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Masters Dissertation

The Most Suitable Project Management Methodology to be used in the IT industry: Comparison between Traditional, Agile and Hybrid Methodology

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Abstract

The Most Suitable Project Management Methodology to be used in the IT industry: Comparison between Traditional, Agile and Hybrid Methodology

By Jitesh Amin

The purpose of this study is to draw a comparison between Traditional, Agile and Hybrid Project management methodologies in terms of their suitability and applicability in Information Technology (IT) organizations. While there are numerous Project Management methodologies available the researcher has selected these three dominant Project Management Methodologies namely, Traditional, Agile and Hybrid in order to determine if the Project Management environment needs to take a step back or forward or stay where it is to remain competitive in the current demanding IT environment accordingly.

The structure of the work is as follows. First, a review of the current literature on the Project Management Methodologies. What are their strengths, weaknesses and perceptions of each of the methodologies under study? Second, a quantitative analysis to collect and process primary data from the market or rather from individuals who are exposed to these methodologies on a daily basis in the Indian and the Irish marketplace. These individuals are IT professionals working at various organizational hierarchies across IT organizations in India and Ireland. Lastly, the analysis and discussions of the findings, compared with those of the previous literature. This study also aims towards contributing literature and perspective towards the field of project management as a whole and the adoption of project management methodologies to organizations within the IT industry.

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List of Abbreviations

IT - Information Technology

PRINCE2 - PRojects IN Controlled Environments

CPM - Critical Path Method

SPSS - Statistical Package for the Social Sciences

PII - Personally Identifiable Information

IC -Individual Contributor

GDPR - General Data Protection Regulation

ANOVA - Analysis of Variance

IID - Iterative Incremental Delivery

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Chapter 1 – Introduction

1.1 Background

Project Management can be defined as the set of process-oriented instructions for Project Managers to achieve a certain organizational goal or target (Marion, 2019). While Project Management helps organizations reach their specified goals there are numerous methods that were developed through the years for the organizations to reach these specified goals.

Traditional Project Management was one of the most primitive methodologies that came into picture to bring order into the chaos IT organizations faced in terms of reaching their goals (Wysocki, 2009). Over the years various Project Management Methodologies have been developed in the IT industry i.e., Agile, PRINCE2, SCRUM, Six Sigma, CPM etc. However, the one methodology that almost every Project Management team in the IT industry is looking to switch to (or has already switched to) is the Agile Project Management Methodology. Lastly, the Hybrid Methodology, as per its name, can be defined as the methodology that combines various Project Management Methodologies (for example, Traditional with Agile, Agile with Adaptable Lifecycle, etc). (Bushuiev & Kozyr, 2020; Inayat & Salim, 2015). The Hybrid Methodology is a fairly new concept which includes using specific features of two or more methodologies in order to derive a better output from the project and eliminate the shortcomings of the individual methodologies in play.

1.2 Purpose of the Research

The academic research in the field of Project Management has been very less, even at Harvard Business School, less than 2% of all the case studies are focused towards Project Management (Kloppenborg & Opfer, 2002). Even more so, a lesser number of the research related to the Project Management field gets published in top management journals (Shenhar & Dvir, 2007). One of the core purposes of the research in this paper is to contribute towards the scarce literature in the field of Project Management.

The Definition of Project Management Methodology as per Project Management Institute is, “a structure of interdependent practices, rules, techniques and

procedures followed by Project Managers and individuals dealing with the project". (Project Management Institute, 2017). While all the methodologies target the success of the project, the structure each of the methodologies follow to reach their end goal is different. For example, while the Traditional Project Management Methodology looks at the project as a whole, the Agile Project Management Methodology looks at project focusing on the different parts. Hybrid Project Management Methodology will have a completely different approach altogether. Organizations across the globe are putting managers under pressure to adopt the Agile Project Management Methodology to highlight how flexible their organizations are while ignoring the fact that Agile might not even be a right fit for their organization due to the nature and complexity of the projects they undertake (Annosi, et al., 2020). The IT industry is mainly divided majorly into organizations who rely on Traditional or Agile Methodologies to manage their projects. Of these two major Project Management Methodologies, there is still a lack of agreement amongst the Project Management community about what methodology is better and should be applied more and also if Hybrid project management should be the way forward (Turkebayeva, 2020). In our research, we are trying to determine which of these three Project Management Methodologies should be the one the Project Managers in the IT industry should use more often to generate better results in their projects.

1.3 Approach and Methodology

In our work, we will first review the literature about the fundamentals, merits and demerits of each of the Project Management Methodologies in question. This is to better understand the purpose, effectiveness and applicability of each of these methodologies. We will then be conducting a quantitative analysis in order to understand what Project Managers in IT industry of India and Ireland think about each of these methodologies and how they use them in their daily work. We will be processing the consolidated data using excel and SPSS and will be analysing the results. We will then discuss our results, draw some conclusions for our research questions and provide recommendations.

1.4 Limitations of research

Discussing the limitations of research ensures that the researcher appropriately portrays the interest of the study and does justice to the research question at hand.

(Morgado, et al., 2017). One of the main limitations to this study would be personal bias and lack of knowledge on other methodologies of the Project Managers answering the survey. Moreover, we are conducting the research in two specific countries i.e. India and Ireland. People belonging to certain geographical areas will have certain preferences and biases based on the social and the cultural environment they have been perceiving (Smith, et al., 2018). Thus, it is reasonable to assume that the Project Managers of the two countries under scrutiny will have certain biases determined by the work environment they have been exposed to. While these biases cannot be completely eliminated, we will be taking some precautions: we will use random sampling, we will run the analysis on the collective data and we will compare our results with those of relevant academic studies on the same topic. (Walters, 2021).

Chapter 2 – Literature Review

2.1 Introduction

A systematic literature review can be defined as, a process to identify, analyse and then understand the available literature to the research question of interest (MacDonell, et al., 2010). We have identified Traditional and Agile Project Management Methodologies as the main focus of research as both of them are majorly used by IT organizations across the globe. While the Traditional Project Management Methodology has been around for a long time, the Agile one is something that is comparatively new and is spreading rapidly. Each of these methodologies have their respective shortcomings due to the approach and rules they follow. This has led to another methodology for review, the Hybrid one, which combines the features of both Agile and Traditional methodologies and eliminates their shortcomings. Hybrid can be a way forward for the IT industry that ends the long-standing war between the promoters of the Traditional Project Management Methodology and the promoters of the Agile Project Management Methodology.

2.2 Traditional Project Management

2.2.1 Overview

The Traditional Project Management Methodology is one of the founding methodologies in the field of Project Management. It has a pretty simple construct and the project success is measured on the three main pillars called the iron triangle i.e. time, budget and scope. (Pinto, 2013). Where time refers to the time taken for the completion of the project at hand which can be days, months or at times years. The time taken is often conveyed by the Project Manager to the client or the organization for their approval and is often decided by the team working on the project. The budget is the overall cost of the project, including the resource or the manpower cost, cost of the software platforms used and any other cost incurred for the project during the duration of the project. Cost for the project is usually calculated by the Project Manager and is approved by the client or the organization requesting the project. As cost at the time of planning is just an estimate it is a good practice to add contingency cost to have the necessary funds in the times of crisis (Venkataraman & Pinto, 2008). The scope of the project refers to the goals that the organization or the client hopes to achieve with this project. The scope of the project is initially laid out

by the organization or the client requesting the project however it can be increased or reduced basis the feasibility of the goals confirmed by the project team. This new scope also needs to be approved by the client or organization requesting the project. Traditional methodology primarily focuses on planning for the entire project even before the execution for the project begins which is also a key factor for the success of the project (Laufer, et al., 2015). Once the plan for the project is drawn, the project team tries as much as possible to stick to the initial plan. The client communicates the requirement for the end product clearly at the kick off meeting itself and the whole plan is built around reaching the end goal or the final product. The execution of the project is linear, i.e., one milestone of the project doesn't begin unless the previous milestone is completed.

2.2.2 Fundamentals and strengths

One of the key strengths of Traditional Project Management is it follows a very structured approach. The core fundamental of Traditional Project Management is that all work is manageable and predictable and planning mainly consists of dividing this work (Saynisch, 2010). There is heavy documentation and processes in place to accommodate any situation that arises during the execution of the project so that the project team is aware of what needs to be done. Project manager is the sole owner of the project and makes the decisions regarding the project for the team. The development phases in Traditional style of development can be broken down into broadly five stages namely Requirements, Design, Coding, Testing and Operations (Andrei, et al., 2019). In the Requirements phase, the entire scope of the project is defined and on the basis of the project's requirements, heavy documentation is put in place to list out the features and necessity of the project. Once the requirements and the features are scoped out, in the Design phase, the software and technology to build the project is selected and a plan is drawn. In the Coding phase, the design from the previous phase is brought into action and implementation of the design begins. In the Testing phase, the project is tested thoroughly to see if it incorporates all the features correctly and it is what the client had originally scoped out. Once the rigorous testing of the project is completed the project is moved from the development environment to the actual working environment, and this phase is called the Operations phase.

As a concrete plan is drawn at the start of the project itself, this methodology is very useful in high complexity projects. The requirements for the project are defined in detail by the client at the start of the project and these requirements are agreed upon by the project team and freezed (locked) so that there is no change during the execution of the project. The project team calls out any challenges or possible hurdles before the freeze so that the expectations are set with the client on the delivery of the final project. Once the expectations are set with the client, the requirements' freeze is signed off by the clients themselves. This freeze ensures the project team encounters minimal changes during the execution phase and ensures smooth execution and minimal iterations. When the deviation from the initial plan for the project is less the output of the project becomes more efficient and effective (Špundak, 2014). Thus, in case of Traditional Project Management the project team sticks to the initial plan as much as possible. Thus, the deviation from the initial estimated parameters like budget and timelines are much less compared to other methodologies.

The execution of the project is linear and thus it is easier for the Project Manager to track the progress of the project with the help of milestones. The project team cannot progress to the next milestone without completing the previous milestone. Thus, the linear execution, central command of the Project Manager, combined with the lack of iterations makes it ideal for large and complex projects, as it is easier for the progress to be monitored and milestones to be set.

2.3 Agile Project Management

Agile Methodology was originally conceptualized for less complex and smaller projects and production teams (Faisal Abrar, et al., 2020). Since its introduction around 20 years ago, Agile has taken over the IT industry rapidly with organizations trying to adopt Agile as extensively as possible or even switch from their existing Project Management Methodologies in hopes of better project results (Zasa, et al., 2021). Agile is more than just a Project Management Methodology, it is a way of thinking. Hence, the most wholesome description of the Agile working process won't come from explaining the phases involved in it, it comes from the principles in the Agile Manifesto given by Saltz and Heckman, Kent Beck and his fellow authors as the 12 Principles of Agile listed below (Beck, et al., 2001) (Saltz & Heckman, 2020):

2.3.1 12 Principles of Agile

1) The highest priority should be the customer satisfaction by continuous feedback and development.

One of the key fundamentals of the Agile Methodology is to empower customer satisfaction as the most important feature in measuring the project success (Wiesche, 2021). The project team ensures that the final output is something that the customer is happy with through continuous feedback and updating the product in accordance to the feedback.

2) Change should be welcome in any stage enabling the customer to gain competitive advantage.

