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## **Being Agile: The Influence of Agile Project Practices on the Project Team Productivity**

المنهجية الرشيقية: أثر ممارسات المشاريع الرشيقية  
على انتاجية فريق المشروع

by

**ZAINAB AHMED AL HAMMADI**

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of the requirements for the degree of  
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## **ABSTRACT**

Agile project practices and methods have gained more popularity and broadly used due to various benefits. The agile project management sound alternative to the traditional project management and its methods characterised as being flexible and the project is done in iterative approach where deliverables or outcomes are expected at the end of each sprint. It is reported that agile project practices have both negative and positive impact on the project team productivity. The main purpose of this qualitative research is to critically assess the concept of agile project management and to better understand the effect of using agile project practices on the project and how does it affect team's productivity.

In this research both primary and secondary sources are used to collect necessary data concerning the research topic. The secondary data is collected from relevant literatures, selected government departments' websites and their periodic documents, while the primary data is gathered through in-depth semi-structured interviews with employees at different position and from different department. The theoretical reviews show that agile project management and practices lead to positives results and also some negative outcomes have been identified. The study shows the results of the group interviews conducted at three different government organisations based in the U.A.E. with a total of 13 people from different departments. The findings show that the implementation of agile practices result in positive impacts and outcomes in the three selected projects, although the results vary among the three, as the practices are found to be implemented partially in some projects or ineffectively. In addition, some negative impacts of using practices have been identified. In terms of productivity, most of the used practices showed positive impact on productivity and some affected the productivity indirectly. Whereas, practices such as open office design is found to have both negative and positive impact on productivity, but actions have been taken to minimise its negative impacts.

The main limitation to this study is that it only examined three projects and the respondents' number is thirteen, where the researcher believes that more projects and respondents will add more insight and value to the outcomes. Thus, for future studies, it is recommended to examine more projects and interview more respondents to get more accurate and valid results.

**Keywords:** agile project management, agile project team, team's productivity, agile project practices, communication effectiveness, knowledge sharing, visibility, change requirement, pressure and stress

## الملخص

في السنوات الاخيرة، اكتسبت ممارسات وطرق المشاريع الرشيقة شعبية أكبر وأصبحت تستخدم على نطاق واسع بسبب الفوائد الناتجة عن استخدامها. هذا وتعتبر إدارة المشاريع الرشيقة بديلاً لإدارة المشاريع التقليدية حيث إن طرقها تتسم بالمرونة ويتم تنفيذ المشروع في نهج تكراري يتوقع منه تحقيق النتائج في نهاية كل سباق. يقال أن ممارسات المشاريع الرشيقة لها تأثيرات عدة على أداء فريق المشروع سلبية وإيجابية على حد سواء. يتمثل الهدف الرئيسي من هذا البحث الكمي في محاولة تقييم مفهوم إدارة المشاريع الرشيقة وفهم تأثير استخدام ممارسات المشاريع الرشيقة على إنتاجية فريق المشروع.

في هذا البحث، يتم استخدام كل من المصادر الأولية والثانوية لجمع البيانات الضرورية المتعلقة بموضوع البحث. حيث يتم جمع البيانات الثانوية من الأدبيات ذات الصلة، والمواقع الإلكترونية للدوائر الحكومية المختارة لهذا البحث ووثائقها الدورية، في حين يتم جمع البيانات الأولية من خلال مقابلات متعمقة شبه منظمة مع موظفين من الجهات الحكومية المختارة ومن إدارات مختلفة عملت معاً على المشروع الذي تم اعتماده لهذا البحث. المراجعات النظرية لهذا البحث تظهر أن إدارة المشاريع والممارسات الرشيقة تؤدي إلى نتائج إيجابية، كما تم تحديد بعض النتائج السلبية. تُظهر الدراسة لنتائج المقابلات الجماعية التي أجريت في ثلاث منظمات حكومية مختلفة مقرها في دولة الإمارات العربية المتحدة. مع ما مجموعه ١٣ شخصاً من مختلف الإدارات. وتبين النتائج أن تنفيذ ممارسات المشاريع الرشيقة يؤدي إلى آثار ونتائج إيجابية في المشاريع الثلاثة المختارة، على الرغم من أن النتائج تختلف بين الثلاثة. حيث يتبين أن الممارسات تنفذ جزئياً في بعض المشاريع أو بشكل غير فعال. بالإضافة إلى ذلك، تم تحديد بعض الآثار السلبية لاستخدام ممارسات المشاريع الرشيقة. من حيث الإنتاجية، أظهرت معظم الممارسات المستخدمة تأثيراً إيجابياً عليها حيث يؤثر بعضها بشكل غير مباشر. في حين أن تصميم المكاتب المفتوحة وجد لها تأثير سلبي وإيجابي على الإنتاجية، ولكن فرق المشاريع التي تمت دراستها اتخذت بعض الإجراءات لتقليل آثارها السلبية إلى أدنى حد.

