, 2016).
These identified factors are enforced by the management with a high emphasis on commitment to SPI goals from the management. The involvement of staff in these programs driven by the management along with effective allocation of resources, setting of realistic and achievable goals, training, effective information sharing, fostering strong relationships and awareness of these programs are described as some of the critical factors. (Khan and Keung, 2016).

There are however, several barriers to the success of such programs and the major factor is identified as the lack of resources. This refers to a lack of resources available to the members of the global software development teams. A critical issue this is more apparent in economies that are in transition. Software process improvement requires staff that are trained and have experience in implementing such policies and strategies in organisations. This includes staff at the top levels of management including directors who define such policies and enforce them across the organisation. This is also applicable to the team members who need to be informed of such process improvement activities and should be trained in applying those policies in the day-to-day activities. (Khan and Keung, 2016).

Implementation of such policies requires change in the way and organisation functions. Team members usually resist such changes and this sometimes leads to split between team members or sub-groups that accept changes versus those who are against. (Khan and Keung, 2016).

Agile has widely been adopted as a methodology for software development and implementation of Agile concepts in Global Software Development is becoming increasingly prevalent. The reason for this can be attributed to the need for accessing a large resource pool of skilled professionals, while maintaining low costs and being capable of delivering results which have value. A recent concept but growing fast is Cloud Computing. Cloud computing
provides several services which are key to the operation and development of software as a service. This makes these services accessible from anywhere, regardless of the geographical location from where the service is being accessed. Some of the services offered by cloud computing are Infrastructure as a service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS). These qualities of cloud computing directly correspond with the objectives of Agile based Global Software Development. These services are accessible across the globe. They provide efficient and stable platforms with cost effective solutions that satisfy the budgetary requirements of projects and organizations. (Haig-Smith and Tanner, 2016).

The concept of integrating agile principles into GSD practices is referred to as Agile Global Software Development or AGSD for short. The objective of this practice is to gain advantage through the benefits associated with global development while still being able to respond to changes, maintaining quality and operating within budgets. Cloud computing enables organizations to use solutions which result in reduced operating costs, increase scalability and performance, while maintaining the availability of resources in a distributed infrastructure. These attributes satisfy the essential requirements of processes operating in a distributed development format. (Haig-Smith and Tanner, 2016).

Cloud computing services specifically the infrastructure and platform services enable software development teams in being able to procure environment required to execute the software development process through the various stages of the software development lifecycle and post development activities. (Haig-Smith and Tanner, 2016).

### 2.5 Outsourcing

“Offshore software development outsourcing (OSDO)” is one of the scenarios that comes under the scope of Global Software Development. Gaps in research on the area of outsourcing have been observed in existing literature. While there is a lot of available research on vendors or organizations and their relationship with the vendors, there is not much study on how outsourcing effects the software development process. (Khan and Keung, 2015; Iacovou and Nakatsu, 2008; Jabangwe, Šmite and Hessbo, 2016; Niazi et al., 2013; Khan and Khan, 2017).

In Global Software Development, outsourcing of part or complete software development to offshore vendors is a strategy used for sourcing by contracting external companies located in a different country. Outsourcing draws a lot of criticism for the difficulties associated in managing such projects. Another major issue is the high failure rate of such projects. Over half the projects in the industry are observed to fail in delivering the desired benefits. An area of ongoing research is that of the effect on quality in such undertakings. (Kristjánsson, Helms and Brinkkemper, 2014; Jabangwe, Šmite and Hessbo, 2016). Despite the criticism, outsourcing has also been reported to have no negative effects on quality in well managed projects. This presents contradictory evidence and since outsourcing seems to be on a rise and is increasingly becoming a preferred sourcing strategy, it is interesting to understand the aspects related to managing such projects. (Khan and Keung, 2015; Iacovou and Nakatsu, 2008; Jabangwe, Šmite and Hessbo, 2016).
Outsourcing has opened doors for several independent software vendors who offer services to organizations across the globe. (Kristjánsson, Helms and Brinkkemper, 2014). It has opened new markets for low wage countries. Vendors from these countries can provide similar software services for one third the price at some of the host countries. India and China are the leading software service providers in Asia with organizations like Wipro and HCL taking positions in the leading organizations providing outsourcing services. India has witnessed very high growth in the recent years in the outsourcing industry. (Niazi et al., 2013; Rasnacis and Berzisa, 2015). It is also observed that despite the concerns over quality delivered, with experience of managing outsourced projects, organization improve in the quality delivered over time. One of the challenges in countries like India that stands out maintains that of communication and coordination. (Niazi et al., 2013; Khan and Khan, 2017).

Literature shows that “Lack of Project Management” is one of the biggest challenges faced in countries like India and governance continues to be a problem. Besides communication several challenges arise that are related to project management like “time-zone problem”, “lack of coordination”, “knowledge management” and “poor monitoring systems”. Ineffective outsourcing relationship management is also one of the identified challenges. (Khan and Khan, 2017). This has led to contract design being given high importance in the outsourcing industry. (Benaroch, Lichtenstein and Fink, 2016).

2.6 India

India is well established as leader in providing offshore software services. The biggest markets India caters to are Europe and the USA. The National Association of Software and Service Company (NASSCOM) is the domestic association for software companies in India. The key factors that attract organizations to India are the availability of low cost labour, in abundance, who are not only skilled but also have fluency in communicating in English. (Weilin Zhao and Watanabe, 2010). The impact of India on the global economies has also been observed as significant with countries like America formulating policies to discourage outsourcing to retain jobs within the country. On the other hand, countries like Sweden were observed to have reduced the local high cost workforce with the cheaper Indian outsourcing options. (Sunny and Ablin, 2015).
2.7 Project Management

Over 97% projects worldwide are unable to achieve 100% success across companies in the current age, project management being one of the main factors contributing to the success or failure rate of a project. (Rasnacis and Berzisa, 2015). Project Management from it beginnings in certain functions of the organization, has grown to being an enterprise wide application as a business process. Project management is directly associated with the performance of an organization. There has been a growth in expenditure on training programs on project management within organizations in the recent years. (Kerzner, 2012).

“Project management is the planning, organizing, directing, and controlling of company resources for a relatively short-term objective that has been established to complete specific goals and objectives. Furthermore, project management utilizes the systems approach to management by having functional personnel (the vertical hierarchy) assigned to a specific project (the horizontal hierarchy). “(Kerzner, 2012).

Project success is a complex term and difficult to define. It is a satisfaction of several conditions that leads to a project being successful. While time, budget and performance or delivery to specification remain the key aspects, user acceptance, agreement to scope changes, integration and preservation of the corporate culture are other dimensions to be considered. While some of these are straight forward to understand, certain aspects require a closer look. (Kerzner, 2012).

A successful project does not imply that project management was also successful as the two are separate entities. While successful project management does not guarantee a successful project, it certainly contributes to the success of projects and is one of the most important aspects of achieving those results. (Kerzner, 2012). It is therefore very important to choose an appropriate methodology for the management of projects. (Gollner and
Vitolina, 2016). The function of Project management is performed by the Project Manager. The project manager is responsible for the planning, execution and control of the projects under him and deliver successful results through effective project management. The official organization for project management is known as PMI or the Project Management Institute. PMI has released a body of knowledge for project management known as the PMBOK or Project Management Body of Knowledge. (Heagney, 2011; Kerzner, 2013).

The global IT industry faces a project failure rate of over 60%. (Öztürk, 2016). In the present day, Software Project Management is essential for software engineering. In the software industry the main goals for any project can be considered to fall within the scope of the following four objectives: timely delivery, cost adherence, customer satisfaction, well managed team. The issues in software engineering however, arise from the dynamic and non-physical nature of the product, which is software. It is difficult to monitor or gather evidence of progress for an intangible product like software. Software projects are usually unique and the requirement specifications vary greatly from project to project. They are specific to the needs of different customers, often being specific to one organization, each requiring a different approach in management throughout the lifecycle of the project. These complexities increase the difficulties in project management and the result is a high rate of unsuccessful projects in the software industry. Each time a completely new system needs to be built, even experienced project managers may face challenges in planning and organizing the project since their previous experience may not necessarily be relevant to the requirements of the new project. This leads to increased costs, delays and sometimes poor quality. (Sommerville, 2016).