Agile accepts that it is difficult to define all the requirements of the project at the start of the project itself and changes to the requirements is inevitable if the product has to have a superior competitive advantage in the market (Shalinka & Richard, 2018). Thus, in an Agile project development environment change is welcome at any stage of development.

3) Partial delivery of the product should be encouraged from the earlier stages itself.

Agile encourages Iterative Incremental Delivery (IID) of the product, i.e. it encourages the delivery of the product in parts to the client so that the development team receives a feedback on the product and if there is any changes to be made in the product it is made in the early stages of the process itself (WHITELEY, et al., 2021). This process of feedback loop ensures that the client is aware of how the product is shaping up and if there are any changes in the product or if the client is unhappy with the product the issues are ironed out in the earlier stages and not when the product is complete.

4) The management and the development team should work hand-in-hand to ensure project success.

In an Agile environment, as the all the stakeholders are aware of the project development progress, collaboration becomes one of the key aspects for the success of the project. Agile environment thrives on constant feedback and

updates unlike traditional management in which the need for constant communication is minimal (Inayat & Salim, 2015).

5) Individuals are given more power in a project and the management should ensure they have all the support to attain their goals.

Agile teams revolve around individuals willing to do more than following set processes and plans decided by the project manager at the start of the project. Agile ideologies and practices promote enhancing and moulding individual personalities against the common practice of having a hierarchical decision making, like stand-up meetings with entire team instead of following set processes, continuous feedback from the client and managing challenges as they come against one person planning for them ahead etc. Individuals have more say in the decision making and shaping of the product. Thus, Agile teams feel empowered and have a sense of contributing towards the higher organizational goals as compared to non-Agile teams. (Tessem, 2014)

6) The most impactful and efficient way of exchange of information is through face-to-face conversations.

In addition to building trust, face-to-face meetings ensure there isn't any information loss when the information is passed on from one stakeholder to the other. Thus, as Rahy and Bass (2020) agree to this point, face-to-face meetings, in terms of Agile practices are invaluable for team bonding and information exchange (Rahy & Bass, 2020).

7) Successful product is the measure of progress.

Agile working environment discourages the usage of heavy documentation. The measure of a successful product is a working software and the documentation could be kept at a minimal as per the development team's discretion (Wagenaar, et al., 2018).

8) The team should be able to maintain a constant pace of development throughout the lifecycle of the project.

Good performance once is not sufficient in any organization's progress. Growth without sustainability will eventually lead to the failure of the organization. While

people are innately resilient to a continuously changing environment, initiatives like the senior management coaching the team instead of giving directives, addressing the pain points of the team and giving a sense and feeling of contributing to the organizational goal help to sustain the continuous improvement behaviour in teams (Harvard Business Review, 2020).

9) The product should be continuously upgraded in order to result in the agility of the entire system.

One of the key-fundamentals of Agile is continuous development. The product should undergo multiple iterations to be able to acknowledge the optimal design and the most efficient way to work so that the speed of operation of the system is always maintained (STOICA, et al., 2013).

10) The entire project lifecycle should be kept simple and unnecessary tasks should be avoided.

Performing tasks that are unnecessary use up resources, funds and time of the team without actually contributing to the project goal. This is counterproductive and exactly opposite of the term Agile. Various activities like reworking, wait time between tasks, switching time, over documentation etc. are examples of tasks in an organization that can be easily avoided, and do not add value to the project itself (Cooke, 2014). Avoiding such tasks will naturally result in the team saving more time and resources and in turn the system being Agile.

11) Self-organizing teams often generate better results and higher quality products irrespective of the experience of its members.

Project success in Agile teams does not wholly rely on the experience of the members working on the project (Serrador & Pinto, 2015). It is rather dependent on the co-ordination of the team. Such well-co-ordinated teams generate higher quality products and plan effectively and efficiently to achieve milestones.

12) Process review and optimization are encouraged in order to create effective and efficient processes.

The IT industry in itself is growing rapidly and organizations that are unable to upgrade themselves often perish. In these times of high competition Agile

encourages organizations to take a step back and to re-evaluate their current processes every time to create more efficient and effective processes which will in-turn take the organization five steps ahead (Cooke, 2014).

2.4 Traditional vs Agile Project Management

While there are various factors on which the Traditional and the Agile Project Management Methodologies can be compared, we will be considering the Parameters listed by Dingsøyr & Dybå for the basis of our comparison. These parameters are listed in Table No. 1 (Dybå & Dingsøyr, 2008).

Table No. 1: Traditional Vs Agile comparison

Metrics	Traditional development	Agile development
Fundamental assumption	Systems are fully specifiable, predictable, and are built through meticulous and extensive planning	High-quality adaptive software is developed by small teams using the principles of continuous design improvement and testing based on rapid feedback and change
Management style	Command and control	Leadership and collaboration
Knowledge management	Explicit	Tacit
Communication	Formal	Informal
Development model	Life-cycle model (waterfall, spiral or some variation)	The evolutionary-delivery model
Desired organizational form/structure	Mechanistic (bureaucratic with high formalization), aimed at large organizations	Organic (flexible and participative encouraging cooperative social action), aimed at small and medium-sized organizations
Quality control	Heavy planning and strict control. Late, heavy testing	Continuous control of requirements, design and solutions. Continuous testing

Source (Dybå & Dingsøyr, 2008)

One of the major shortcomings of the Traditional Method lies in the fact that it assumes that entire requirement of the project can be scoped out even before the execution of the project begins (Saynisch, 2010). This is where Agile has the upper

hand as it relies on tackling the challenges as they are encountered. Agile adapts to the requirements as they are added in scope of the project.

In the Traditional Method of project management, the entire project is delivered at the end when it is complete however Agile follows much more of an iterative approach where parts of the project are delivered to the client and these parts are developed accordingly (GHEORGHE, et al., 2020).

With the structure of Traditional Project Management, which has a decision maker in the centre, it follows a much more of a hierarchical management model. While in Agile Methodology, where everyone is expected to contribute to the success of the project, it assumes more of a collaborative style of leadership. This in turn affects the permeability of information through the organization as well as in Agile organizations everyone learns together however in traditional organizations the knowledge needs to be distributed.

Traditional Project management relies on heavy planning and much tighter control on the project at hand as compared to Agile, which relies on planning and controlling the project in a real time. This makes Traditional Project Management suitable for higher complexity projects whereas managing complex projects with Agile can get a bit difficult. Thus, one of the key distinguishers in the application of Traditional and Agile Project Management is based on the size of the project and the complexity of the project. While Agile Methodology seems to be a perfect fit for smaller projects, the Traditional Methodology seems to cater well to larger and much complex projects (Jovanović & Berić, 2018).

One more reason when Agile falls short of perfection when it comes to large projects is having too much for everyone to understand. In smaller settings it is easier for project teams to accommodate, understand and comprehend the bigger picture and the client and the project goals. However, as the complexity and the size of the project increases this becomes difficult for people to keep a track and be on-board with everything (Annosi, et al., 2020).

It is still unclear which of the two methodologies is superior, and the views of the industry and the researchers on this topic still remains divided. However, Pace found that introducing Agile Methods only positively affected the project delivery time however it didn't affect other project parameters like budget, efficiency etc. instead it brought the successful completion of project rate down (Pace, 2019).

2.5 Hybrid Project Management

2.5.1 Overview

The IT sector, which is the sector under scrutiny in this study, is evolving rapidly and out of this necessity neither Agile nor Traditional Project Management Methodologies will be sufficient to fulfil the need of the current customer demand. The solution should lie somewhere in the middle where organizations could use the benefits of both Agile and Traditional Methods. (Conforto & Amaral, 2016)

As the name suggests Hybrid Project Management is often combination of 2 or more Project Management Methodologies. There are various types of Hybrid Project Management Methodologies, but we will focus on the combination of Traditional and Agile as this is one of the most recently flourishing Project Management Methodologies. This Hybrid method derives benefits from the positives of each of the individual methodologies being combined and eliminates the shortcomings (Port & Bui, 2009).

2.5.2 Features and strengths

Hybrid Methodology has risen out of the need of organizations following Traditional Project Management Methodology trying to integrate and transition into Agile Project Management Methodology (Wallin, et al., 2002). This doesn't mean the Hybrid methodology is restricted to the organizations transitioning into the Agile Methodology; in fact it is also seen in organizations that continue to follow the Traditional Methodology but are looking at Agile to solve their long existing problems (Gemino, et al., 2021).

Hybrid Project Management is not as rigid as the Traditional way, where the team is forced to stick to the processes and the pre-agreed plan, neither as robust as the Agile way, where the team solves problems as and when they encounter it. Hybrid finds itself somewhere in the middle creating a perfect harmony between the best of

both the Traditional and Agile methodologies. Thus, one of the key strengths of Hybrid model is that it adopts the predictive model from the Traditional style of Project Management and the adaptive model from the Agile style of Project Management. This Hybrid way of working helps the team to have wider control over the outcome. Firstly, with controlling the well-defined objectives of the project with the predictive model(i.e., using the features of the Traditional Methodology) and secondly, for the not yet defined objectives to be controlled with the adaptive model(i.e., Agile Methodology) enabling the project to undergo iterations as well to develop as per the changing needs of the client or the environment (Cavalieri Barbosa & Pego Saisse, 2019).

As against Traditional and Agile Methodologies there isn't any specified set of rules Hybrid Methodology follows. The features to be used for the Hybrid Methodology from its individual methodologies is at the discretion of Project Manager or the team using it. Thus, it in-turn becomes imperative to take only the necessary features from the parent methodologies to create a Hybrid or else the whole process can become counterproductive. For example, if there is no need for heavy documentation in a project then the feature of creating all documents should be excluded from its Hybrid methodology to make it more effective. If this is done correctly the team will save time that is usually lost in creation of not so necessary documents else the project ends up investing extra time and resources in documents which might not even be used in the future. Thus, having a Hybrid way of thinking in turn results in the team developing the critical thinking ability to churning out the not so necessary processes and procedures from the system and keeping only the necessary ones. Thus, merging the Agile way of thinking with the Traditional structured way of project execution into a new Hybridized way boosts productivity and flexibility in an organization by refining the traditional policies and way of working (Conforto & Amaral, 2010).

2.5.3 Challenges and shortcomings

There are three main challenges any business faces in terms of adoption of Hybrid methodologies i.e., conflict of peoples thought process, conflicts of business goals and conflict of processes (Copola Azenha, et al., 2021).

One of the arguable shortcomings of Hybrid methodologies is that it is difficult to implement, as Agile and Traditional Project Management Methodologies follow exactly opposite ideologies and thus the organizational structure and thought processes are completely opposite (Vinekar, et al., 2006). Thus, individuals hoping to implement the Hybrid approach successfully should be able to find the delicate balance between both Traditional and Agile methods without tipping the scale to either side.

One more of the shortcomings that Hybrid approach faces is the combination of the incorrect features from individual methodologies which might lead to more devastating results than the use of the individual methodologies. Currently, we have a huge database of the actual case studies that we have from the IT organizations and research studies conducted by researchers around the globe. Substantial literature is also developed around these case studies which can be really helpful in creating much more refined, effective and efficient Hybrid Project Management Models for implementation (Boehm & Turner, 2005).

Hybrid doesn't have a set of rules to follow as compared to Traditional and Agile Methods. While it takes the benefits from both Agile and Traditional Project management, it is the Project Managers discretion of which aspects of each of the methodologies they wish to adopt.