أما من حيث المعوقات أو القيود التي واجهت هي هذه الدراسة هي أنها ركزت على دراسة ثلاثة مشاريع فقط و إجمالي عدد الأشخاص الذين تم عمل المقابلات معهم هو ثلاثة عشر فقط، حيث يؤمن الباحث أن دراسة المزيد من المشاريع وعمل مقابلات مع شريحة أكبر سيضيف المزيد من المعرفة ويثري النتائج. لذا يوصي الباحث للدراسات المستقبلية، دراسة المزيد من المشاريع وإجراء مقابلات مع شريحة أكبر من فرق المشاريع للحصول على نتائج أكثر دقة وصحة.

كلمات البحث: إدارة المشاريع الرشيقة، فريق المشاريع الرشيقة، إنتاجية الفريق، ممارسات المشاريع الرشيقة، التواصل الفعال، تقاسم المعرفة، وضوح المشروع، متطلبات التغيير، الضغط والإجهاد.

## DEDICATION

To my beloved family who have meant and continue to mean so much to me, specially my mum and to the soul of my father.

There are a number of people without whom this dissertation might not have been written, and to whom I am greatly indebted, my supervisors and friends.

Thank you all  
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## **List of abbreviation**

AP	Agile Practices
APM	Agile Project Management
APP	Agile Project Practices
LR	Literature Review
MOM	Minutes of Meeting
PM	Project Management
TPM	Traditional Project Management

# **1. CHAPTER (1) – INTRODUCTION**

This Chapter is an introduction to the background and problem associated with the concept of agile project management (APM) that leads the researcher to this research paper. It concisely presents the problem, its consequences and identifies the critical objectives of the research. It further highlights the significance of this paper, the limitation to this research and the questions the researcher will attempt to answer. It also gives an insight into the structure of this dissertation.

## **1.1 Research Overview**

Over the last century, projects around the world went through significant and constant changes within their contexts that threatened their continuation and profitability; however, a number of these projects adapted to these changing conditions through the implementation of different agile practices (AP) and methods innovated during this period (Maskell, 2001). However, then things have changed, and today's projects operate in a highly competitive and continually changing environment where requirements change quickly and are unpredictable due to various factors such as the emergence of new technology, which transforms everything. Thus, the old practices of getting things done have become less effective or obsolete, and project teams face difficulties in delivering projects successfully (Tersine & Wacker, 2000). Organisations around the world confront challenges from two directions; newer technologies that make the existing one obsolete and the increasing demand for innovative products and services within a short period (Ho et al., 2005)

Cervone (2011) highlights that defining the requirement of the project can be intensive and taking a considerable time that technological needs change before the project begins. Serrador & Pinto (2015) add that the causes of failure in many projects are the lack of an efficient technique and method of managing the need for agility in the project, excessive rework and ever-changing technological needs. They explain that most problems generally caused by the traditional project approaches have been answered in recent years by the implementation of APM. Dyba & Dingsoyr (2008) suggest putting less emphasis on initial planning and allowing for a more developmental process, in this case, the management of the project would be more efficient and planning would be done throughout the project.