Given the dynamic nature of the industry and the product, software project management is a complex process which requires a high level of adaptability. It is also important to consider other factors that influence the environment and decision making in managing a software product. The size of the organization is one such aspect. In project management, communication holds great importance. This has led to the development of frameworks and platforms that enable organizations to establish effective communication channels. The size of an organization influences how the company implements these policies for communicating and process related to it. The nature of the client, internal or external, determines the nature of the contract and process will be influenced by the agreed terms between the organization and the client. As discussed earlier, different customers have different needs and software requirements are often unique. This also means that the size of the software can vary from project to project and from one client to another. The size of the software to be developed can determine how complex or complicated the management of the project will be. (Sommerville, 2016). The size of the project or the software to be developed can influence decisions pertaining to communication, time, coordination or the choice between distribution of development teams or centralization. (Al-Zaidi and Qureshi, 2017; Sommerville, 2016). The sensitive nature of certain projects with sensitivity relating to the nature of data or process, or the nature of the client organization can be considered an influencing factor in the decision making process for governing policies of the project. While each project is unique and thus no standard policy applies to all projects, the organizational culture is a factor that can influence the way a project is governed or executed. The culture of the organization can influence how the project is approached, planned and executed. It can be the influencing factor in decisions pertaining to risk management as well. (Sommerville, 2016).
The methodology the organization adopts to develop software is a contributing factor to project management decisions. Software development methodologies have evolved over time and modern approaches like Agile introduce a higher level of flexibility over traditional frameworks like waterfall. The approach that different methodologies take towards the development of a software product influence the way projects are planned at different stages through the project timeline. Traditional models like the waterfall model are non-iterative process based models and the development usually follows a linear fashion through the various stages of the development lifecycle with the delivery of the product at the end in one chunk. Agile differs from traditional approaches in the sense that it employs a more iterative approach, with delivery in chunks or parts, incrementing over time to result in the final product at the end of the project cycle. The various stages of development are visited several times over in this process as the process is broken down in smaller deliverables and each deliverable requires to be assessed as an individual piece of software that requires to go through the entire stages from planning to delivery. It is difficult to draw a conclusion on whether this approach is effective or not as it depends again on the unique nature of each project and while it may be successful in one scenario, it may fail terribly in another. It also requires increased levels of understanding and agreement on the scope of the deliverables and their timelines. (Sommerville, 2016).

2.8 Software Development Methodologies – Waterfall (traditional) and Agile

Since the beginnings of software development, the waterfall model has been the most popular approach to software development until agile techniques started receiving attention around 2008. Technology is changing at a rapid pace and the application of technology is growing constantly and the world runs on software. With this there is constant demand for better software and greater performance, creating a need for innovation in software constantly. While technology has become more sophisticated and major advances in tools for creating software have been made, the aspect of managing such endeavours and approach to project management of such projects did not receive the same attention. (Layton, 2012).

“Agile project management is a style of project management that focuses on early delivery of business value, continuous improvement of the project’s product and processes, scope flexibility, team input, and delivering well-tested products that reflect customer needs.” (Layton, 2012). Agilemethodology.org, an online resource on Agile approaches agile as a movement instead of a methodology. Providing alternatives to traditional sequential software development practices like the commonly implemented waterfall model, agile aims to make the software development process more robust and responsive to the uncertain nature of the software development environment through incremental work done in iterative cycles and continuous feedback. (agilemethodology.org, 2017).

The philosophy behind Agile is based on a process of evaluating the realities of a project and making decisions based on the observations. The empirical approach that Agile involves requires transparency, frequent inspection and adapting to change. Traditional waterfall model is a linear approach to software development where the project lifecycle goes through the stages of requirement gathering, design, development, testing and deployment for the entire product or software. These are the various stages of the software development lifecycle. This means that the entire requirements for the complete product are gathered, a design of the end product is created and
development is done followed by testing and delivery. Each stage is visited only once throughout the project lifecycle. (Layton, 2012; STOICA et al., 2016).

Waterfall model still continues to be one of the most popular models to apply to the software development lifecycle. There are certain characteristics of this model that make it advantageous to implement. The simplicity of the model as a sequential, linear approach make it easy to execute eliminating the complexities involved with iterative models. The scope for error is minimal in a waterfall model. There is a higher attention to detail in the requirement gathering process when working in a sequential format since there is an increased emphasis on avoiding rework due to unclear requirements considering the difficulty in changing an entire software system as opposed to a part or module from the whole system as in the case of iterative models. Waterfall model also requires comprehensive documentation throughout the phases of development and these benefits associated with waterfall enable project managers to overcome the drawbacks associated with the lack of flexibility. (STOICA et al., 2016).

![Waterfall model diagram](image)

**Figure 5. Waterfall model.** (Bassil, 2012).

While there is higher rigidity and avoidance to change in traditional approaches with an emphasis on documentation and hierarchal control, the agile manifesto lays focus on the aspects of people and communications with flexibility and end results. The Agile manifesto expresses the core values of Agile in less than 75 words. (Layton, 2012).

"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

**Individuals and interactions over processes and tools**

**Working software over comprehensive documentation**

**Customer collaboration over contract negotiation**

**Responding to change over following a plan**

That is, while there is value in the items on the right, we value the items on the left more.” (Layton, 2012).

A deeper look at the essential values of the agile manifesto provides insight into the practice that was generated out of experience and not just theory. Individuals are given importance over process and tools and so are interactions. The objective is to have a unified purpose and the processes and tools can be agreed upon. The second
value that the manifesto talks about emphasizes on development of working products instead of comprehensive
documentation. The nature of the software development industry so far has treated customer interaction at a very
contractual level and not as a part of the process of developing the solution. The traditional approaches require
that the requirement gathering phase is completed and finalized before moving on to the next phase. This reduces
the scope of the customer’s participation in the process as the scope is defined and does not allow for changes or
is rigid to change. If there are changes in the agreed timelines of the contract, it calls for a re negotiation of time
expectations otherwise the end of the project is only when the interaction happens. This creates a disconnect and
the customer is not usually aware of the developments until the final product is delivered. Addressing changes or
requests for modification at this stage is difficult and often leads to unsatisfied customers or strained relations.
Agile propagates collaboration and involvement of the customer through the entire phase. This allows the
customer to be more involved through the stages and build more confidence in the process. The needs of the
customer can be better addressed and a more satisfactory product can be created through a method of continuous
feedback. The degree of flexibility increases here and it is less complicated to make adjustments. (Layton, 2012).
Several variants of Agile have come up in the past, identified as different practices in their own respect. One thing
that remains constant however, is the adherence and belief in the essential values of Agile as proposed in the
manifesto. Some of these methods or practices are Scrum, eXtreme Programming (XP), Crystal method, Kanban,
Dynamic Systems Development Method(DSDM), etc. These are all offshoots of Agile and while they may differ
in their approach to software development and project management, the core essence of Agile remain intact.
(Gandomani and Nafchi, 2016).
This leads to the fourth value addressed in the manifesto which is that of being responsive to change. It is important to be more adaptive in the current market which demands products that are usable. While the traditional approaches tend to fight change, the agile approach aims to predict and manage it. There are twelve main principles that Agile follows. These principles are guidelines for project managers to assess whether the project objectives are similar to the objectives of the agile movement. The principles provide guidance to teams in the areas of customer satisfaction, quality, teamwork and project management. (Layton, 2012).

The influence of Agile on project management is evident from literature. While conventional approaches employ an exhaustive approach to the planning phase, it results in a delay in the start of the actual development process. Sometimes delays in the initial phases can set the time line for the entire project back by weeks. Agile offers advantage with early start of the development process. Agile emphasizes on the self organization of teams. Management of scope is another advantage associated with Agile. Teams employing an agile structure of working
analyse and determine the scope of each iteration also known as sprint. The requirements are determined, prioritized and committed for each sprint. This allows the team to organize their work and take control of the scope determination. The benefit of this is being able to set more realistic goals. Since each sprint lasts not more than three to four weeks, it is easy to make better estimates compared to larger deliverables over a longer period of time. Since there is a continuous feedback loop, the customer is constantly involved in each iteration. Since the entire lifecycle of the software development cycle is observed through each sprint, followed by feedback from the customer, it increases the quality of the final product since the risk of misinterpreting requirements or change requests can be managed better. (Layton, 2012). What is significant to observe is although the traditional approaches have laid emphasis on process and establishing procedures and policy, Agile brings attention to the people aspect taking into consideration relationships, including the members of the project and development teams, subsequently increasing the overall productivity. (Rasnacis and Berzisa, 2015).