Thus, one of the shortcomings of the Hybrid Model can be stated as the imagination and efforts of the team using it. It is often difficult to find dedicated individual who will go the extra mile in organizations to make something new work by testing our various combinations to make new models like these work (Magistretti, et al., 2019).

2.6 Past research and Empirical findings

We are conducting this research as an extension to the research conducted by Gemino et al. (2021), which had mentioned as a future scope to their study to test Traditional, Agile and Hybrid on various factors that promote project success.

There have been several researches which have compared the traditional and Agile researches in the past there have been not many researches that compare the

perception and performance of Traditional, Agile and Hybrid. Of the research available, majority of the recent research support the thought that Hybrid Methodology is the path ahead as it overcomes the shortcomings of the individual methodologies. In their detailed literature review of Papadakis & Tsironis (2020) have underlined that Hybrid methodologies have emerged as a need of the current highly competitive IT environment where conventional parameters measuring project success fail (PAPADAKIS & TSIRONIS, 2020). While the biggest challenge with Hybridization is the opposing thought process governing each of the methodologies. Kosztyán & Szalkai (2020) claim that Hybridization of Agile and Traditional methodologies is possible and the resulting methodology delivers projects with more efficient output (Kosztyán & Szalkai, 2020).

Also, there have been several other studies which support each of the Traditional and Agile methodologies and consider one superior to the other instead of a Hybrid approach. For instance, Pervoukhin, et al. (2020) argue, using a purely Agile method might be better than using a Hybrid approach when it comes to managing projects as it worsens certain features of the project lifecycle (Pervoukhin, et al., 2020). In direct contrast one of the research claims, whole process of Agile Methodology can be improved by incorporating certain planning related features of the predictive (Traditional) approach (Freitas, et al., 2020). And Bianchi et al support this thought by their research, that Agile in itself cannot be credited to be a strong Project Management Methodology (Bianchi, et al., 2020).

Taking into account the above contradicting opinions one fact is something all the researches will agree to as stated by Gemino Et al (2021), there has been very little empirical research done in the field of project management itself and in terms of factors that determine project success. By the findings in our research, we hope to complement the research conducted by Gemino and his co-authors and contribute to the literature in this field.

2.7 Conclusion

Two projects are never alike. Thus, drawing a direct comparison between Project success that use methodologies like Traditional, Agile and Hybrid might not always be accurate (Niederman, et al., 2018). While keeping this limitation in mind, we can

still look at the literature present and draw a rough comparison between the effectiveness of each of the methodologies.

From the above review, it is evident that, the Traditional Project Management Methodology can use a bit of the flexibility of the Agile Methodology and the Agile Methodology can make use of the grounded nature of Traditional Methodology. These criteria are easily fulfilled by the adoption of Hybrid Project Management Methodology. Hybrid Project Management Methodology helps eliminate the drawbacks of each of the individual methodologies and helps find a symbiotic way for multiple methodologies to be applied in a project in harmony bringing out the best of each methodology (CRUZ, et al., 2020). This in-turn results the success of the project in various parameters which would have been a trade-off feature due to the limitation of the individual methodologies.

Chapter 3 – Research Question

3.1 Introduction

Structuring and forming a research question is an important step in generating knowledge and insights in the area of research (Thuan, et al., 2019). A wholesome research question has a few important features that indicate its completeness. While addressing a problem at hand is one of those features, contributing significantly to the field of study is another key feature. (Cai, et al., 2020)

The review of the literature allowed us to identify few research questions for our research that will allow us to address the purpose of our research in comparing Traditional, Agile and Hybrid Project Management Methodologies.

3.2 Research questions

Research question 1 (RQ1) aims to determine the significant difference between Traditional Project Management, Agile Project Management, and Hybrid Project Management. We compare the main characteristics, the benefits and drawbacks of each Project Management Methodology. Moreover, we analyse the similarities and differences between the different project management stages and implementation processes of the three methodologies.

Research question 2 (RQ2) aims to affirm the benefits of each of the Methodologies in review based on the individual Factors representing each of the questions in the questionnaire. These factors will help to draw conclusions as to which methodologies to adopt basis the targets of the Organization.

Research question 3 (RQ3) aims to identify the best suitable Project Management Methodology for IT organizations with focus on implementation, management, and efficiency. In this context, the study will try to identify the most suitable project management Methodology for organizations in the IT Industry which will help them build operational efficiency and effectiveness and reduce the overall operating cost.

3.3 Hypothesis for RQ3

- H_0 Agile Project Management Technique does not perform better than Traditional Project Management Technique.

- H_1 Agile Project Management Technique does perform better than Traditional Project Management Technique.
- H_0 Hybrid Project Management Technique does not perform better than Traditional Project Management Technique.
- H_1 Hybrid Project Management Technique does perform better than Traditional Project Management Technique.
- H_0 Agile Project Management Technique does not perform better than Hybrid Project Management Technique.
- H_1 Agile Project Management Technique does perform better than Hybrid Project Management Technique.

Chapter 4 – Research Methodology

4.1 Introduction

Research Methodology can be defined as a strategic plan a researcher follows in order to achieve an answer to a problem statement or research questions at hand (DŹWIGOŁ, 2021). An answer to a research question can be found in many ways, for example a research for the same research question can be conducted using Quantitative, Qualitative or mixed Methodology. However, finding a correct methodology to fit the research aims becomes crucial as it improves the overall quality of the research and its findings (EDMONDSON & MCMANUS, 2007). In the upcoming sections, we will be discussing the various aspects of research methodology adopted for this research, and how well it fits as compared to others currently in practice. We will also discuss the philosophies in knowledge generation and how our research falls in the Mode 2 field of knowledge production.

4.2 Research Method adopted and Rationale

The two major ways of conducting research are either a Quantitative approach or a Qualitative approach. Each of the approaches has its own strengths and weaknesses which makes them suitable for specific types of researches. Qualitative research is used in researches like, product testing (Perfume testing, food taste testing etc.), where a detailed, quality description of the respondents experience has more weightage over the number of respondents answering. On the other hand, Quantitative research is used where performance or specific features are to be tested (Customer experience, Car performance data, Voice of customer surveys etc.) where the need to have a higher sample weighs the experiential data.

Qualitative research can be defined as the method of collecting and interpreting non-numerical experiential data from personal experience, observations, introspections, interactions and so on (Johnson, et al., 2020). The data derived by qualitative methods is not quantifiable rather it is a description of the experience rich in emotions, feelings and perceptions that the respondent has undergone. As qualitative research deals with experiences and instances of individuals, the data collected at times might deviate from the main topic and be specific to the experience the respondent has gone through (Rahman, 2016). Also, the

interpretations of the responses are as per the perceptions of the researcher and thus it may differ from researcher to researcher. There is no scientific measurability to the data acquired in qualitative studies like in quantitative studies for the analysis to be uniform across researchers. This is one of the drawbacks of Qualitative research i.e. the interpretations of the respondent answers are interpreted as per the understanding, thought process and perceptions of the researcher and is not uniform unlike quantitative studies (Sevilmiş & Yıldız, 2021). Apart from these, qualitative research utilizes smaller sample and thus using that sample to generalize the entire population, which in our research is the huge spread IT industry, seems unfair. Due to the above shortcomings of the Qualitative research, we have not used a qualitative approach for our study.

Quantitative studies, on the other hand, are based on the positivist belief that the real world is quantifiable due to its unchangeable and concrete nature. Thus, with this belief comes the thought that data is generated for any problem is fixed and one must know how to extract and measure it to reach to the solution. Also, once quantified numerically the insights the data delivers doesn't vary as per the perceptions of the researcher, it remains constant no matter who looks at it. For e.g. when 7 out of 10 people are not happy with the cleanliness of a shop, any researcher looking at the would develop a conclusion that the shop is dirty. This is different as compared to Qualitative where the perception of the response changes from researcher to researcher. Also, Quantitative studies utilize a much higher sample in comparison with Qualitative studies. Thus, the results of a quantitative study can be generalized for the entire population (Carr, 1994) in our case the whole of the IT industry thus making it.

The way knowledge is generated can be broadly classified into 2 modes namely Mode 1 deals with generation of knowledge but doesn't focus on the applicability and Mode 2 which deals with generation of knowledge and its applicability as well (Boggio, et al., 2016). Project management research exhibits the features of Mode 2 field of knowledge production where the research mainly deals with solving the real-world research questions by interacting with stakeholders involved and then the application of the findings (Pace, 2019). Mode 2 field of research follows the following 4 steps: 1) generate a research question from a problem in the real world.

2) involve the stake holders and people affected by the problem 3) collaborate with these stakeholders to find a solution for the problem 4) apply the solution for the problem (Guerci, et al., 2018). We have addressed the first and second step in the Literature review and the Research Question generated. In addition to a Secondary research in the form of a detailed literature review & we have adopted a quantitative Primary Research. The Methodology, data processing and the sample size are in tandem with the research paper Neelu & Kavitha (2020) from which the questionnaire is adopted. For the third point, with the stakeholder involvement, it is often found that stakeholders prefer using quantitative research as its findings are easily quantifiable and thus easy to verify (Sallee & Flood, 2012).

Thus, like other authors with similar researches, e.g., Pace (2019), Neelu & Kavitha (2020) and Serrador & Pinto (2015), we chose quantitative research, in the form of a survey as being the perfect fit our research in particular.

4.3 Sample and Population

For most of the researches a sample size between 30-500 is considered sufficient when the data is tested at 5% confidence level (Delıce, 2010). We have kept the sample size consistent with the study of Neelu & Kavitha from which the questionnaire is adopted. Neelu & Kavitha were able to achieve a target of 30 respondents in their study however we were able to achieve a higher target of 64 responses in total. We will be using the entire sample that we captured as larger the sample the better it represents the population on the condition that it is collected randomly (which is true in our case) (Fowler & Lapp, 2019). The sample we collected was distributed across multiple organizations in the IT industry across India and Ireland. We have not collected the Personally Identifiable Information (PII) of the respondents so the organizations of the respondents are not collected or stored. The sample profiles are summarized in Table 2.

Table No. 2: Sample profile			
Organizational Hierarchies	**Designation**	**Target achieved**	**Percentage**
Executive Level (36.2% of the total sample)	Programmer/ Developer	6	9.40%
	Consultant	5	7.80%
	Security Engineer	3	4.70%
	Legal and compliance analyst	2	3.10%
	Quality Analyst/ Software Tester	1	1.60%
	IT ANALYST	1	1.60%
	Software Engineering	1	1.60%
	Lead Analyst (ETL Process)	1	1.60%
	Data Analyst	1	1.60%
	Business Analyst - OCM & Training	1	1.60%
	Human Resources	1	1.60%
Project Manager Level (23.5% of the total sample)	Project Manager	14	21.90%
	Product Manager	1	1.60%
Senior Management Level (40.7% of the total sample)	Management level Executive (Team Leader, Team Manager, Sr. Manager etc.)	24	37.50%
	Compliance officer	1	1.60%
	Business Development Manager	1	1.60%
Source: Sample count			

While Project Management Methodology to be adopted for a project is driven by the Project Manager, the methodology adopted affects the entire team working on the project. This is why we have not restricted our sample only to Project Managers but we also to Top Management (Sr. Managers, Team leaders, Business Managers, etc.) and the Individual Contributor (IC) level (like Developers, Quality Analysts etc.) so as to portray a real picture of the population in the IT Industry affected by the Project Management Methodology in play. We are seeing a healthy mix of respondents from various designations in the IT industry. The sample consists of individuals working in multiple organizations across India and Ireland. We have not collected Personally Identifiable Information (PII) to identify the organizations from which the respondents belong to in line with the General Data Protection Regulation (GDPR) guidelines. This ensured that we got a clear picture of how people perceive the three Project Management Methodologies at various levels in organization in the IT industry. Also, the data includes more responses from Project Managers and Top Management ensuring that the data is representative of the people directly affected by the used methodology.