Late of the last century especially after the publication of the Agile Manifesto in 2001, Schwaber (2004) states that a new approach for managing projects, particularly IT projects has emerged leading to developing many methods that share common values and concept known as “agile methods”. Lagerberg et al. (2013) highlight that the Agile Manifesto report contains some values upon which the APM based on. It also covers a set of principles that presents how to apply the values to different areas. Besides, several APs are considered more concrete in which this research will focus on and the impact will be produced from using these practices. The thorough literature reviews (LR) show that more than ten agile methods are being used by different industries around the world and most of them share common practices and principles like iterative development, iteration planning and less emphasis on documentation (Meng et al., 2007).

After the publication of the Agile Manifesto, the software development projects have been considerably transformed, due to the introduction of the agile project methods, to name a few

scrum, XP and kanban that are promoted as a contrast to the traditional, plan-driven approach to IT projects due to its various benefits (Dyba & Dingsoyr, 2008 and Bowles, 2012). These methods are developed due to the crisis that the project failed to meet the deadline and the quality of the end results was not up to the standard or client expectation. Therefore, to prevent such a situation in projects, controls with agility have been required. Since changes always occur in all type of projects, the project team needs an approach that enables them to adapt the project to these changes as smoothly as possible.

The research of Schatz & Abdelschafi (2005) reveals that APM is gaining more popularity and growing due to increasing number of successful project that changes to agile management. They elaborate that project plans are made to be flexible allowing for changes to be done even at later stages of the project life cycle and to avoid project delays; flexible approaches use the time-box (sprint) concept, which means that deadline (time and date) replaces the activities. This means that regardless of the total number of activities that have been finished, the project stages end on a set date. According to Schwaber (2004), this means that regarding management and control, both the project team and the client must continuously prioritise and reprioritise the project tasks and activities before the agreed deadline.

The agile methods and practices are claimed to correlate positively with the project success delivery and leads to many benefits to the project to name just a few; improve communication, improve project visibility, knowledge sharing, improve the quality of end results and boost productivity (Pikkarainen (2008). In his overview of AP, Highsmith (2009) reports that 89% of respondents stated an increase in productivity and 84 a reduction in the

number of errors, while a decrease in project duration represents 82% of the respondents and 66% a cut in cost. In addition, the reviews show that the project success can as well be affected other factors that contribute to weak performance of the team such as unclear goals, lack of skilled members, weak project team structure and team and lack of top management involvement and support (Drury-Grogan, 2014).

In a study to investigate whether agile approaches have a more significant positive influence on the project in comparison with the traditional project management (TPM), Serrador and Pinto (2015) surveyed 859 people representing around one thousand projects across different industries. Interestingly, their research shows that less expert and experienced members achieve higher results in agile projects. While, Chakravorty et al. (2014) summarise the characteristics as early involvement of the client in the project and throughout the project, reprioritisation of the requirement according to the client's needs, iterative practices and flexible development conditions with reducing the amount of documentation and complexity management.

Concerning the impact of APs, the review of pieces of literature shows that APs have a significant positive influence on the project performance. Claims of the effect are classified into different categories. First, both Beck (1999) and Highsmith & Cockburn (2001) indicate that productivity is boosted through dividing the project into small pieces of works and concentrating on most prioritised requirements, thus creating a working environment that people wish to be part. Second, Fowler & Highsmith (2001) claim that agile ways develop trust between the project team and their stakeholders because of the integration and continuous involvement of stakeholder in the project as the project is performed in iteration

and involvement of stakeholders is important to re-prioritise the requirement and plan the next cycle. Third, Highsmith & Cockburn (2001) state that the iterative approach allows the project team to have better control, deliver better and more often over the project lifetime, thus increases the success rate and reduces risk.

However, for all of its benefits, agile approach is something of a double-edged sword. The agile project approach is associated with several challenges and limitations that are reported by researchers in this field. Through the number of researchers who discuss the positive influence of using Aps, some dubious reports confirm the negative results of implementing APs such as a decrease in controllability and additional risks which lead to poor performance Schwaber (2004). Moreover, lesser emphasis on documentation may result in knowledge loss particularly in the long-run Stettina & Hijstek (2011), and the concentration on regularly delivering results may put extra pressure and stress on the project team to deliver faster that triggers other issues; accordingly, affecting the project overall (Stray et al., 2012) and (Strode et al, 2012). Therefore, a need for further studies on possible impact and results of introducing APs in a project is required.