One of the biggest advantages that can be associated with agile is that of managing a big task in smaller sub tasks. As observed from literature, Agile offers better management of scope for each sprint. This makes estimation of timelines more realistic. Traditional approaches present a challenge in the estimation of scope and timelines. More often than not, the timelines are unrealistic and can impact quality, delivery and customer satisfaction. Traditional approaches also come with challenges in applying fixes or modifications. The earlier in the development process issues, bugs or changes are identified, the easier it is to manage and address them. (Layton, 2012).

Software development teams are made up of coders, members of the test team, and other members. Agile lays emphasis on two roles in the team which are a requisite of Agile teams. The “product owner” functions as the expert of the product and client’s requirements and functions as an advisor on clarifications and requirements to the development team. The “scrum master”, functions as the expert on the Agile process and acts as a facilitator for the development team. (Layton, 2012).

There are several approaches or methodologies that are very similar to Agile like lean, extreme programming and scrum and ideally in implementation, there are characteristics that project managers apply to their agile approach, from these approaches depending upon the focus. The modern software industry is complex and the problems and issues are no as simple as they were in the initial years of computer programming or development. The market needs have evolved and expectations have greatly changed over time. This had led to the older or traditional practices outdated. It can be said that the rate of development in software has surpassed the rate of development in hardware. While there is constant research and new developments in hardware as well, there is a certain level of repetition due to mass production and the requirement for custom hardware is much lower than the requirement for unique software solutions. This means that most of the software being built in the modern day is unique and requires analysis and planning from the point of view of developing a new product. Most of the hardware being mass produced today offers enough choices and options to satisfy and requirements that users may have. This includes large businesses and their infrastructure. From this it can be observed that software development has become highly dynamic and the nature of the industry has changed greatly since the early days of software development. This also calls for a change in the approach to managing such projects since the traditional concepts
that might still apply and prove to be effective for hardware production, may not be very successful for software. (Suetin Sergei et al., 2016).

Previous research and studies on the effectiveness of Agile have shown positive results especially in the areas of productivity, increase in quality through reduction in defects, improved time management and cost management. Literature shows that while the cost differences are usually not very significant, there is a substantial difference in the time, defect management and quality of product delivered. Significant increase in productivity of engineers through self organization has resulted in value add to the organizations. (Suetin Sergei et al., 2016).

However, there are studies that have shown contradictory results as well and cases with reduced productivity, issues in management and control leading to poor results. While the reasons for these results can be many, it presents scope for further exploration of the implementation of Agile methods and its influence. (Suetin Sergei et al., 2016).

Agile has since its conception been associated with software however, several industries apart from software adopt the ideology. This opens up new avenues for research in the area of Project Management and Agile. The literature available des address the correlation but there are gaps that have been identified in the existing literature and there is a difference in theoretical analysis and practical scenarios. The concepts of Agile like Scrum, extend their influence to project management and so do the the principles of interaction, acknowledgement of the personal and emotional aspects of people involved in the process. There is increased emphasis on relationships and interaction between client and the project team. These aspects influence the people management, and client relationship aspects of project management. Since the approach is different from traditional methods, the project management approach to resource, time and cost is greatly impacted by the implementation of Agile. This requires an integration of the project management practices and Agile approach. (Sulaiman, Mahrin and Yusoff, 2016).

3. Research Methodology

Research is a process of inquiring through various tools and techniques into a specific subject. It involves inquiry through reflection by reviewing literature. The research answers a problem statement or hypothesis and has one or multiple objectives and research questions. The research needs to be based on a theoretical framework following a logical structure. The procedures that apply to research influence the research design and methodology employed for collecting data, analysing and presenting it. (Luo, 2017).

Collecting data is essential to any research, as a research is conducted for the purpose of gaining knowledge. It is however, important that research is approached by using appropriate methods based on the questions that the researcher is trying to answer and the research objectives. The choice of tools and techniques is dependent on the approach selected for the research purpose. The other factors that influence these decisions are the availability of resources and the time available to conduct the research. (Saunders, Lewis and Thornhill, 2012; Bielczynska-Wojcik, 2014).
For the purpose of this research, the researcher aims to establish perceived benefits and disadvantages associated with the implementation of Agile as the software development methodology for outsourced software projects in India, in contrast with traditional methods like Waterfall in an attempt to explore the influence of Agile on Project Management of such projects. To achieve this, the researcher will collect data through semi-structured interviews, using a qualitative approach. The researcher will conduct the study using interpretivist philosophy, through an inductive approach.

Saunders, Lewis and Thornhill use a research onion to explain the process of research that has layers starting with the outer most layer which is the Philosophy of the research.

![Figure 7. The research Onion. (Saunders, Lewis and Thornhill, 2012).](image)

The philosophy used by the researcher is reflective of the choices made by the researcher based on the way he/she perceives. This philosophy is critical to the choice of strategy and methods to execute that strategy. The philosophical choices we make impact the way we function and understand. The approach to selecting a philosophy is dependent on our assumptions of the world that influence the way we view it. This philosophy is however based on practical considerations influenced mostly by the researcher’s particular view or perception of acceptable knowledge and how it was constructed. The choice of philosophy is reflective of the researcher’s personal choices and while it is not wrong to chose a particular philosophy, it is important to be able to justify the choice and display an understanding or reasoning for not opting for the others. This means that there is no better philosophy, where in fact they are just different approaches which need to be carefully selected based on the objectives of the research. (Saunders, Lewis and Thornhill, 2012).
The three common approaches or philosophies for research are Positivism, Realism and Interpretivism. (Saunders, Lewis and Thornhill, 2015, p. 112).

Epistemology is the area that is concerned with what is considered acceptable knowledge in a particular area of study. In contrast to the interpretivist researcher that gives importance to “feelings”, the positivist researcher employs a more objective approach and uses tools to collect data that increase objectivity and remove bias. (Saunders, Lewis and Thornhill, 2015, p. 112).

The positivist researcher adopts methods that are reflective of reality from observations, drawing causal relationships and analysis. The researcher exists externally and takes an objective stance on the research observing from the outside. (Bryman and Bell, 2015, p. 93). Personal interests in the topic of research can make objectivity difficult and Positivism would not be the best approach for a biased researcher. A common approach to positivism would be through the development of a hypothesis based on an existing theory and then testing the hypothesis to develop theories that are tested through researching further. The concept of removing bias means that the researcher employs a value-free approach to the data collected. In contrast to the positivist, who is external to the process, the “feelings” researcher could be considered a part of the data collection process. It is also argued that any researcher conducting a research will not be able to completely exclude themselves from influencing the data collection and that it may influence the value position. This approach would employ quantitative approach to collecting data that can be analysed statistically and presented in a quantifiable fashion. (Bryman and Bell, 2015, p. 93).

For the purpose of this research the researcher will not be choosing the Positivist approach since the researcher has a personal interest in the topic. Given the exploratory nature of the research and the subjectivity involved, positivism would not be the best approach for the purpose of this study. (Bryman and Bell, 2015, p. 93).

Realism is a compromise between positivism and interpretivism, drawing elements from both the philosophies, the essence being the reality that objects exists independent of human perceptions. Idealism is the theory that what is in the mind is what exists. In contrast to idealism, realism takes a scientific approach to developing knowledge. The two approaches to realism, direct and critical, look at reality in two different ways. While direct realism looks...
at the reality as it is perceived and assumes that what we see is what it is. Critical realism, however, argues that what we sense and experience is not reflective of the real world. (Saunders, Lewis and Thornhill, 2015, p. 114).

For the purpose of this research, Realism does not suit as the ideal philosophy since the research deal with understanding perceptions and beliefs associated with methodologies employed for software development. The analysis and discussion related to limitations and benefits are perceived values and the nature of the data intended to be collected requires a different approach to the selection of philosophy for the purpose of this research.