As suggested by Kaplan et al (2014), to eliminate bias sample must be selected randomly, sample should be a nice mix of representative of the population and should involve those who are directly affected by the research (Kaplan, et al., 2014). Keeping these suggestions in mind, we have randomly selected respondents working in the IT industry across India and Ireland. The reason to use 2 regions is to avoid regional bias in the perceptions of Project Management Methodologies due to culture and regional preferences. Apart from that as shown in Table 2 our sample consists a nice mix of respondents working at various designations and organizational hierarchies in the IT industry

4.4 Data collection & Processing

For Primary data collection a survey was designed in Google Forms and was sent out to individuals in IT industry for their opinions. The data was collected and saved in a password protected Excel file. When 10 completes were received a pilot data review was done in the excel itself using pivots to see if there is any inconsistencies in the data using Pivot tables. In this pilot data check the, we checked if the

responses to all the mandatory questions were filled or not, if there were any responses not present in the response list and so on. There were no issues found in the pilot data review so we had a green flag for the complete data collection.

For the final Data processing SPSS will be used in regards to its ease of use and superior computing abilities in comparison to Excel (Rode & Ringel, 2021). The Excel sheet was converted to .SAV file to be used in the SPSS for data processing. Factor based questions have Likert (5-point scale from Strongly Agree to Strongly Disagree) scale as options and will be analysed looking at their mean values. A direct comparison will be drawn between the mean value score for each of the factors of each of the methodology to derive conclusions. We might also create a crosstabulation of the data on the basis of the organizational hierarchies as seen in Table 2. to understand the perception of the methodologies at each of the hierarchy.

We have added three Open end questions to the questionnaire. The purpose of these questions it to capture data that are beyond the constraints of the close end questionnaire that we have. This data might point us towards new avenues of research that are not covered in the current questionnaire. It might also highlight the weightage of certain factors or stress on the fact that why certain factors have more weightage as compared to others. These avenues are usually not collected in the close end questions as they have a list of specified options to select from. Key verbatims from these questions will be highlighted in the findings and Analysis part.

4.5 Ethical Guidelines

At the start of the online survey, the respondent have been provided with the details of how their data would have been collected, stored and processed. Respondent's consent was asked in the first question of the online survey and, if the respondent consent was denied, no further questions would have been asked. The participation to the survey was voluntary and the respondent could drop out of the survey at any point. The data for only completed respondents were stored; no partial data is stored. Any data that can be used to identify the respondent is called Personally Identifiable Information (PII) for e.g. age, phone number, email address, physical address, Gender, sex, Organization working for and so on (Voss & Houser, 2019).

No respondent Personally Identifiable Information (PII) was collected in any form in the survey.

Following the above steps, we have kept the survey confidential by not capturing any personal identifiers of the respondents answering, anonymous and with the consent of the respondent and transparent by stating the purpose of research avoiding any ethical issues from arising (Swain & Spire, 2020). Also, all ethical guidelines outlined in the ethical guideline form from NCI were followed.

4.6 Questionnaire design

The Questionnaire for this study is adopted from a peer-reviewed paper (Neelu & Kavitha, 2020), published on the TEM Journal and conducting a similar research comparing Traditional and Agile Project Management Methodologies in the IT industry. We are using a tested questionnaire to avoid inconsistencies in the survey. With the use of tested questionnaire, it is assured that the respondent is completely able to understand the question and is able to respond to the question in the best way possible (Palmieri, 2020). This in turn ensures that the data collected is correct as the respondent understands the questionnaire completely and there is no loopholes or missing information. 23 questions were asked to 64 respondents in total. Of these questions, 18 questions are a loop of 6 questions asked for each of the three methodologies i.e. Traditional, Agile and Hybrid each. The remaining 5 questions were added to the original questionnaire: 1 question regards the role of the respondent in the organization; 1 question draws a direct comparison between each of the methodologies; 3 questions are open-end questions and have the purpose of capturing any responses that the close-end questions are not able to. These 3 questions were included to capture experiential quality responses which could redefine the boundaries of this study in its future scope.

Table No. 3: Questionnaire and factors under review		
Sr No	**Questions**	**Factor**
1	Do you agree that while using Proposed Project Management Methodology the team is aware of the project status and is effective in achieving higher client satisfaction level	Schedule & Client Satisfaction
2	Do you agree that while using Proposed Project Management Methodology the approach to achieve targets for the project are well aligned with the client and the individual contributor goals	Scope & Milestones
3	Do you agree that while using Proposed Project Management Methodology the specified budget targets are met and we are able to see an increased productivity	Budget & Productivity
4	Do you agree that while using Proposed Project Management Methodology the risks with the project are addressed effectively and the opportunities are well capitalized on for a smooth execution	Risk Mitigation
5	Do you agree that while using Proposed Project Management Methodology there is effective utilization of all the available resources and there is an internal harmony while execution	Resource Utilization
6	Do you agree that while using Proposed Project Management Methodology the overall quality of the project is much higher leading to a higher client satisfaction	Quality
Source (Neelu & Kavitha, 2020)		

4.7 Limitations to Research Methodology

One of the biggest limitations to any quantitative research can be the so-called Hawthorne effect. The Hawthorne effect can be simply explained in terms of research as- the fact that a research is being conducted might alter the responses of the respondents and in-turn affect the integrity of the responses (Robertshaw, 2007). While most the respondents to our survey will be from the IT industry from the Project Manager level and above with years of experience this effect can be considered negligible however it is safe to assume this effect will still be present.

Another limitation of using a quantitative approach is that there is a set of boundaries or factors are pre-defined to derive to the solution to the research question at hand. The respondents are expected to respond to only those set of factors or respond within the boundaries of that question. This leaves a possibility of a factor that is far more influential for determining the solution of the research question being left out because of the factor being neglected by the researcher or being not discovered at all. This in-turn might result in the solution being not as effective as it would have been if the factor would have been taken into consideration. For example, for less sales in a shop the researcher might consider the factors like cost of products, cleanliness, availability of products and so on and would ask the customer to answer on what would they like the shop to improve on more. However, if the main problem is accessibility to the shop and the respondents are not allowed to evaluate that or rather comment on that the whole solution that the researcher provides may not be effective at all. Also, quantitative studies do not measure the emotional severity of the problem at hand. Again, coming back to the above shop example, we can say at times a scale of ‘Strongly Agree’ to ‘Strongly Disagree’ might not describe the severity of any specific instance that the customer might have gone through which has led to a strong reason to dislike or like the shop. This particular instance might be the reason for the customer to never come back to the shop again but the severity of that instance might not be covered in the boundaries of the study.

Other than that, there is always a regional bias because of a specific culture the individuals are exposed to. Being exposed to certain specific cultures or certain work environments affects the way you think and the decisions you make. This in-turn will lead to affinity towards certain practices and dislike towards practices irrespective of their applicability. For example, a Project Manager who has worked in a Traditional Project Management environment will feel the performance of Traditional Project

Management is better than Agile and vice versa. Our survey responses may be exposed to regional bias however we have tried using sample from different two different regions i.e. India and Ireland to dilute this bias.

One more shortcoming of the quantitative research is the belief that the selected sample selected usually represents the entire population (Maxwell, 2021). Due to the various factors like respondents availability, changing IT environment and so on the sample that res While, we have used is higher than the sample used by Neelu & Kavitha (2020) it still might not be a true representation of the entire population of the IT industry.

Chapter 5 Findings and analysis

5.1 Introduction

The aim of the study was to determine the most suitable Project Management Methodology for the organizations in the IT industry. To do that we prepared an online survey sent to individuals working in the IT sector across India and Ireland, and we were able to have a sample of 64 respondents. Also, the said sample is above the target (30 respondents) of the base study from which the questionnaire is adopted (Neelu & Kavitha, 2020). The collected data is then converted into a .SAV file to be processed in SPSS to derive insights. All the data processing, tabulation and significance testing is done in SPSS.

5.2 Computed and recoded Variables

We have created 4 new computed variables from the variables that we already had in the questionnaire by grouping the factors that we had from our questionnaire. The first variable that we created is the organizational hierarchy one named as "Organizational_hierarchy". This variable is created by grouping the options of Question No. 1 as per the hierarchical level of the option. For example, a Programmer and a Quality analyst are 2 different designations in an organization and hence fall under the same band of Individual contributors or Executive level. Similarly, Project Manager and Product Manager can be clubbed together and so on.

Table No. 4: Organizational hierarchy grouping	
Executive Level	Business Analyst - OCM & Training
	Consultant
	Data Analyst
	Human Resources
	IT ANALYST
	Lead Analyst (ETL Process)
	Legal and compliance analyst

	Programmer/ Developer
	Quality Analyst/ Software Tester
	Security Engineer
	Software Engineering
Project Manager Level	Product Manager
	Project Manager
Senior Management Level	Business Development Manager
	Compliance officer
	Management level Executive (Team Leader, Team Manager, Sr. Manager etc.)

We have 6 Factors that we are testing for each of the 3 Project Management methodologies which leaves us with 18 variables representing these factors in total for analysis. Thus, for the ease of analysis we are summing the 6 factors in each of the individual Project Management Methodology to create an overall factor score. Statistically it is proven that total variables or sum variables are representative of the individual factors from which they are created or derived from in terms of analysis (Santesson, et al., 2020). The 3 variables that we created are “Traditional_overall” which is a sum of the variables from Q3 to Q8, “Agile_overall” which is a sum of the variables from Q10 to Q15 & “Hybrid_overall” which is a sum of the variables from Q17 to Q22. This method helps us analyse collective effect of all the factors for each of the methodologies helping us understand the net effect of these factors on the 3 methodologies. As the new variable created is a sum of its individual factors the scale for the new “overall” variable changes to 1-30.