Based on the LR, it is found that different agile methods have different practices in which some of them are common. In addition, it the findings show that scrum method is one of the broadly used methods; thus, this research will focus on mostly on the practices of the scrum to name a few; iterative development, iteration planning and daily meeting.

## **1.2 Research Problem**

Several researchers such as (Nilsson, 2008) have claimed that when issues occur in projects with traditional management approach, the project team has to go back to the earlier stages in order to resolve the issues, leading to significant re-works, delays and cost overruns. This is because the traditional methods of project management (PM) focus on upfront planning for requirements and control, which may take a long time and various resources.

In agile project methods as reported by (Schwaber, 2004), the plan for the project is made to be flexible allowing for changes to be made at any point in the project even at late stages. It allows the project team to go through a process of planning, implementing and evaluating as the project moves forward resulting in many benefits such as the flexibility of the project team which enables them to accept changes as well as increasing customer involvement, delivering results earlier and improving teams performance and productivity (Sommer et al., 2015).

In the area of organising events, Getz (2005) states that the research studies show that planning and organising public events is associated with difficulties and complexity that includes weather condition and inadequate resources. In addition, changes frequently occur at any time during the implementation phases as well as during the operation phase and what makes it more challenging is that the event dates is something can not be negotiated. In general, changes or events may occur suddenly resulting in a change in priorities overnight; therefore, the traditional management practice is not sufficient to address rapid changes in this

type of projects as well. Thus, it is essential for the event team to be agile to respond swiftly to any matter.

Sheffield & Lemétayer (2013) express that agile methods and practices are originated and used mostly in the IT industry; however, agile management is now being used in other industries and business. Additionally, the implementation of APM in software development industry is well established and researched (Mishra & Mishra, 2008). However, more empirical studies are needed to investigate the practical results of agile project practices (APP) implementation in different industries. Melo et al. (2011) says although agile methods are widely accepted and used; however, more empirical researches are required on the effect of the APs on productivity and this type of research could assist the management where to focus its efforts to improve productivity. Moreover, the research on the result of the implementation of APs is still scarce in other industries and the empirical evidence to the reported impacts is thin; therefore, a number of researchers have asked for more empirical studies on the influence of APs and methods (Dyba & Dingsoyr, 2008). Thus, this research paper will cover government organisations based in the U.A.E.

### **1.3 Research Scope and Limitation**

The focus of this dissertation is on some practices that are mostly based on Scrum method. One of the reasons for selecting these practices is that these practices can be used in any project without the need to apply the agile method itself. Additionally, this research aim on

government organisations based in the U.A.E. particularly the Emirates of Sharjah and Dubai and all projects are not owned by the IT team; however, they are involved in all projects.

The LR findings show that there are other factors related to human factors and organisational factors that lead to the successful implementation of APM. However, due to the limitation of this dissertation, these factors will not be covered and examined in this research paper.

#### **1.4 Research Aim and Objectives**

The focus of this research paper will be on APs and the ultimate aim is to gain a better understanding of the influence of embracing APs and identify which of the mentioned practices are most significant for the team's productivity. The understanding will be obtained by studying three different projects that are chosen based on the different extents of implementing APs they have adopted. The following are the key objectives of this research:

- To critically evaluate the concept of APM and the impact of using APPs on the project team's productivity
- To develop a conceptual framework based on the findings of the intensive LR on the APs impacts and effects
- To investigate how the implementation of APPs influences the project and the team progress
- To examine the most used and influential APPs and their actual contribution to the projects

### **1.5 Research Question**

The research paper focuses on APM particularly the APPs of the most popular methods, scrum. In this research paper, the researcher would like to critically assess the possible impact of implementing APPs. Thus, this paper will attempt to answer the question of *“What are the impacts of implementing APPs on the project team productivity?”*

### **1.6 Significant of Study**

This study is significant particularly for leaders, project managers and all those who are in charge of the long-term health of their organisation and projects, as it will introduce them to the concept of agility and its significance for projects. It also shows how the use of APs affect the project and its member, thus get a better knowledge about the project APs.