The positivist approach receives criticism for reducing the insights and observations to law-like generalizations. There are observations that are critical to understand and develop theories in a research that require a more accommodating approach. Interpretivism accounts for the difference in humans and their behaviour as social actors and factors for that influence. The intellectual traditions of phenomenology and symbolic interactionism lend elements to the interpretivist approach. Empathy is the key element in interpretivism and it aims to understand how it is perceived by the subjects being observed in the study. The field of business and management related studies, particularly in the field of organizational behaviour, often employ an interpretivist approach. This approach accounts for the fact that the social world is constructed of people and they give meaning to it. (Saunders, Lewis and Thornhill, 2015, p. 114; Bryman and Bell, 2015, p. 98).

Interpretivism has been selected as the philosophy of choice for the purpose of this research. The research involves understanding perspectives and perceptions of the participants of the study to develop an understanding of Agile methodologies as observed in application. It aims to develop a contrast and comparison between traditional and Agile methodologies based on the perceived advantages and limitations as experienced by professionals in the software industry for outsourced projects in India. The researcher holds a personal interest in the study and the subject matter. To this end, interpretivism has been selected as the philosophy that the researcher will follow for this study.

3.1 Research Approach

The next layer in the Research Onion is the Research Approach. A deductive approach is one where the researcher tests a theory by developing a strategy, where this theory is developed from reading academic literature. An inductive approach involves collection of data in order to explore a phenomenon and build a theory upon it.

The deductive approach derives characteristics from scientific research. The process involves developing a theory based on literature and testing it through proposed test cases. Certain characteristics that can be identified with a deductive approach. Hypothesis are developed based on academic literature and concepts derived from these theories, are clearly established in relation to the variables. Operationalisation is another characteristic which means that execution of concepts needs to enable measurement of facts for purpose of quantification. The third characteristic is that the result should apply in a generalized manner which implies that the sample and its size should be justified. A deductive approach is supported by Positivism. (Saunders, Lewis and Thornhill, 2015, p. 114; Bryman and Bell, 2015, p. 98).
An interpretivist philosophy is based on understanding subjective realities. The process involves building theories through observation in order to understand a social phenomenon. It aims to explore different experiences and understand the underlying factors. (Bryman and Bell, 2015, pp. 98–99). It is a study of humans and experiences as perceived in context to the research. This research involves studying the observations of the participants from their experience of software development methodologies in offshored software development projects in context to project management of such projects in India. Based on these observations the researcher aims to develop theories to achieve the objectives of this research and answer the overarching research question. The inductive approach is supported by the interpretivist philosophy and the researcher will use induction for the purpose of this study.

3.2 Research Strategy

The objectives of research are the influencing elements in selection of the strategy for the research. This is relative to the time period of the study, resources available including budget and the philosophy that the researcher uses for the study. An interpretivist philosophy is usually associated with qualitative research. It involves the study of social constructs that explain the phenomenon being discussed in the research. Quantitative research is usually done if the researcher follows a positivist philosophy. There are also mixed methods that draw elements from more than one strategy.

Since qualitative research involves studying social constructs and meaning that participants add to the research findings, it usually consists of several data collection and analysis techniques as the data collected is not standard and it uses a non-probability sampling. Qualitative research is not as straightforward as quantitative as it involves the researcher getting access to the cognitive sensitivities of the participants of the study. (Bilczynska-Wojcik, 2014).

Multiple methods involve more than one technique and can be further divided into two sections, multimethod and mixed methods. Multimethod research may attract more than one technique for collecting data in association with the process for analysis that the researcher will use. However, this method uses either qualitative or quantitative methods. Mixed methods on the other hand, makes use of both quantitative and qualitative methods. (Saunders, Lewis and Thornhill, 2015).

The strategy is the plan that the researcher needs to develop in order to achieve the results of the research. There are several strategies that are available to the researcher to collect his data based on what the researcher chooses the most appropriate way to conduct his research. Some of the strategies available to the researcher are Experiment, Survey, Archival Report, Case Study, Ethnography, Action Research, Grounded Theory, Narrative Enquiry. (Saunders, Lewis and Thornhill, 2015).

The strategy being used by the researcher for the purpose of this study is Action Research. The research involves investigating the influence of a change and the resulting experiences. It involves discussion with the participants.
who are members of the organizations that have experienced this change and their views. For this purpose, the researcher will interact with members of organizations and explore their opinions and action research will be the suited strategy for this.

Figure 9. Research Choices. (Saunders, Lewis and Thornhill, 2015).

Experiments aim to study cause and effect of changes in variables and is a method more suited to natural sciences. Another technique, case study, is effective when studying a particular case or occurrence and is used in exploratory and explanatory researches. Data collection techniques depend on the research and can be a combination of several techniques. The study may involve one or more cases being studied as a part of the research. Corbin and Strauss developed the grounded theory which derives elements from induction and deduction. (Saunders, Lewis and Thornhill, 2015).

Research choices pertain to decision about data collection and the choice of using qualitative, quantitative or both techniques to collect the data that is necessary and required to conduct the research. A quantitative research strategy is conducted by analysis of numerical data which is collected and mathematical analysis to be able to interpret it statistically. Questionnaires are a broadly used technique for quantitative data collection. A large sample size and probability sampling are required and data is collected through experiments or surveys keeping in mind objectivity and avoiding bias. (Saunders, Lewis and Thornhill, 2015).

Qualitative research on the other hand, uses an interpretive approach to study human responses, phenomena, etc. to analyse information that is subjective and cannot be quantified. It is an approach that attempts to answer the how instead of how many. (Saunders, Lewis and Thornhill, 2015).

The objective of an exploratory research is to discover and gain inside knowledge about a phenomenon or topic. It is a more flexible approach, rather requires the researcher to be more flexible in their approach starting with a broad focus and narrowing down to more specific interest areas within the research as it progresses. The interviews are mostly unstructured and often take new directions as new information is brought to light. For this research the researcher has adopted a qualitative research strategy to collect primary data and analyse it qualitatively to find the patterns that emerge. This research aims to get the perspectives of Project Managers and Software engineers who have or are currently working on outsourced software projects which use Agile or waterfall approaches for developing software. This is not possible through an experiment. Case study would not justify the requirements from primary data and would not be the appropriate technique for this research. Interviews are the most suited approach to gather the qualitative primary data that is required for analysis in this study.
3.3 Time Horizons

The fifth layer of time-horizon gives two options to the researcher. The choice of longitudinal time horizon or cross-sectional. While cross-sectional studies involve looking at events or occurrences at a moment or snapshot in time, longitudinal study looks at a period of time through a duration. Since this is an academic research which is constrained by a fixed time frame, this study will be a cross-sectional study. The main areas where longitudinal studies are done are outside of the area of business. Longitudinal studies are done to observe changes and development over a course of time. (Saunders, Lewis and Thornhill, 2015).

3.4 Sampling

Selecting the set of respondents or a sample from the entire population of the elements that share the common characteristics that comprise the universal set of the problem being addressed in the research is sampling. (Saunders, Lewis and Thornhill, 2015).

![Population and Sample](image)

Figure 10. Population and Sample. (Saunders, Lewis and Thornhill, 2012).

Sample frame, size and the selection procedure determine how appropriately the sample represents the entire population and it is important to appropriately select the sample to achieve the desired results from the research. (Saunders, Lewis and Thornhill, 2012).
The approach as suggested by Saunders has been used to determine the sample for the purpose of this research. The process starts by defining the population. (Saunders, Lewis and Thornhill, 2012).

The population is the collection of all elements that share the characteristics which make them the target for the research. They are the participants that have the information or data that is required to answer the questions the research is trying to answer. An element is the object from which the information is desired. Elements for this research are project managers and non-managerial members of software development teams in outsourced projects within organizations in India. (Saunders, Lewis and Thornhill, 2012).

A unit can be an element or a unit that contains an element. For example, in this study the outsourced software service providing organization is the unit. The geographical boundaries define the extent which in this study is India. Time is the time frame or period for which the research is conducted which in this case is Feb 2017 to May 2017.

The next step is to determine the sampling frame. The sampling frame is a representation of the target population. The census is the entire list of the elements of the population. While the census represents all the elements in the population, a sample is a fraction or representation of the population which can also be considered a subgroup which is used for the research. (Saunders, Lewis and Thornhill, 2012).

India has a huge software industry and that makes the population for this research very large. Since the research is limited by resources and time, the sample has been chosen to consist of employees in project management and software engineering roles in outsourced software development projects in India from 3-4 organizations. (Saunders, Lewis and Thornhill, 2012).