5.3 Overall Factor Scores

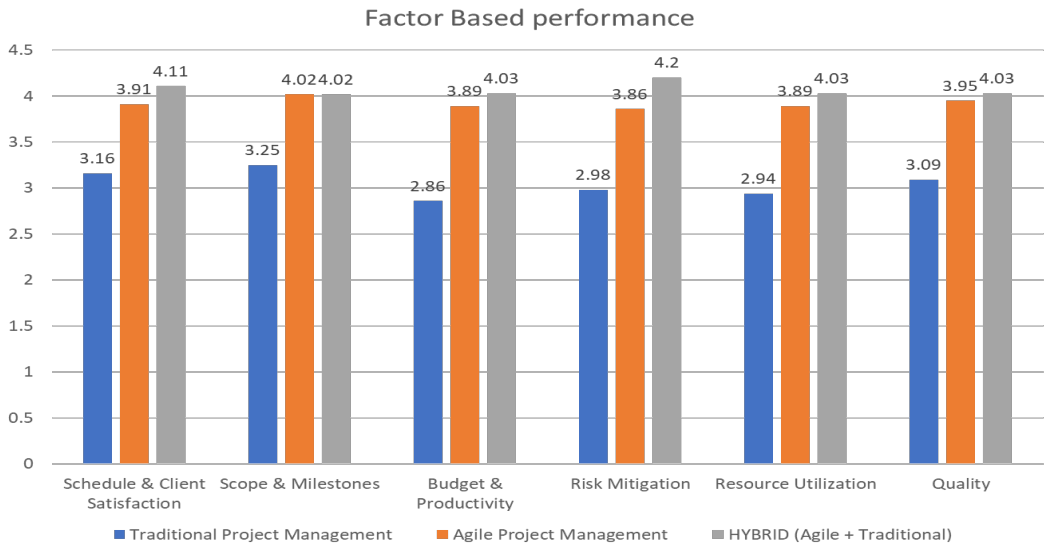

Fig 1: Factor Based Performance

Figure 1 provides a comparison between the mean scores of the factors Schedule & client, Scope and milestones, Budget & Productivity, Risk Mitigation, Resource Utilization and Quality for each of the Project Management Methodologies. This section answers our Research Question 2 (RQ2) addressing the strength and weakness of each of the methodologies. It is evident that Hybrid Methodology exceeds other methodologies in terms of all factors. Also, it is notable that not only does Hybrid Methodology have a score higher than other Methodologies but it has a mean score higher than 4.0 in a 5-point scale. This indicates that Hybrid Methodology itself is a very strong methodology in itself in addition to being better than the Methodologies considered(Traditional and Agile). Hybrid Methodology has received the highest score for Risk mitigation whereas the lowest score is seen for Scope & Milestones.

The Traditional Methodology, we are seeing the lowest scores being awarded to it by the respondents. One striking score, is the score for Budget and Productivity which is the lowest score for Traditional Project Management and also the lowest score overall. While for productivity we can understand this low score, as some times due to scope creep the teams might not be able to provide an efficient output. However, the budget is fixed when Traditional Project Management is used. Further analysis, one of the verbatims revealed the below:

“Since its target oriented there are limitations and can incur cost at later stage.”

This points out to the fact that the low score to the budget might be due to the final product not being as per the client requirement and the project going overbudget for managing change request. The highest score for Traditional Project Management is seen in Scope & Milestones which is consistent with the literature review section 3.2.1 as the entire project is planned before the start of the execution so the scope and milestones are well defined (Laufer, et al., 2015).

The Agile Methodology lies in between Traditional and Hybrid Methodology in terms of scores for individual factors. While the scores for Agile are not as high as Hybrid, they are still near the lower side of the 4.0 boundaries. The highest score for Agile is acquired for Scope and milestones which is again remarkable as the scope for Agile project keeps on changing. This might point towards the tendency to be inclined towards small wins and targets in order to reach the bigger goal (Pangarkar, 2019). Also, Agile sees the lowest score for Risk Mitigation. The reason for this can be understood with the classic example of the originally budgeted £2.2 billion Universal Credit project which shot up to 6 times its initial estimate and still failed highlighting the risks associated in Agile Methodology (Elbanna & Sarker, 2016).

5.4 Factor Score as per Methodology preference

In the upcoming paragraphs we will be using the one-way independent sample ANOVA test, as explained by Martin (2008), to establish the significant differences between the respondents preference of a Methodology as the most suitable for IT industry against their scores for the other Methodologies. For example, here we will be evaluating how respondents who say Hybrid is the most preferred methodology for the IT industry would score Traditional and Agile Methodologies overall and so on. We will be listing the ANOVA F-statistic score and the p values (significance level) for each of the tests we are conducting in addition to the Mean scores and standard deviation. The F-score helps determine if the difference between the two samples is actually different or not. The F-score is inversely related to the significance level, so lower the F score higher is the significance. P values can be defined in simpler terms as the probability of getting the same result again looking at the population (Martin, 2008).

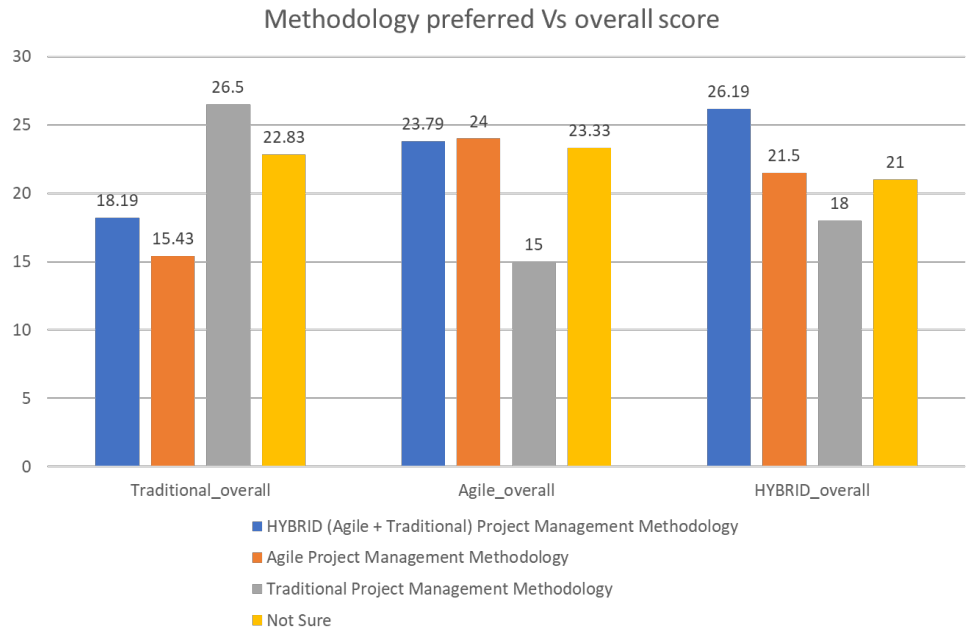

Fig 2: Methodology preferred vs overall factor

Figure 2 is a representation of the overall scores of the methodologies against the preference of the respondents of each of the methodologies. For example, how would a respondent who says that Hybrid is the most suitable methodology for the IT industry in Question 24 of the questionnaire, rate Traditional Project Management and Agile Project Management, how would a respondent who says Agile is the most suitable Methodology for the IT industry in Question 24 of the questionnaire, rate Traditional Project Management and Hybrid Project Management and so on.

We will be performing ANOVA test to measure if the mean score is significant in comparison to the other scores in the group. ANOVA helps in understanding the variance of variable with groups.

Table No. 5 Sig testing Traditional on the basis of Preference 1						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	373.699[a]	3	124.566	6.549	0.001	0.247
Intercept	9031.44	1	9031.44	474.823	0	0.888
Q24	373.699	3	124.566	6.549	0.001	0.247
Error	1141.238	60	19.021			
Total	22904	64				
Corrected Total	1514.938	63				
a. R Squared = .247 (Adjusted R Squared = .209)						
Source: SPSS run						

Here we are conducting an one-way independent-samples analysis of variance (ANOVA) to evaluate the impact of preference of the Project Management Methodology on the Overall score for Traditional Project Management Methodology. Looking at table 5 we can say that there is a significant effect on the Overall Traditional score, $F(3,60)=6.5$, $p=0.001$, $\eta p2=0.25$. From table 6, Bonferroni post hoc comparisons reports that there is significant difference between Agile Project Management Methodology (M=15.23,SD=3.27) and Traditional Project Management Methodology (M=26.5,SD=4.95) and between Agile Project Management Methodology and Not sure (M=22.83,SD=1.72) at 95% confidence interval. There is no significant difference between any other groups.

Table No. 6 Sig testing Traditional on the basis of Preference 2						
Multiple Comparisons						
Dependent Variable:	Overall Score Traditional					
Bonferroni						
(I) Which of these do you believe is the most suitable Project Management Methodology for the different kinds of Software Development?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Agile Project Management Methodology	HYBRID (Agile + Traditional) Project Management Methodology	-2.761905	1.3459157	0.2672062	-6.434306	0.9104962
	Not Sure	-7.4048*	2.1280796	0.0056511	-13.21134	-1.598186
	Traditional Project Management Methodology	-11.0714*	3.2968067	0.0082019	-20.06694	-2.07592
HYBRID (Agile + Traditional) Project Management Methodology	Agile Project Management Methodology	2.7619048	1.3459157	0.2672062	-0.910496	6.4343057
	Not Sure	-4.642857	1.9034122	0.1061585	-9.836416	0.5507021
	Traditional Project Management Methodology	-8.309524	3.1564521	0.0645599	-16.92207	0.3030198
Not Sure	Agile Project Management Methodology	7.4048*	2.1280796	0.0056511	1.5981862	13.211338
	HYBRID (Agile + Traditional) Project Management Methodology	4.6428571	1.9034122	0.1061585	-0.550702	9.8364164
	Traditional Project Management Methodology	-3.666667	3.5609582	1	-13.38293	6.049593
Traditional Project Management Methodology	Agile Project Management Methodology	11.0714*	3.2968067	0.0082019	2.0759201	20.066937
	HYBRID (Agile + Traditional) Project Management Methodology	8.3095238	3.1564521	0.0645599	-0.30302	16.922067
	Not Sure	3.6666667	3.5609582	1	-6.049593	13.382926
Based on observed means. The error term is Mean Square(Error) = 19.021.						
*. The mean difference is significant at the .05 level.						
Source: SPSS run						

Here we are conducting an one-way independent-samples analysis of variance (ANOVA) to evaluate the impact of preference of the Project Management Methodology on the Overall score for Agile Project Management Methodology. Looking at table 7 we can say that there is a significant effect on the Overall Agile score, F(3,60)=4.6, p=0.006, ηp2=0.19. From table 8, Bonferroni post hoc comparisons reports that there is significant difference between Traditional Project Management Methodology (M=15,SD=4.24) and Hybrid Project Management Methodology (M=23.79,SD=3.38), between Traditional Project Management Methodology and Agile Project Management Methodology (M=24,SD=2.88) and between Traditional Project Management Methodology and Not sure (M=23.33,SD=3.78) at 95% confidence interval.