### **1.7 Dissertation Structure**

The following sections of this research paper are structured as follow:

Chapter One: presents an introduction to the study and the purpose and objectives of this research. This Chapter as well outlines the theoretical background and justification of the significance of this study.

Chapter Two: a review of related literature and studies where each section of this Chapter focuses on a critical subject area such as the concept and meaning of project agility, its importance, characteristics and influence on the project.

Chapter Three: highlights the proposed conceptual framework based on the finding of the LR, which will be used for the research purpose of data collection and analysis.

Chapter Four: presents the research design and discusses the appropriate methods for data collection and analysis in an attempt to address the aim and objectives of this research.

Chapter Five: describes the results of the group interviews data and discusses the main findings for each project separately in order to be used for the cross-analysis

Chapter Six: describes the cross-analysis of the outcomes of the three selected projects and discusses the main findings based on the findings of the LR.

Chapter Seven: presents a concise conclusion of the research, limitation and key recommendation for future works as well as the research contribution.

## **2. Chapter (2) – Literature Review**

### **2.1 Introduction**

In this Chapter, the vital information about agility from multiple viewpoints will be presented and a brief on its evolution up to recent days will be highlighted. It also addresses the differences between TPM and APM as well as the critiques of TPM. In addition, it explains the characteristics and impacts of agility on projects and how does it support the project team to take on challenges, respond to change requests and enhance their productivity.

### **2.2 Historic Origins and Evolution**

The development of agile methods and practices according to Iivari et al. (2004) was in the early 1990s in an attempt to replace the existing heavyweight systems that involve detailed planning, firm project role division and extensive documentation throughout the project, which often results in unsuccessful implantation of the project. Similarly, Chow & Cao (2008) claim that APPs first emerged as a replacement for the traditional methods used to develop software projects. In comparison, Dyba & Dingsoyr (2008) say that agile methods and practices are designed to be lightweight to promote an active, quick and flexible development under changing or uncertain circumstances and time pressure. The philosophy stresses the significance of individuals and their interaction, delivery of early results, effective response to change, teamwork and collaboration with clients. In addition, agile approach allows the team to continually plan the project requirement and tasks as the project moves

forward, which enables them to respond fast to changes in the project requirement and scope. Moreover, in lieu of delivering the whole project at the end, agile approach enables the team to deliver frequent releases of the project throughout the project (Chow & Cao, 2008).

However, thorough LR results show that the notion of agility first used in 1950s within the social sciences according to Parsons et al. (1953). However, Yusuf et al. (1999) claim that it is only gained considerable attention in management discussions in the late of twentieth century after the publication of a research work so-called “Lehigh report” in 1991 conducted by a group of scientists and researchers at the Iacocca Institute of Lehigh University and sponsored by the U.S. Government (Iacocca Institute 1991 and CEST 1996). They coin and promote the embracing of agile manufacturing strategies to ensure the competitiveness of American businesses due to the emergence of digital technology and globalisation. Beck et al. (2004) state that around that time, agile approaches and practices start to emerge in software industry resulting in the publication of the “Agile Manifesto” in 2001 (refer to Appendix A), which leads to extensive research in this area.

Later, mainly after 2000, the concept of agility spreads quickly from manufacturing literature and becomes widely used in different areas such as strategic management, innovation management, organisational and project management (PM) literature as a tool to address the issues related to the dynamic environment. Since then, it causes a revolution in the way projects are managed and recently its methods and practices are gaining more and more attention as claimed by Dyba & Dingsoyr, (2008). Similarly, Bowles (2012) notes that according to Agile Manifesto’s authors, agility will become more significant due to its recognised response to change within the project environment. He says that agile approaches

are more beneficial for all types of projects, holistic and appropriate everywhere in business or life. It is crucial to use APPs in any project that faces uncertainty.

Researchers such as Ansoff & Sullivan, (1993) say that an environment is seen as dynamic when changes happen suddenly, frequently and challenging to be predicted as well as have impacts on a project. Sharfman & Dean (1991) and Kettunen (2009) say that competition; technological innovation and market diversity are the most factors causing the instability and change continuum. Scholars such as Tushman & O'Reilly (1996) agree with them and add critical changes in economic and political conditions as a fourth factor. The force of these changes has put businesses with new challenges as mentioned by (Zain et al., 2005).