3.5 Data collection instruments
The main factors that influence the choice of instruments used for data collection are the research approach, time, resources and geographical limitations. Through this research the researcher aims to determine the influence of Agile methodologies on the successful execution of project management plans and strategies for which the researcher has adopted an exploratory and descriptive approach. (Saunders, Lewis and Thornhill, 2012).

One of the issues to address here is that of access. There are two main categories in which access can be divided. Traditional access and Internet-mediated access. Traditional access comprises of the traditional methods of communication with the participants through face to face, telephonic or postal interactions. With the emergence of internet, reaching out to participants or data collection through internet mediated channels has become very convenient. There are however, limitations with both the approaches and it also depends on the objectives of the research and the type of data the researcher aims to gain access to. A combination of these two types of approaches leads to a hybrid approach which involves using internet based as well as traditional channels for collecting data. (Saunders, Lewis and Thornhill, 2012).

There are different levels of access when collecting information. They are physical, continuing or cognitive and it depends on the depth of access that the researcher desires that influences the decision. Physical access has limitations in terms of time and resources. It is also not very easy to gain physical access to participants at all times. This makes this approach difficult. Internet makes collecting secondary data very convenient and also at time primary data wherein internet mediated surveys or communication through email, skype or other channels make reaching out to participants easier. It is however, dependent on the participant having access to the necessary technology for establishing effective communication. (Saunders, Lewis and Thornhill, 2012).

An exploratory research starts with a broader perspective and narrows down in focus as the research progresses. It is an indispensable means of finding out “what is happening”. This research aims to explore the area of project management in relation to Agile methodologies in software companies providing offshored services and to this end, the researcher has decided to use in depth interviews, face to face and over phone as appropriate. Conducting interviews with the participants will enable the research to explore the topic in depth and cover a wide scope related to the themes established in the literature. (Saunders, Lewis and Thornhill, 2012).

Since the researcher aims to conduct face to face interviews with the participants, there are certain challenges that may make the process difficult and the researcher may have to use a different strategy to collect the required data. In situations where face to face interaction with the participants is not possible, the researcher will conduct telephonic interviews. If the participants have access to the required technology, then Skype interviews will be conducted. Email will be used as a last resort as it is difficult to engage the participant in discussion over electronic mail exchange. (Saunders, Lewis and Thornhill, 2012).

The chosen method of data collection for this research is interviews. There are three choices or a mixture of these available to the researcher. These are structured, semi-structured or unstructured interviews. (Dadié, 2015, p. 37).
When designing an interview there are several choices available to the researcher and it depends on the researcher to opt for an appropriate approach that justifies the purpose of the data collection activity. Based on the choices the researcher makes, the interviews can be informal and unstructured questions or very structured and formal with the levels of formality and structure varying from case to case. Structured interviews involve a high degree of standardization through the interviews with questions standard through the participants. Structured interviews can also be considered as interview based method of quantitative data collection. (Saunders, Lewis and Thornhill, 2012).

Semi-structured and unstructured interviews follow a non-standardized format varying in degree of structure. These kind of interviews are generally used in qualitative data collection. Semi structured interviews allow the researcher to develop certain “themes” around which the researcher probes or asks questions. It may involve some specific questions or may omit some questions, while allowing the scope for impromptu questions based on the discussion. This approach is flexible and allows the researcher to explore a widely scoped discussion while still staying within the scope of the themes that the researcher is trying to get information on. (Saunders, Lewis and Thornhill, 2012).

Unstructured interviews are in-depth discussions on a particular research area and generally follow a non-standardized approach leading. There is no pre determined list of questions that the researcher has which allows the interviewee to discuss the topic freely. (Saunders, Lewis and Thornhill, 2012).

The researcher has employed a semi-structured interview based approach for collecting the required data for this research. Considerations about the objectives of the research and the exploratory nature of the research require collection of qualitative data. Since the research is time based, it is important for the researcher to define the scope of exploration within the topic. While unstructured interviews provide deeper insights, they can be time consuming to analyse and develop themes and conclusions from. There are certain themes identified from literature that allow the researcher to narrow down to specific areas within the topic that can be explored through

![Figure 12. Types of Interviews. (Saunders, Lewis and Thornhill, 2012).](image)
semi-structured interviews with the participants. The second consideration to make is that of resources and unstructured interviews are best suited to face to face settings where the participant has sufficient time to discuss the topic being researched. Since time available is restricted in this research the researcher aims to gather sufficient information across all areas of interest, a semi structured approach allows a perfect balance of exploration and time management while covering all areas of interest within the research.

An inductive approach will be used to summarize and categorize emerging themes and develop structure using narrative

3.6 Data Analysis Procedures

The data analysis is a critical part of any research and it constitutes the part where the primary data collected is analysed to derive meaningful insights from resulting in one or more theories. The primary data collected in this research gathers insights from Project Managers and Software Engineers about processes relating to the application of Agile or Waterfall methods in outsourced software development projects in India using an inductive approach. (Saunders, Lewis and Thornhill, 2012).

The method of obtaining the primary data was interviews. The first step to analysing the collected data would be transcription of the interviews. The recommended approach is to transcribe the interviews as soon as they can be done after the data is collected. The researcher collected data through notes on the computer and elaborated on the details at the soonest opportunity after the interviews were conducted. There were follow up questions at the end of interviews to gather any significant details that may have been missed. The collected data was analysed for emerging themes or patterns and trends observed to draw conclusions about the relationships between the variables that were established. The conclusions drawn were used to address the questions this research aims to answer. (Saunders, Lewis and Thornhill, 2012).

3.7 Ethics

Bryman and Bell (2015) emphasize on the importance of protecting information and ensuring that no information disclosed affects any of the participants. Appropriate precautions should be taken to mitigate the risk of any sensitive information from being disclosed. (Bryman and Bell, 2015, p. 177). Some of the issues associated with data collection for research relate to informed consent, maintaining confidentiality and avoiding any immoral means of obtaining data. (Camille Yip, Nian-Lin Reena Han and Ban Leong Sng, 2016).

Different research designs reveal different concerns over ethics and the overall approach itself is governed by ethical concerns. (Saunders, Lewis and Thornhill, 2012)Ethics are not just limited to protecting data but also apply to the researcher in accurately presenting information. Concerns over plagiarism have led universities across several countries to enforce stricter emphasis on the importance of ethics in conducting research. This research requires a declaration which is also a protocol introduced to improve the ethical integrity of the research. (Greenwood, 2016).
The participants of this research will be informed in detail about the nature of the study and their role in it. Information sheet and consent forms will be provided to the participants before the interview and on their approval. The research does not require disclosing of any personal information or sensitive data that may be traceable or may create issues in maintaining anonymity. The participants will be informed prior to the interview to not disclose any sensitive information. This research aims to collect insights about the perception of the participants and does not require disclosure of any sensitive details about the organizations they work with or the clients.

The participants will have the right to refuse to participate at any moment and also hold the right to withdraw their participation even after the interview until the final submission has been made, after which it will not be possible to make alterations.

### 3.8 Limitations

Limitations arise out of several reasons and the research design and the approach to method can sometime cause limitations. The time available to the researcher should be sufficient to justify the objectives of the research.

The main limitation of the research is the limited sample size. The Indian software industry catering to the outsourced software development service sector is huge and due to constraints with time and resources, the sample size will be small. This does reflect a very generalised view of the perceptions of the population but not reflective of the entire population very accurately. However, the research establishes ground for more comprehensive research in a similar area.

The topic being explored in this research presents a vast scope of knowledge to be researched. Due to time constraints, the researcher will not be able to explore very widely and selective themes will be identified to establish the basis of this research.

Since the research involves one to one interviews, a face to face meeting is the ideal approach to gather the quality of data the researcher aims to get access to. This however, is not possible in the case of all participants and several interviews were conducted over telephonic discussions. The researcher however, took appropriate precautions to ensure that the quality of the interaction was affected minimally by ensuring appropriate timing and conducting the interview efficiently to explore the various themes and not miss out on any information that may be critical to the finding s of this research.
4. Research Findings and Analysis

There are two main objectives of the research undertaken:

1. To identify the key challenges to project management of outsourced software development project within Indian companies.
2. To explore the limitations and benefits Agile offers to management of projects in offshored software vendors in India.