Table No. 7 Sig testing Agile on the basis of Preference 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	151.580[a]	3	50.526538	4.5628696	0.006	0.1857629
Intercept	9734.1436	1	9734.1436	879.05543	0.000	0.936106
Q24	151.57961	3	50.526538	4.5628696	0.006	0.1857629
Error	664.40476	60	11.073413			
Total	36207	64				
Corrected Total	815.98438	63				
a. R Squared = .186 (Adjusted R Squared = .145)						

Source: SPSS run

Table No. 8 Sig testing Agile on the basis of Preference 2						
Multiple Comparisons						
Dependent Variable:	Overall Score Agile					
Bonferroni						
(I) Which of these do you believe is the most suitable Project Management Methodology for the different kinds of Software Development?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Agile Project Management Methodology	HYBRID (Agile + Traditional) Project Management Methodology	0.2142857	1.0269424	1	-2.58778	3.0163515
	Not Sure	0.6666667	1.6237385	1	-3.763788	5.0971217
	Traditional Project Management Methodology	9.0000*	2.5154849	0.0041571	2.1363686	15.863631
HYBRID (Agile + Traditional) Project Management Methodology	Agile Project Management Methodology	-0.214286	1.0269424	1	-3.016352	2.5877801
	Not Sure	0.452381	1.4523159	1	-3.510339	4.4151004
	Traditional Project Management Methodology	8.7857*	2.4083935	0.0033301	2.2142875	15.357141
Not Sure	Agile Project Management Methodology	-0.666667	1.6237385	1	-5.097122	3.7637884
	HYBRID (Agile + Traditional) Project Management Methodology	-0.452381	1.4523159	1	-4.4151	3.5103385
	Traditional Project Management Methodology	8.3333*	2.7170343	0.0194427	0.9197641	15.746903
Traditional Project Management Methodology	Agile Project Management Methodology	-9.0000*	2.5154849	0.0041571	-15.86363	-2.136369
	HYBRID (Agile + Traditional) Project Management Methodology	-8.7857*	2.4083935	0.0033301	-15.35714	-2.214287
	Not Sure	-8.3333*	2.7170343	0.0194427	-15.7469	-0.919764
Based on observed means. The error term is Mean Square(Error) = 11.073.						
*. The mean difference is significant at the .05 level.						
Source: SPSS run						

Here we are conducting an one-way independent-samples analysis of variance (ANOVA) to evaluate the impact of preference of the Project Management Methodology on the Overall score for Hybrid Project Management Methodology. Looking at table 9 we can say that there is a significant effect on the Overall Hybrid score, $F(3,60)=15.6$, $p<0.001$, $\eta p2=0.44$. From table 10, Bonferroni post hoc comparisons reports that there is significant difference between Hybrid Project Management Methodology (M=26.19,SD=2.82) and Traditional Project Management Methodology (M=18,SD=0), between Hybrid Project Management Methodology and Agile Project Management Methodology (M=21.5,SD=3.61) and between Hybrid Project Management Methodology and Not sure (M=21,SD=2.1)

Table No. 9 Sig testing Hybrid on the basis of Preference 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	403.633[a]	3	134.54439	15.585009	0.000	0.4379656
Intercept	9863.7507	1	9863.7507	1142.5719	0.000	0.9501069
Q24	403.63318	3	134.54439	15.585009	0.000	0.4379656
Error	517.97619	60	8.6329365			
Total	39093	64				
Corrected Total	921.60938	63				
a. R Squared = .438 (Adjusted R Squared = .410)						

Source: SPSS run

Table No. 10 Sig testing Hybrid on the basis of Preference 2						
Multiple Comparisons						
Dependent Variable:	Overall Score Hybrid					
Bonferroni						
(I) Which of these do you believe is the most suitable Project Management Methodology for the different kinds of Software Development?		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Agile Project Management Methodology	HYBRID (Agile + Traditional) Project Management Methodology	-4.6905*	0.9067439	1.68E-05	-7.164574	-2.216378
	Not Sure	0.5	1.4336879	1	-3.411892	4.4118921
	Traditional Project Management Methodology	3.5	2.2210598	0.7219489	-2.560277	9.5602771
HYBRID (Agile + Traditional) Project Management Methodology	Agile Project Management Methodology	4.6905*	0.9067439	1.68E-05	2.2163784	7.164574
	Not Sure	5.1905*	1.2823295	0.0009021	1.6915736	8.6893788
	Traditional Project Management Methodology	8.1905*	2.1265028	0.0017265	2.3882026	13.99275
Not Sure	Agile Project Management Methodology	-0.5	1.4336879	1	-4.411892	3.4118921
	HYBRID (Agile + Traditional) Project Management Methodology	-5.1905*	1.2823295	0.0009021	-8.689379	-1.691574
	Traditional Project	3	2.3990188	1	-3.545847	9.5458474
Traditional Project Management Methodology	Agile Project Management Methodology	-3.5	2.2210598	0.7219489	-9.560277	2.5602771
	HYBRID (Agile + Traditional) Project Management Methodology	-8.1905*	2.1265028	0.0017265	-13.99275	-2.388203
	Not Sure	-3	2.3990188	1	-9.545847	3.5458474
Based on observed means. The error term is Mean Square(Error) = 8.633.						
*. The mean difference is significant at the .05 level.						
Source: SPSS run						

5.5 Risk Mitigation using Traditional Project Management Methodology

Here we are conducting an one-way independent-samples analysis of variance (ANOVA) to evaluate the impact of organizational hierarchies on Risk Mitigation factor score for Traditional Project Management Methodology. Looking at table 11 we can say that there is a significant effect on the Risk mitigation score for Traditional Project Management Methodology, $F(2,61)=4.24$, $p=0.019$, $\eta p2=0.12$. From table 12, Bonferroni post hoc comparisons reports that there is significant difference between Executive Level($M=2.57$,$SD=0.99$) and Senior Management Level ($M=3.35$,$SD=0.94$). There is no signification difference between any other levels.

Table No. 11 Sig testing Risk Management on the basis of Organizational Hierarchies 1

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.448[a]	2	3.7237929	4.2429023	0.0188248	0.1221229
Intercept	534.38144	1	534.38144	608.87603	0.000	0.9089384
Q2_recode	7.4475857	2	3.7237929	4.2429023	0.0188248	0.1221229
Error	53.536789	61	0.8776523			
Total	631	64				
Corrected Total	60.984375	63				
a. R Squared = .122 (Adjusted R Squared = .093)						

Source: SPSS run

Table No. 12 Sig testing Risk Management on the basis of Organizational Hierarchies 1						
Multiple Comparisons						
Dependent Variable:	Risk Mitigation-Traditional					
Bonferroni						
(I) Organizational hierarchy		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Executive Level	Project Manager Level	-0.434783	0.3109163	0.5011773	-1.200194	0.3306288
	Senior Management Level	-.78*	0.2681691	0.0150263	-1.441113	-0.12076
Project Manager Level	Executive Level	0.4347826	0.3109163	0.5011773	-0.330629	1.200194
	Senior Management Level	-0.346154	0.3037532	0.7767381	-1.093931	0.4016235
Senior Management Level	Executive Level	.78*	0.2681691	0.0150263	0.1207599	1.441113
	Project Manager Level	0.3461538	0.3037532	0.7767381	-0.401623	1.0939312
Based on observed means. The error term is Mean Square(Error) = .878.						
*. The mean difference is significant at the .05 level.						
Source: SPSS run						

5.6 Verbatim Analysis

One of the key purposes of an open-end question is to capture data beyond the constraints of the close ended questions boundaries to reveal new unanticipated information (Sarwanto, et al., 2021). We were in fact able to capture new information with the open-ended question for the Traditional Methodology:

"It does not go well with the new technologies. Especially, when it comes to cyber security, traditional methodologies lack security aspect."

"All the tasks are carried out in a pre determined orderly sequence.The only weakness i see here is of new software..it might get difficult to define all the requirements upfront."

The above verbatims point us towards a lack of flexibility of the Traditional Methodology towards new software platforms and new technologies at a whole.

Almost all of the verbatims towards Agile Project Management Methodology had positive Reponses or a sandwich response still tilting more towards the positive aspect. A few of the key responses for Agile Project Management Methodology are as below

"The project is well distributed and channelised in the Agile Methodology as working within collaborative, transparent and continuous feedback in Agile working brings clarity and scope of improvement in short intervals rather in the end which results in a quality product delivery in the end achieving higher scope of work!"

"It's good for todays world project where requirment are evolving and changing by the time. It overruns the budgets due to changing requirment and completion of overall projects is also pushed and we cannot identify a fix date for completing the entire project."

Also, the below verbatim for Agile Project Management Methodology notably points out towards one of the vulnerabilities of Agile i.e. People. If the people working on the project fail to execute with full honesty the project might go for a toss.

"It's great but not necessarily the best. It all depends on the workforce (meaning the employees), respective team, and/or organizations. There was a time when the

process had to bypass in order to achieve unexpected last minute projects and some organizations/personnels even tried exploiting the same rather than following the SLAs."

Again, when it comes to Hybrid the verbatims were able to capture something which the close end questions didn't highlight as mentioned in the below verbatim.

"The combination of Agile and traditional project management give both advantages and disadvantages depending on the organisational environment as we are targeting to utilise the benefit of both the methodologies within the project work but this makes the working team/a more vulnerable as at constant interval there has to be a connecting point to bridge two working methods around the people involved."

This verbatim highlights one of the key weakness of Hybrid Project Management which the team following it has to face i.e. finding a balance between the 2 methodologies. Thus, it is evident that it is a constant challenge for the people using Hybrid Methodology to decide which parent methodology to turn to when they are posed with an issue or hurdle as both Traditional and Agile have opposing views and solutions.

A few key verbatims for Hybrid Project Management Methodology are as below:
"Hybrid brings in the best of traditional approach where we plan and execute things and gets best of Agile where the team and client is on board with the overall project and on time-to-time basis we have approval from client and have acceptance of the overall project across the board"

"The Hybrid approach can be a better choice to opt for if your organization is primarily based on the theory of competitive advantage, thus, accepting the fluidity of projects
Benefits: Both and consumers and developers accepts the deliverables at the early age."

While like the quantitative data most of the verbatims also label Hybrid Project Management Methodology as the better Project Management Methodology due to its flexibility .

5.7 Best Project Management Methodology for the IT industry

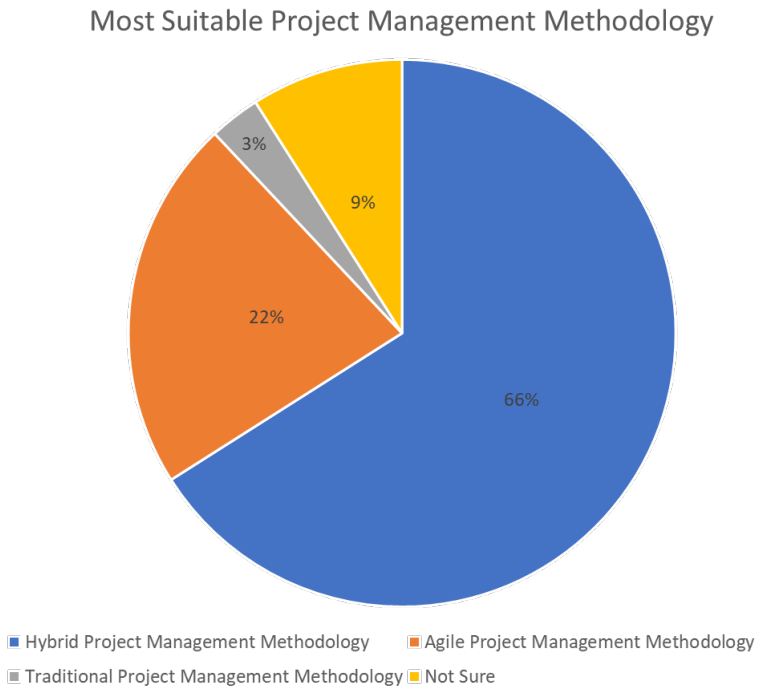

Fig 3: Most suitable Project Management Methodology

Looking at the response to Q24 in the questionnaire which asks the respondents to state the most suitable Project Management Methodology for the IT industry, there is little doubt that Hybrid (Agile + Traditional) Project Management Methodology is the respondents favourite. The Hybrid (Agile + Traditional) Project Management Methodology is perceived as the most suitable methodology across all organizational hierarchies. However, in Figure below we can see an interesting outcome when we aggregate the data based on the organizational hierarchy variable.