In the 21st century, organisations face tremendous changes in their environment, forcing them to change their approaches, practices, expected results and processes, which push them to seek flexible methods to perform effectively and minimise the risk of operating in such environment (Nickpour & Salajegheh, 2010). In addition, today's projects are characterised as uncertain, unpredictability and complex where the ability to quickly sense and respond to urgent and essential changes has become essential to succeed (Pan et al. 2007).

During the last two decades, academic researchers such as Adler et al. (1999); Grewal & Tansuhaj, (2001) and Judge & Miller, (1991) look at the role of agility in supporting the project team to manage the fast and unpredictable changes of projects successfully. Nowadays however, researchers use the term "agility" to describe the response to change requirements and challenges within a particular context such as market orientation by (Grewal & Tansuhaj, 2001), information technology by (Sarker & Sarker, 2009), social networking tools such as

(Li et al., 2011) and strategic alignment for example (Tallon & Pinsonneault, 2011).

### **2.3 Definitions and Concept**

Giving the fact that agility concept is new in PM and several senior researchers have studied it; there is no commonly accepted definition of agility as stated by Bottani (2009) and Yusuf et al. (1999). Similarly, Nijssen & Paauwe (2012) add that the concept of agility is still somewhat new and only a few pieces of research have been done about the needed practices to improve it, although it is promoted as the main feature to operate in a constantly changing environment. Hornby (2000) say that agile in the dictionary means swift, nimble, active, ready and can move and think quickly with smart approaches. Taking this as a basis for understanding agility, different definitions have been developed today that are influenced by the application domain and context; however, since discussion of all developed definitions is out of this research paper's scope, the research paper will only focus on definitions of agility that are related to the research topic.

Agile management is a term for a collection of practices and techniques that share specific common characteristics. Chin (2004) defines the agile project as the one that is characterised with a certain amount of uncertainty, needs specific knowledge and stresses the need to deliver the project at the earliest. Similarly, Dyba et al. (2008) define it as a process by which the project is handled and executed in small chunks of work. While Richet (2013) defines it in terms of practices as an iterative approach of managing a project in a very collaborative approach from planning, implementation to controlling and finally delivering of the project at

the earliest. He says that using APs can be leveraged for PM in general, mostly in areas of innovation and uncertainty, and the outcome is a project that best satisfies clients and meets their needs with least cost and time.

Conforto et al. (2014) define APM as an approach implemented to accelerate and simplify the project development through instilling flexibility and permitting iterative cycles as a means to improve the project quality, timing and cost. Whereas, Conforto et al. (2016) describe agility as a method in which the project team responds rapidly to the changes in the project requirements to achieve a better outcome. They note that teams performance in agile projects is not merely an adjective that explains a method implemented to manage the project. In addition, they describe that internal and external factors such as the management techniques and practices that play a part whether a team is agile, in lieu of the practices and techniques being explained as agile. They further explain that practices are tools, techniques and action used to execute agile project methods such as iterative planning and frequent monitoring. Whereas, enablers are the internal and external factors that are needed to facilitate the use of agile methods in the organisation such as the structure and culture of the organisation as well as a working environment that promote collaboration.

Researchers such as Boehm & Turner (2005) and Conforto & Amaral (2008) say that agile approaches are more for creative and innovative projects with clear business needs and vision, but are characterised by high level of uncertainty, unclear project scope and unpredictable requirements that will undoubtedly change during the project course. For example, process improvement projects, new innovative product development or event research projects. Likewise, Wysocki (2007) states that a typical agile project is the one that involves with a

considerable amount of uncertainty and change requirements during the project lifetime, concentrates on team communication, closes interaction with clients and will be pushed to deliver as soon as possible. Moreover, Turner et al. (2012) say that software development and research projects are recently the most non-traditional projects.