To collect the data for this research, semi-structured interviews were conducted through face-to-face interactions and telephonic conversations where meeting in person was not possible. The selected respondents are Software Engineers and Project Managers from Software Organizations in India with experience of working on outsourced projects for international clients and having exposure to Waterfall or Agile methodologies.

Given the large population for the research and the limited accessibility to respondents the researcher has adopted Heterogeneous or maximum variation sampling. The selection of the respondents was based on concerns like maintaining diversity in background and experience in the software industry, size of projects and geographical distribution of teams, the ease of access to contact and engage respondent for interaction. The respondents were also divided in two categories, software engineers and project managers to get a broader perspective on the insights. This method of sampling is actually a strength when the sample size is relatively small as it provides maximum variations and diversity in data collected.

Out of all the potential candidates, 8 participants agreed and were available for the interview for the duration of the data collection for this research. Out of the 8 participants 5 have worked as Project Managers and 3 as Software Engineers for globally outsourced projects. The participants interviewed belong to two different cities in India Bengaluru and Chennai. The participants interviewed come from various backgrounds, from large global multinationals as well as smaller companies catering to specific geographic sectors or clients.

Out of the 8 participants, 5 participants were interviewed through face to face interactions, while 3 were conducted telephonically. The Project Managers were asked questions about challenges faced from their experience in Project Management of outsourced projects in India. Depending on experience with Waterfall and Agile further questions were asked to gauge the benefits and challenges associated with processes and also to understand how Agile has changed the approach to Project Management. Software engineers from a background in global outsourced projects about their experiences. Questions asked probed into the areas which gauge the benefits and challenges of processes to productivity of engineers and their involvement in the execution of the project plan. The distribution of participants and the method of interview is illustrated in the chart below.
It was agreed with all participants to maintain anonymity and non disclosure of any sensitive or identifying information. For the purpose of this study, no sensitive or identifying information relating to the interviewee or their clients was required. The interview questions probe into the experiences and perceived influences, of performing the functions of a project manager, in their work environments. None of the participants had objections to any of the questions asked.

To maintain anonymity, pseudonyms have been used in this research to differentiate between the participants. Project manager or PM are referred to as PM1, PM2 ad so on. Software engineers are referred as SWE1, SWE2 and so on. Below is a table of all the participants of this research with the pseudonym.

<table>
<thead>
<tr>
<th>Interviewee Profile</th>
<th>Pseudonym</th>
<th>Agile/Waterfall Exp.</th>
<th>Experience (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>PM1</td>
<td>Agile</td>
<td>7</td>
</tr>
<tr>
<td>Project Manager</td>
<td>PM2</td>
<td>Agile</td>
<td>8</td>
</tr>
<tr>
<td>Project Manager</td>
<td>PM3</td>
<td>Agile</td>
<td>8</td>
</tr>
<tr>
<td>Project Manager</td>
<td>PM4</td>
<td>Both</td>
<td>15</td>
</tr>
<tr>
<td>Project Manager</td>
<td>PM5</td>
<td>Both</td>
<td>10</td>
</tr>
<tr>
<td>Software Engineer</td>
<td>SWE1</td>
<td>Both</td>
<td>10</td>
</tr>
<tr>
<td>Software Engineer</td>
<td>SWE2</td>
<td>Agile</td>
<td>8</td>
</tr>
<tr>
<td>Software Engineer</td>
<td>SWE3</td>
<td>Waterfall</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 1. Participant profiles and their identifiers.
The questions of the interviews were aimed at gathering information to achieve the objectives of this research. To further analyse the data collected in respect to the individual objectives, the following section discusses each objective in relation to data collected during the interview process.

Research Objective 1

*To identify the key challenges to project management of outsourced software development project within Indian software vendors.*

To achieve this Project Managers were asked questions to gather knowledge in the area of

- Their experience in their roles
- Experience with globally distributed teams and outsourced projects
- Challenges faced in Project Management of outsourced software projects of various sizes and distribution geographically.

Software Engineer were questioned to gain insights in the areas of

- Their experience in Waterfall/Agile outsourced projects for global clients
- The awareness of process and methodologies
- Challenges faced in performing project tasks

Research Objective 2

*To explore the limitations and benefits Agile offers to management of projects in offshored software vendors in India.*

To achieve this Project Managers were asked questions to gather knowledge in the area of

- Opinion on applied software development methodology Agile/Waterfall
- Perspective on influence of Software Development methodology in the various areas of functions of Project Management, specifically Scope, Time, Cost, Communications and Stakeholder Management
- The ratio between Waterfall and Agile projects in Organization

Software Engineer were questioned to gain insights in the areas of

- Perceived benefits and limitations of processes specific to Software Development Methods and Project Management
- Expectations from the process

The following section is divided into two parts, each sub-section addressing to each of the research objectives respectively.
4.1 Research Objective 1

To identify the key challenges to project management of outsourced software development project within Indian software vendors.

The responses of the participants pertaining to the knowledge areas under this objective will be analysed.

1. Experience of the participants in their roles in the organization, Project Manager/Software Engineer.

![Experience of Respondents Chart]

**Chart 2. Experience of Respondents.**

Project Managers and Software Engineers with experience between 5-20 years in their roles were selected for the interview process. Above is a chart that shows the experience distribution of the respondents in groups of 0-9 and 10 – 20 years in experience.

About 38% of the respondents have above above 10 years of experience in their respective roles.

2. Experience of Project Managers and Software Engineers with globally distributed teams in outsourced projects.

All the Project Managers selected for this study have experience on outsourced software development projects for global clients. Out of all respondents 80% Project Managers have experience in projects spanning across multiple
geographic locations on large projects for big clients. 20% have worked on projects of smaller scope with an international client with centralised development at the offshore centre. PM1 works on projects spanning across four different countries and various locations within those countries. PM3 suggests a more centralised operation with the entire development activities centralised at the offshore centre in India and client coordinating from the onsite location. PM2, PM4 and PM5 have experience working in globally dispersed projects across several locations. SWE1 has experience working for a globally distributed environment, SWE2 however, works for a smaller project as a part of a smaller team of 4 members from the offshore development centre. SWE3 has also worked in distributed team based projects.

![Globally Distributed/Centralised Projects](chart3.png)

**Chart 3. Distributed/Centralised Projects.**

Among all Software Engineers interviewed, one third of the respondents worked in a small project team for a single client on a small project. Two-thirds worked on medium to large scale globally distributed projects.

3. Challenges faced by the respondents.

The key areas of Project Management that this research focusses on are Scope, Time, Cost, Communications and Stakeholder Management. PM1, PM3, PM4 and PM5 have faced challenges in managing scope in terms of requirements and clarity in the initial stages of each cycle. PM4, PM1 and PM2 also mentioned communication as being a key area of challenge.

Project managers were asked questions to gauge the issues with project management of outsourced projects of different sizes. Software engineers were asked questions to understand the challenges to executing development activities.
The responses were analysed across the parameters Scope, Time, Cost, Communications and Stakeholder Management.

![Challenges in Project Management](chart)

**Chart 4. Challenges In PM.**

About 27% respondents faced challenges in communication. Scope management being the next with 20% respondents citing scope management related challenges. Cost management and Time management also being mentioned as challenges by 20% respondents whereas 13% mentioned stakeholder management to be challenging.

To analyse the challenges across small to medium sized projects against large and more globally distributed projects, responses were analysed to identify the key areas of challenge to small and medium project and large projects. The main areas for large and globally dispersed projects are Scope Management, Time Management and Communication management. PM1 mentions that since costs are calculated based on effort, the methodology does not necessarily impact costs or budget in large organization and large projects. Size does impact communication and integration.

For small to medium projects with limited distribution or centralised development teams face challenges mostly in the areas of Cost Management, Stakeholder Management and Scope. PM3 who works for a smaller organization on smaller scale projects faced issues with cost management due to unclear requirements and extended project timelines. It is difficult to manage stakeholder expectations in smaller projects indicates PM3. SWE1 indicates the importance of the client’s involvement through the process to avoid issues with customer satisfaction and stakeholder management.