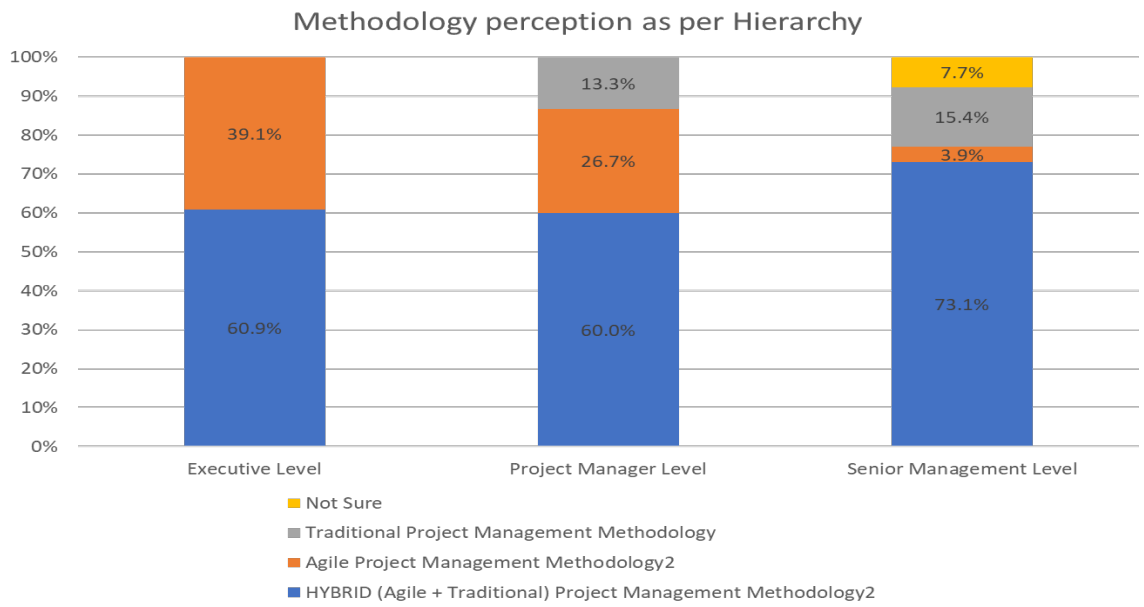

Fig 4: Most suitable project Management Methodology as per Organizational Hierarchy

The Senior Management level is more inclined towards the use of Traditional Methodology over the use of Agile as against the preference of the other 2 hierarchy levels (executive and project management), who prefer the Agile Methodology over Traditional. While all the respondents in each category prefer Hybrid, each of the respondents version Hybrid might be a bit different. While the Senior Management level might insist on a Hybrid methodology leaning more towards the Traditional Methodology, Executive and Project Management levels might adopt more features from Agile Methodology than Traditional Methodology. The analysis from this section and the analysis from section 6.3 provides a clear answer to our Research Question 3 (RQ3) and thus states that Hybrid Project Management Methodology is the best Project Management Methodology for the organizations in the IT industry within the constraints of this research.

5.8 Limitations

Unlike Agile and Traditional Methodologies Hybrid Method isn't bound by any rules. While not having any rules gives the user the freedom to take whichever feature they seem fit from the parent methodology to create their own version of Hybrid Methodology. This happens to be one of the limitations to this study. While we have defined Hybrid methodology as Agile+ Traditional Methodology the way it is

combined is upto the respondents and each respondent has answered as per their version of the Hybrid. While the difference between different versions of Hybrid might not be huge but still some respondents perception might vary from the other. In order to find a completely accurate analysis for this study it is suggested to carry the same study with different versions of Hybrid Methodologies.

As the boundaries to this study, we have considered 2 geographical regions, namely India and Ireland. Thus, our survey is limited by the thoughts and way of working in professionals in India and Ireland. While the findings of this study might represent the scenario of organizations in the IT industry in India and Ireland it might not be true and applicable to IT industries across the globe. A global study of much higher scale and sample is recommended to find the true representation of the Global IT scenario. One more limitation that arises due respondents cultural affiliations is cultural bias. Due to respondents exposure to specific cultural and working environments the respondents might develop a liking or dislike towards specific Methodologies which in-turn affects the survey results (Smith, et al., 2018). While we have used random sampling and 2 different regions to dilute this bias as explained in the Research Methodology section. It is still safe to assume we might see some bias in the responses.

The Neelu & Kavitha (2020) questionnaire evaluate the three project management methodologies for the six factors, Schedule & client, Scope & milestones, Budget & Productivity, Risk Mitigation, Resource Utilization and Quality. Thus, these factors act as boundaries for the study and any factors apart from these were not evaluated. In the open-end questions we see new factors like applicability to new technologies like cyber security, new software, top management preference and so on emerge as crucial factors in determining the preference to Project Management Methodologies. Thus, boundaries of this study might act as one of the limitations to the findings. To overcome this limitation, we suggest a detailed qualitative plus quantitative research to be performed in multiple iterations find much more concrete findings.

Chapter 6 - Discussions & Conclusion

6.1 Discussion

The aim of the study was to find the most suited Project Management Methodology for the organizations in the IT industry. For this purpose, we defined the boundaries of this study as a comparison between the three majorly used Project Management Methodologies in the IT industry, namely Traditional Project Management, Agile Project Management and lastly Hybrid (Agile + Traditional) Project Management. We compared these methodologies on the basis of the factors six factors Schedule & client, Scope and milestones, Budget & Productivity, Risk Mitigation, Resource Utilization and Quality listed down by Neelu & Kavitha (2020).

One of the major findings of the study was in relationship to the perception of respondents towards these methodologies as a whole and as per their performance for each of the factors. No matter what the case Hybrid Project management Methodology always came out on the top as the respondents favourite choice. When asked directly which Project management Methodology would be most preferred by the respondent for the IT industry, a staggering 66% agreed that Hybrid Project management is the most preferred followed by 22% for Agile Project Management Methodology and then Traditional Project Management Methodology at 3%. Apart from that when we asked the respondents questions on the performance of each of the methodologies on the six factors Schedule & client, Scope and milestones, Budget & Productivity, Risk Mitigation, Resource Utilization and Quality. Like the previous question here as well Hybrid Methodology scored the highest scores for each of the factors. One more striking feature is that none of the factor scores for Hybrid Project Management Methodology were below 4 in a 5-point scale showing that the respondents have extreme likability towards Hybrid Project Management Methodology. The Agile Project Management Methodology received the next highest score followed by Traditional Project Management Methodology. Agile and Hybrid Project Management Methodologies had tied for a score of 4.02 for Scope and milestones.

In order to understand how the respondents who preferred one specific methodology felt about the performance of the other methodologies we used the ANOVA test

described in the Findings and Analysis. As an example, here we are trying to understand how the respondents who say their most preferred methodology is Traditional Project Management Methodology would rate the factors for Hybrid and Agile Methodologies and if there is any significant difference in their scores towards these methodologies in comparison with traditional. It was found that the respondents who preferred Traditional Project Management Methodology as the most suitable Project Management methodology for the IT industry scored the factors for Agile Project Management much lower than the people who selected Hybrid or Agile as the most preferred methodology for the IT industry. Similarly, It was found that the respondents who thought Agile project Management is the most preferred methodology for the IT industry gave a significantly lower score for the factors of Traditional Project Management in comparison to people who thought that Traditional Project Management is the most preferred methodology. Factor scores for Hybrid Project Management Methodology don't show any significant difference irrespective choice of the respondent for the most suitable Project Management methodology for the IT industry. The main reason for the significant difference in the mean scores for the Traditional and Agile factors by the respondents preferring the other factor can be tied back to the fundamental rules which each of the methodologies follow. These rules for these two methodologies seems to be exactly opposite at many instances (Rasheed, et al., 2021). For example, at the core Traditional Project Management plans for the entire project at the start while Agile Project Management follows planning on the go. Such exactly opposite ideologies can be a reason why respondents who say Agile is the most preferred Methodology in the IT industry would believe the Traditional Project Management's performance on the factors might not be good enough and respondents preferring Traditional Project Management might believe that Agile Project Management performance is not suitable as per their needs. This establishes the fact that there is a significant difference in the ideologies people in favour of Traditional Project Management and the people who are in favour of Agile Project Management.

While deep-diving in to the factors and testing them based on the organizational hierarchies we saw some interesting findings for the Risk Management factor. We found that respondents belonging to Senior Management level had significantly higher belief in the risk management capabilities of the Traditional Project

Management Methodology than the respondents belonging to the Executive level. An effective risk management is a result of strong values and governance of senior management in any given organization (Haq, et al., 2018). Thus, the Senior Management has a crucial role to play in Risk Mitigation strategies for any organization. For what concerns Risk Mitigation, the best strategy to mitigate the risks consists of fully identifying the risk (DuHadway, et al., 2019), and the risks can be identified only by having an in-depth planning in place (HORNE, 2017). As discussed in literature review section 3.2.2, Traditional Project Management invests lot of efforts and time in planning for the project and thus the score and perception of the Senior Management level towards the Risk Mitigation seems justified. Thus, in agreement with the Senior Management respondents of the study we can say that Traditional Project Management can be considered when it comes to managing and mitigating risks. Also, when creating a Hybrid Methodology, the Risk Mitigation strategies from Traditional should be adopted instead of adopting them from Agile. While there is a significant disconnect between the perception of the Executive level and the Senior Management level on the Risk Mitigation score the reason for this disconnect should be investigated as a future scope to this study. This might reveal interesting results and further strengthen the hybridization of Project Management Methodologies.

While at the start of the research we would have expected a preference of respondents towards Traditional Project Management being the respondents' choice after the Hybrid Project Management Methodology, in agreement with the views of Pace (2019) and Serrador & Turner (2015). However, our analysis suggests a different result: Agile Project Management is preferred over Traditional Project Management Methodology for every single factor we tested in our questionnaire taken from the Neelu & Kavitha (2020). One way to explain this result would be as stated by Bianchi & Amara (2021), would be the tendency of people to resist changes and be comfortable in doing what they have been doing before. This in our case would be if the organization inherently uses Agile methodology for most of their project, they will continue using it even when they encounter a new project not fit for Agile. This habit of using Agile will hinder them from exploring new methodologies which might be a better fit for the new project. Certain factors like Risk Management, Resource Utilization and Scope & Milestones are addressed better using a

Traditional Methodology rather than an Agile Methodology due to the detailed planning that goes behind it. However, these factors have scored less than Agile in our survey. This strengthens the argument that respondents who use Agile will continue using Agile as they will feel it is the best fit for every project instead of exploring new methodologies which might yield better results and the same can be said to be true about the Traditional organizations as well.

Our research supports the findings of Gemino, et al. (2021) that used a different approach to compare the three Project Management Methodologies to arrive at the same conclusion: the Hybrid Project Management Methodology surpasses its predecessors as a superior Project Management Methodology. However, Gemino, et al. emphasised that the success of Hybrid is contingent to the people accessing the methodology and how it is combined from its parent methodologies. Other features that also affect the success of the Hybrid methodology are the alignment of the methodology with the organizational goals, lack of proper support at the execution or the individual contributor level, lack of teamwork and lack of knowledge and management skills by the project owners (Sithambaram, et al., 2021). Further emphasis is provided to team or the skill of the individuals implementing Hybrid Project Management, as also seen in a research by Albrecht & Albrecht (2021), which states that professionalism in executing the methodology honestly and knowledge of the parent methodologies and the competence in implementing them are the key success factors in Hybridization of different Project Management Methodologies (Albrecht & Albrecht, 2021). A support for this is again seen in our study as highlighted in section 6.5 of this paper, in one of our open-ended questions which states the below.