4. **Awareness of process and methodologies among software engineers**
While one third of the respondents were not aware of Agile methodologies, all Software Engineers showed awareness of Waterfall methods. Two thirds of the respondents were aware of Agile methodologies. SWE3 expressed a lack of experience and knowledge of Agile methodologies and has experience only on Waterfall. All other PMs and SWEs have worked, or currently work on Agile methodologies and about 43% of the total sample has a knowledge and awareness of both Waterfall and Agile methodologies.

4.2 Research Objective 2

To explore the limitations and benefits Agile offers to management of projects in offshored software vendors in India.

The following section elaborates on analysing the data collected under the scope of the second objective of this research.

1. Experience of respondents with Waterfall or Agile project management methodologies. The responses were chosen based on the experience of Project Managers in managing projects using these methodologies and Software Engineers from their experience of working in projects using these software development methodologies.
Close to 65% Project Managers and Software Engineers have worked on Agile methodologies and about 36% have experience of Waterfall methodologies.

2. Impact of the methodology implemented on the Project Management through the Project lifecycle.

The responses collected were analysed to determine from the responses which areas are key considerations in analysing the impact or influence of software development methodologies like Waterfall or Agile. The responses collected from Project Managers and Software Engineers were analysed to identify the key areas of interest.

The most emergent theme is Scope of the project or the requirement gathering and analysis phase. Respondent from both Agile and Waterfall backgrounds indicated a high influence on the Scope management. Another area influenced by these processes was client interaction and involvement. Cost and impact to budget was another area of influence across the respondents. Resource management was also an area indicated in the responses along with Delivery. PM1 responded that the number of “ceremonies” in Agile are several and sometimes the process can be overly complicated. This can sometimes impact communication and integration especially in the terms of dependencies. PM4 suggested that the entire approach to project management gets influenced.
3. Ratio between Agile and Waterfall implementation within organizations. The respondents were asked about the ratio of Waterfall and Agile application in their organizations based on their observations.

Out of the 5 Project Managers, 2 respondents indicated a 100% Agile approach. The other indicated a 1-10% application of Waterfall methodologies across Projects in their organizations. PM1 responded that their organization doesn’t have any projects that use a pure Waterfall approach. All the projects managed are Agile or a Hybrid form of development. PM2 says that all the projects in the organization use Agile. Waterfall is used only for small internal team development requirements and these requirements do not arise often.

4. The respondents almost unanimously indicated the influence of the size of the requirement or the project as key in deciding the methodology to apply. Agile being the preferred choice for large sized projects and waterfall for small projects.

4.3 Discussion

The analysis of the data collected enabled the researcher to identify themes and recognise patterns about the perceptions regarding the processes governing the development of software for outsourced projects in relation to the software development methodology applied.

One of the most prominent pattern that emerges is that most of the organizations in India are using Agile methodologies for managing the software development in their projects. Especially large sized projects which are distributed globally and operate in coordination with several teams have a more prominent approach to Agile
adoption. Waterfall methodologies seem the methodology of choice for organizations that have followed similar process over the years and function independently without much involvement of the client in the development process. It is interesting to note here that the size of the organizations itself did not influence the decision between selecting Agile or Waterfall, rather the size of the requirement that play an influencing part. Several participating PMs and SWEs did not have any previous experience of working in a Waterfall environment, however only one of the participants had no experience of Agile. PMs suggest a prominent shift in industry from Waterfall to Agile methodologies due to benefits involved.

Scope, Time, Cost, Stakeholder management and communication were identified as the most widely observed areas of concern and influence from the participants. While these are also some of the key areas where Agile offers benefits to Project Management, they are also the areas where the most challenges to successful project management were observed.

There exists a high level of awareness towards Agile methodologies and a strong indication of a wide adoption of the methodology was observed from the responses of the PMs and SWEs. Pure Waterfall seems to find very limited application whereas organizations that are not prepared to completely adopt an Agile framework are applying a hybrid approach which combines elements of Waterfall and Agile.

Considering that Agile is a more recent approach, benefits associated with Agile prompt PMs to use a hybrid approach and adopt the processes that offer benefits over a purely waterfall approach. The interesting observation here is that there are limitations that prevent a complete Agile implementation in Hybrid projects. These are usually challenges that are identified under challenges to Agile adoption in the areas of Scope, Time, Cost, Communications and Stakeholder Management. Resource management is also an important consideration when making the decision on the approach to software development.

The PMs were asked about the ratio of implementation of Agile and Waterfall in their organization according to their estimation. It is interesting to note that Agile far surpasses Waterfall in terms of Agile. In practice and real scenarios, organizations are adopting an Agile approach on a wide scale in India.

4.4 Conclusion and Recommendation

This research explores into one of the most important topics of the modern world which is that of technology. The constantly progressing technology is driven by powerful software and the constant developments in the field, making it an industry of great importance. The researcher chose to explore this topic to discover more knowledge in the areas where there exists a gap in literature. For this purpose, the researcher travelled from Ireland to Bengaluru, India, where the research was conducted. The sample for the research was selected based on several factors determining the suitability and availability of the participants. Out of all the potential interviewees, 8 responded and were available to participate within the confines of the dissertation timelines. The respondents come from varied backgrounds in the Indian Software industry and present views on how influences and
challenges are different in different project scenarios and provide significant insight into the Indian outsourced software development industry.

The overlying question of this research is “How has the adoption of Agile methodologies by Indian software development companies influenced project management of outsourced software development projects?”

The first research objective aims to find the challenges to project management of outsourced projects in India. The findings suggest that one of the main challenges is that of managing scope. This includes the requirement analysis. PMs and SWEs interviewed both have expressed issues with the requirement analysis, estimation and timeline review processes. This was observed across Agile and Waterfall projects both. While this is a challenge that PMs from Agile projects are able to manage better, since even if the requirements are not very clear in the beginning, as suggested by PM1, the sprints are short and requirements get clearer as the project proceeds. As understood from literature, Agile emphasizes on flexibility and acceptance for change. While it seems to be an issue in the beginning, Agile offers benefits over the course of the project timelines in managing scope better. In contrast, Waterfall based projects seem to face bigger problems with scope management. SWE3 who works completely on a Waterfall model expresses concerns with unclear requirements and considering the nature of Waterfall development, it is difficult to accommodate changes at later stages, resulting in increased costs and delayed project timelines.

One of the themes that emerge is the importance of understanding the challenges faced by smaller organizations with small projects and larger organizations. While scope is a common concern, smaller organizations face issues in involvement of the client as opposed to client side project teams that coordinate with other distributed teams in larger projects.

The other interesting observation is that of cost. Budgets and cost management is a bigger concern for project managers in smaller organizations. Any delays in the process resulting in extended timelines mean extra costs for running the project. Larger organizations have projects divided into several sub projects and usually managed by different project managers. Since the relationship with the client is usually based on cost based on effort, the cost factor does not impact whether the methodology is Agile or Waterfall. It can be concluded that smaller organizations can benefit from Agile methods in controlling costs but the interaction and involvement from the client can be difficult to negotiate.

Awareness is critical to successfully implement new methodologies and processes. One of the objectives of the research under the first research objective was also to assess the level of awareness about software development methodologies, Agile and Waterfall, among the participants. There is a high level of awareness about software development methodologies and their implementation as models for project management of software development projects. While larger organizations are at par with the global standards in adoption of Agile methodologies, even smaller organizations are adopting Agile very widely and the participants had a strong understanding of the ideologies. This doesn’t imply that Waterfall is completely abandoned and a small percentage of the participants also showed a comprehensive understanding of Waterfall methodologies from experience.
The second research objective, “To explore the limitations and benefits Agile offers to management of projects in offshored software vendors in India”, explores the limitations and benefits that Agile offers to Project Managers and some interesting gaps in the literature are addressed as well as scope for new research emerges.

Although Agile offers several benefits in many areas of project management as found in literature, in practice the organizations are not always able to realise all the benefits of Agile methods and its mostly because of the challenges faced by Project managers as explored in the first objective of this research. A prominent theme is that of the size of the organization, the project and the geographic distribution. In projects that span across several geographic locations, the project teams operate almost 24 hours with coverage from one location or more. This is a good thing, but sometimes it is difficult to find the right resources from a specific team or location at certain hours and this can cause delays since there might be dependencies that need to be cleared from a team that is unavailable before the development can proceed to the next stage.