“The combination of Agile and traditional project management give both advantages and disadvantages depending on the organisational environment as we are targeting to utilise the benefit of both the methodologies within the project work but this makes the working team/a more vulnerable as at constant interval there has to be a connecting point to bridge two working methods around the people involved.”

This shows while hybridization can be a bit challenging for the team but with the right individuals as at constant intervals they will be torn in between choosing which of the

parent methodology to implement for the upcoming challenge. But with the right set of skilled individuals this can be a massively useful tool to make the most of the organizations strengths and overcome its weaknesses.

6.2 Conclusion

The results of our research clearly support the findings from the literature reviewed on the topic: Hybrid Project Management Methodology is the best Project Management Methodology for the Organizations in the IT industry to adopt.

One of the key strengths of Hybrid Project Management Methodology is that it has high preferability as compared to the other two Methodologies across all the organizational hierarchies (i.e. at an executive level, project manager level or senior management level). Thus, as all hierarchies support Hybrid Project Management Methodology, transforming the organization from a Traditional or an Agile dominant environment to a Hybrid Environment will be easily accepted by everyone from the top Senior Management level to the lower Executive levels. In addition to preference, all organizational hierarchies have scored Hybrid Project Management Methodology the highest when it comes to the performance in terms of the six factors Schedule & client, Scope & milestones, Budget & Productivity, Risk Mitigation, Resource Utilization and Quality that we tested them for. Another strength of Hybrid Project Management as per our sample is Risk Management, where this has scored a 4.2 mean score out of a 5-point scale. This finding is in line with the fact that organizations tend to adopt Hybridized methods when the project is faced with high risk (Costantini, et al., 2021). Also, all the factors, Schedule & client, Scope & milestones, Budget & Productivity, Risk Mitigation, Resource Utilization and Quality, have acquired a score of above 4 from a 5-point scale highlighting the fact that Hybrid Methodology is not only better in comparison with the other methodologies but has a near to excellent performance.

Hybrid Project Methodology can have many versions. However, finding the right combination and balance to meet the organizations goals is the biggest challenge (Bianchi, et al., 2021). And it is up to the people working in the organization to figure this out. Which methodologies to Hybridize and how much to take from each methodology is up to the team or the Project Manager to decide. Once the right fit is found, the correct Hybrid Methodology can provide strong results for the

organizations, which neither of the traditional or Agile methodologies individually couldn't have produced. As it is commonly agreed in the Project Management field "One Methodology can never fit all Projects" however Hybrid in itself isn't just one Methodology. It is the best of all the Methodologies that it is created from so it just might be the "one that fits all".

6.3 Recommendations

One of the biggest recommendations from this study, back to the organizations in the IT industry, to start embracing organizational ambidexterity in the form of making the most out of what they already know (old certainties) and giving a shot to new possibilities (Sanchez, et al., 2019). It is seen across organizational hierarchies that people do not have an affinity towards a specific kind of Methodology. People like to have the best of both worlds by incorporating the positives of both the methodologies together and in the process eliminating their negatives. While Traditional Project Management Methodology gives a concrete plan for handling a project and Agile handles the challenges as they come people would like to have both of these benefits while working on Projects. At least as a starting point Organizations strictly loyal to either of the Traditional or the Agile Methodology are recommended to list out the major challenges that they face in their projects and should try overcoming it by the use of the other methodology. For e.g. If Organizations following Traditional Project Management Methodology feel that poor client feedback at the end leading to change request is a major problem in their projects, they should try implementing the partial delivery approach from Agile Project Management Methodology and see if they have positive approach and vice a versa. Such small steps will start a Hybrid mentality in the organization thus leading to longer term transition to a fully Hybrid environment which adapts to the positives of any Methodology as per requirements. This, Hybrid environment will not be confined by the boundaries or rules of a specific Methodology but will create an optimal environment for project success every single time. Also, this project success will be will not be inclined to purely Senior Management Satisfaction like in case of Traditional Methodology or Client Satisfaction like in the case of Agile Methodology but will provide high level of satisfaction to both the parties.

6.4 Limitations

As already mentioned, one of the biggest limitations of this study concerns the limited literature in the field of Project Management. Very few academic papers are available in this field, thus there is very few reliable references to provide validation to the practices, thoughts and processes that are actually followed in the industry.
While there was sufficient research done for the Agile Project Management Methodology, there still wasn't enough good recent research content available for Traditional Project Management Methodology and for Hybrid Project Management Methodology as well. The lack of research for Hybrid Project Management Methodology is justified as it is a fairly new concept.

Another limitation of the study concerns our sample. We have randomly selected respondents from few organizations scattered across India and Ireland. While, we have tried our best to eliminate biases using random sampling in two countries, the sample might be prone to some regional bias. One additional limitation of the sample would be it might not be an exact representation of the sample of the IT industry as the IT industry is constantly changing. Also, different regions around the globe follow different practices in their organizations to reach a specific goal. One way to fix both of these limitations would be to conduct a global research with a much higher and targeted sample of respondents from the IT industry.

The scope of the study was to investigate the best Project Management Methodology from Traditional, Agile and Hybrid based on 6 factors stated in Neelu & Kavitha (2020). There might be other factors and Project Management Methodologies beyond the ones considered in our research that might need investigation to truly conclude that the Hybrid Project Management Methodology is the best Methodology for the IT industry.

6.5 Future scope

We have conducted a quantitative study with a small sample randomly selected from Individuals in the IT industry. An extension to our research would be to see a qualitative and a quantitative run simultaneously. Also, the sample should be much larger and targeted respondents from the IT industry should be selected. This high-quality sample coupled with the option for the respondents to express their emotions

towards the factors in addition to quantify the factors performance will yield a much more complete result to this study. Also, other prominent Project Management Methodologies, as Lean Six Sigma, PRINCE2, CPM etc. could be included in the research. Thus, giving the research results a wider range of accuracy across different methodologies.

In the Findings and Analysis section we observed that Senior Management has a significantly higher trust in the Risk Management capabilities of Traditional Project Management than the Executive level. The perception of Senior Management towards Traditional Project Management is justified in terms of Risk Management due to the heavy planning that goes into it and the systematic evaluation of risks. However, the reason for this divide in the organizational hierarchies should be further investigated. This research should only be towards the perceptions of the IT industry towards the Risk Management strengths and weaknesses of Traditional, Agile and Hybrid Project Management Methodologies.

Looking at the Findings and Analysis section we can see that there is a significant difference in the overall perception of the Traditional Methodology in terms of risk mitigation at the Senior Management Level and the Executive Level. There can be in-depth analysis of which features of the Traditional Methodology makes it actually risk prone or risk free and further investigate the reason for the difference in perception.

Hybrid Methodology in itself is a combination of various methodologies. Thus, the way in which these methodologies are combined differs from Project to Project and from user to user. Some users might take 30% of their features from Agile and 70% from Traditional. Some users might use the exact opposite combination in a similar situation. Some users might even add features of other Methodologies like Lean, PRINCE2 to the mix. Thus, it would be important to see the results of how the top Hybrid Methodologies of that time perform when compared against each other. A similar study with these different top performing versions of the Hybrid methodology can be conducted to evaluate their performance.

Appendix

Appendix A – Questionnaire

1. Which of the following best describes your position in the organization?
    1. Programmer/ Developer
    2. Quality Analyst/ Software Tester
    3. Software Architect
    4. Software Engineering
    5. Consultant
    6. Project Manager
    7. Management level Executive (Team Leader, Team Manager, Sr. Manager etc.)
    8. Other (please specify)

2. Do you agree that while using Traditional Project Management Methodology the team is aware of the project status and is effective in achieving higher client satisfaction level?
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

3. Do you agree that while using Traditional Project Management Methodology the approach to achieve targets for the project are well aligned with the client and the individual contributor goals?
    1. Strongly disagree
    2. Disagree
    3. Neutral
    4. Agree
    5. Strongly agree

4. Do you agree that while using Traditional Project Management Methodology the specified budget targets are met and we are able to see an increased productivity?
    1. Strongly disagree
    2. Disagree

3. Neutral
4. Agree
5. Strongly agree

5. Do you agree that while using Traditional Project Management Methodology the risks with the project are addressed effectively and the opportunities are well capitalized on for a smooth execution?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

6. Do you agree that while using Traditional Project Management Methodology there is effective utilization of all the available resources and there is an internal harmony while execution?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

7. Do you agree that while using Traditional Project Management Methodology the overall quality of the project is much higher leading to a higher client satisfaction?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

8. Overall, what are your views about Traditional Project Management Methodology in general (it's strengths, weaknesses etc.).
(Open end)

9. Do you agree that while using Agile Project Management Methodology the team is aware of the project status and is effective in achieving higher client satisfaction level?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

10. Do you agree that while using Agile Project Management Methodology the approach to achieve targets for the project are well aligned with the client and the individual contributor goals?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

11. Do you agree that while using Agile Project Management Methodology the specified budget targets are met and we are able to see an increased productivity?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

12. Do you agree that while using Agile Project Management Methodology the risks with the project are addressed effectively and the opportunities are well capitalized on for a smooth execution?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

13. Do you agree that while using Agile Project Management Methodology there is effective utilization of all the available resources and there is an internal harmony while execution?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

14. Do you agree that while using Agile Project Management Methodology the overall quality of the project is much higher leading to a higher client satisfaction?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

15. Overall, what are your views about Agile Project Management Methodology in general (it's strengths, weaknesses etc.).
(Open end)

16. Do you agree that while using Hybrid (Agile + Traditional) Project Management Methodology the team is aware of the project status and is effective in achieving higher client satisfaction level?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

17. Do you agree that while using Hybrid (Agile + Traditional) Project Management Methodology the approach to achieve targets for the project are well aligned with the client and the individual contributor goals?

1. Strongly disagree
2. Disagree

3. Neutral
4. Agree
5. Strongly agree

18. Do you agree that while using Hybrid (Agile + Traditional) Project Management Methodology the specified budget targets are met and we are able to see an increased productivity?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

19. Do you agree that while using Hybrid (Agile + Traditional) Project Management Methodology the risks with the project are addressed effectively and the opportunities are well capitalized on for a smooth execution?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

20. Do you agree that while using Hybrid (Agile + Traditional) Project Management Methodology there is effective utilization of all the available resources and there is an internal harmony while execution?

1. Strongly disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly agree

21. Do you agree that while using Hybrid (Agile + Traditional) Project Management Methodology the overall quality of the project is much higher leading to a higher client satisfaction?

1. Strongly disagree

2. Disagree
3. Neutral
4. Agree
5. Strongly agree

22. Overall, what are your views about Hybrid (Agile + Traditional) Project Management Methodology in general (it's strengths, weaknesses etc.).
Open end

23. What do you believe is the most suitable Project Management Methodology for the different kinds of Software Development? (Single response)

1. Hybrid(Agile + Traditional)
2. Agile Project Management Methodology
3. Traditional Project Management Methodology
4. Other (Please specify)
5. Not Sure

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