Some benefits that large organizations draw from implementing Agile is flexibility and it makes managing larger projects easier. The requirement gathering process usually comes with its own challenges and sometimes the requirements are not very clear in the very beginning. For large projects Agile makes requirements easier to manage since its broken down into smaller sprints. This also ensures engagement of the client and the continuous feedback loop is established. Smaller organizations may not always be able to realise this benefit since for smaller projects getting the constant engagement of the client is not always very easy and delays may be encountered.

For smaller organizations, contrary to the above point, Agile offers benefits in the same field of managing scope. The smaller organizations in the study were able to manage scope better and get early feedback to avoid extended project run times and costs at later stages in the project.

The influence of the software development methodology selected is very apparent from the results if this study. PMs interviewed acknowledge the influence of Agile or Waterfall on the complete approach to the project management strategy and planning. It is reflected from the fact that the majority of the respondents use or work on Agile methodologies and most of the organizations have already adopted Agile methods over Waterfall.

4.5 Recommendations

The Indian IT industry is constantly progressing and even though it has faced criticism for the quality of product, the industry shows adoption of the latest methods and stands at par with the global software competition. It is however, important to acknowledge the diversity within the Indian Software industry and while there is a high level of awareness, the complete benefits of methodologies like Agile will be realised only when attention is given to certain key areas of challenge which require attention to be managed better. This research explores several areas of project management of software development projects in India ad also opens up several areas with scope of further research to better understand the direction and evolution of one of the biggest software service providers in the world.
There are several areas of knowledge where gaps are exposed through this study. Literature shows that Agile offers benefits to smaller projects but larger projects benefit more from a Waterfall approach. The results of this study show contrary results and a wider adoption of Agile among larger projects and organizations. There is a gap in literature studying the application of Agile adoption within Indian organizations based on the organization and project size. There is also not much literature over the impact of infrastructure and available channels of communication on effective implementation of software development methodologies. The general assumption is that there is a low level of awareness among Indian vendors about methodologies. This research presents some contrary results. However, this also raises another question, which is that of the implementation in practice. While this research assumes that project managers use best practice, it still raises the importance of understanding how implementation of these methodologies in practice impacts the project management.

A study could also be done on the implementation of hybrid models within the options available under the Agile umbrella of software development methodologies. It can help identify the benefits associate with the different types of Agile methods and how they can be used by organization in a hybrid model to avail most benefits. Several PMs are already implementing Agile by drawing influences from the various styles like Scrum, Kanban, XP, etc. This can reveal more insights about how the approach to software development methodologies is evolving.

Another area of research that opens up is studying centralised and widely globally distributed projects to understand the complications that come with different time zones and dependencies within teams operating out of different geographic locations. This can provide further insight about how to mitigate the challenges and delays in process that arise out of highly distributed environments. From literature we understand that Agile emphasises on process and people more than documentation. The above research can provide important information that can lead to studying the feasibility of having comprehensive documentation to mitigate the challenges of geographic and time distribution.

5. Self-Reflection

The researcher comes from an IT background and has worked on several large scale global projects for global organizations. The interest in the topic of the research arises out the researcher’s personal interest in the Indian and global software industry and its advancements. After six years of working in the software industry, the researcher decided to pursue an MBA and obtain a degree of higher education to further grow his career and explore newer opportunities. The researcher chose Dublin Business School, Ireland and joined the January 2016 batch of Masters in Business Administration.

The reasons that led to the decision to pursue an MBA were several. The researcher had moved on to senior roles in his organization and had developed an interest in the business and management aspect of the company. The researcher had gathered 6 years of experience before applying for an MBA and it seemed like the right time to advance the career with a Masters degree. The main objective behind choosing Ireland to pursue the course was
the opportunity of being able to find work in Ireland after the MBA and the other was the international exposure. The research has previously lived in Singapore for a year on deputation from his organization to the client office, however, that was much early in the career of the researcher and now the researcher planned to move to managerial roles after the MBA. Dublin Business School offered the researcher the opportunity to pursue the MBA under excellent guidance from the faculty and also provided a platform to discover and explore various cultures as well.

The course of the MBA was involving and enlightening. The researcher chose to opt for the MBA general program and explore a wider scope of business and management in order to develop a comprehensive understanding of the modern business environment. The electives of choice were Project Management and Marketing. Both the areas of study have intrigued the researcher and the research wishes to progress in career as a Project Manager. This is also one of the influencing factors behind the topic of choice for the dissertation. The experience has been eye opening for the researcher. The course of the MBA is designed to encourage the student to explore and involve themselves in discovering and expanding their knowledge in the various areas of study that apply to them. While the lecturers and classes provided excellent guidance, the importance on self learning was emphasized developing some essential skills for the researcher. The most important learning for the researcher has been that of effective research skills and how to leverage them to excel in the area of choice.

The researcher was new to several subjects covered in the course of the MBA and while a wide ground was covered during the course, the researcher continues to explore the new areas of interest. Some of the most though provoking and stimulating subjects studied as a part of the MBA were Business Strategy, International Management, Research Methods, Project Management and Marketing. Besides these the previously unfamiliar area of Finance was also explored by the researcher.

The MBA course presented the researcher with different challenges through the duration and it was the will to overcome the challenges that made the entire experience one of learning and development for the researcher. The researcher developed some essential skills during the course of the MBA which will enable the researcher to apply those skills throughout the course of his career and life. Some of the key values developed are Team work, Research Skills, Management and Ethics.

The researcher is a non-EEA resident and moving to a different country to pursue education comes with its own challenges. The course of the MBA required assignment submission and exam requirements which taught the researcher how to manage tasks in time. Many of the assignments required group effort and sometime the classes also had assignments which required the collaboration of students. The classes consisted of students from diverse professional and ethnic backgrounds. This proved to be an excellent platform to interact and collaborate with a diverse group of students and work collectively towards a common goal. There are challenges in such situations and often there are disagreements or breakdowns in the framework, and it is from these experiences and attempting to resolve situations to achieve the goals that the researcher developed team work and leadership skills. Working in teams not only develops team working skills but also provides a chance to lead, direct, engage and collaborate with several members.
The progression to the dissertation marked an important milestone for the researcher as a student. This implies that the student has completed all the previous modules successfully and can proceed to the research phase for the topic of choice. The researcher under the guidance of his supervisor undertook this research and took this as an opportunity to put to practice all the skills and knowledge developed over the course of the MBA. The research process is intense and the dissertation is a critical part of the course. The researcher had developed a good idea of the topic of his choice during the Research Methods 2 element. After the first meeting with the supervisor, face-to-face, the researcher received further clarity about how to approach the dissertation, the requirements and the procedures. Since the research topic explores a phenomenon in India, the researcher travelled to India to the city of Bengaluru. The researcher identified his sample group and progressed with the dissertation. The interaction between the researcher and the supervisor continued through email exchange. The researcher received regular guidance from the supervisor as the dissertation progressed and the motivation and guidance was key in the completion of this research.

The duration of the MBA has been one of learning and self discovery for the researcher and also of clarity. The experience opened several opportunities for the researcher as a professional by helping him develop essential skills key to succeed in the current business environment, but also helped him develop personally. Most importantly the significance of ethics, which is an important concern in the current business environment.
References


APPENDICIES

Project Manager Interview Questions

1. How long have you worked as a project manager in the Indian offshore software industry?

2. Have you previously worked or currently work with globally distributed teams?

3. As a project manager, what are some of the key challenges to successfully managing an offshore software project?

4. What models Agile/Waterfall/hybrid have you worked on?

5. How does the methodology impact PM(scope) through the project lifecycle?

6. How often do you interact with the client?

7. What is the impact of the methodology used on the cost factor or budgeting?

8. What are the factors would you consider when deciding selecting between Agile and Waterfall for a project?

9. What kind of a relationship do you share with the client?

10. How does the size of the project impact the SDM used?

11. What is the percentage between Waterfall and Agile development across projects in your organization?

Software Engineer Questions

1. What experience do you have as a software engineer in an offshore team?

2. What is the size of projects, geographically and in scope, that you have experience working on?

3. Are you aware of Software Development Methodologies like Waterfall and Agile?

4. What challenges have you faced as a Software Engineer in an Agile/Waterfall framework?

5. Does your work require you to work with distributed teams in different time zones?

6. How often do you have to communicate with the client?

7. What suggestions would you like to make to make the process better.