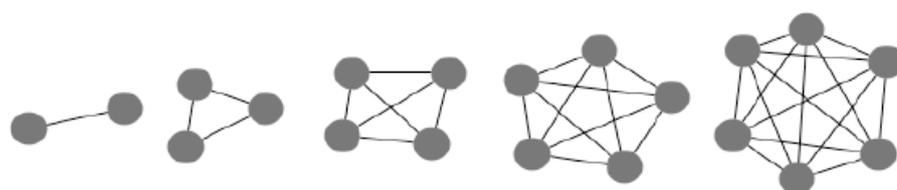
Aoyama, M. (1998) states that the central goal of agile management is to produce results quickly and adapt to changes in requirements over the project lifecycle. In addition, results are delivered in small logical chunks of work known as iterations or sprints. Many researchers such as agree that APM is a great approach to apply when business needs are frequently changing or benefits needed to be obtained earlier.

In addition, there are disagreeing viewpoints as to how and when agile approaches should be applied. Some researchers such as Boehm (2002) state that agile development is only appropriate for a small and non-critical project. Others such as Highsmith & Cockburn (2001) have reported successful implementation of agile methods on a large of scale project, high technical and coordination complexity projects. Gustavsson (2011) states that usually projects particularly a big or complex one require more resources to be included at any point in order to deliver the project on time. However, the size of an agile team is significant to be able to gather the team and discuss everyone's update about the project's progress. In the study performed by Ancona & Caldwell's (1992), the results point out that the team size may have a direct influence on the project team performance and communication.

A research done by Fayol (1917) shows that the more people involve in a project, the more interaction is required, thus, the more challenging to manage such teams. Therefore, is it

important to define the roles of each person involved in the project and the relationship between all members to support effective coordination and better control of the project. The interaction and coordination between the project team enhance the efficiency of the team, which is at its peak when team size is between three to seven and starts to drop when team size goes beyond nine members according to Stray et al. (2012). Furthermore, it is suggested that a common workspace or “war room” is best for an agile team as it enables them to work and perform their duties in an open workspace, thus, facilitates communication and collaboration among the project team which leads to improving team productivity.

Lee & Xia (2010) say that communication; either a lack thereof or miscommunication is considered one of the root causes of failure in the project especially in large teams, which are associated with lousy communication due to the increasing number of communication channels. To elaborate, a team of three members has three communication channels while a five-member team has communication channels double the number of people in the team as illustrated below (see Figure 1). They state that agile projects require continuous and intense communication; therefore the larger the project team, the more challenging and problematic it becomes to communicate efficiently and share information among the project’s members.



Overview of communication channel complexity  $(N \times (N - 1) / 2)$

Figure 1: Number of Communication Channels, (Stray et al., 2012)

## **2.4 Difference between Traditional and Agile Project Management**

There are major differences between APM and TPM as mentioned by Dyba & Dingsoyr (2008). The first one is built on the assumption that the environment of the project is unpredictable and uncertain; thus, it is based on adaptive methods and aims at being flexible and responsive. While the TPM focuses on optimising the project development through a well-planned process. The sequence of events is another difference between the two. To elaborate, the planning and implementation are inseparable and performed iteratively in the APM; however, in the TPM the steps are done separately and consecutively, where one step must be finished, so the next one can be begun.

In terms of the triple constraints of any project, which are scope, time and cost, Williams et al. (2015) say that TPM applies a tight discipline to scope and view it as a fixed entirely element by the project's initiation, while time and costs are then modified to create a satisfactory plan. Any change in any of the three variables leads to a change in at least one of the other elements that means achieving a successful project depends heavily on balancing these variables. The main issue with this approach is that scope is often changed as the project moves forward, which influences both time and cost. Consequently, this sometimes brings about cost overrun and late accomplishment of the project and stakeholders feel unsatisfactory even if all requirements are met.

In contrast, Highsmith (2009) states that APM is different by inverting constraints' triangle upside down (see Figure 2). This means time and cost are fixed while the scope and new

requirements are then reviewed and rearranged to focus on the highest priorities requirements. This approach is developed with the expectation that scope will be changed over the project course and aimed at delivering the client’s most significant requirements within budget and time. Through committing to a defined time and budget, work can be easier approved in comparison with TPM; eventually, project team and stakeholders usually find APM more successful.

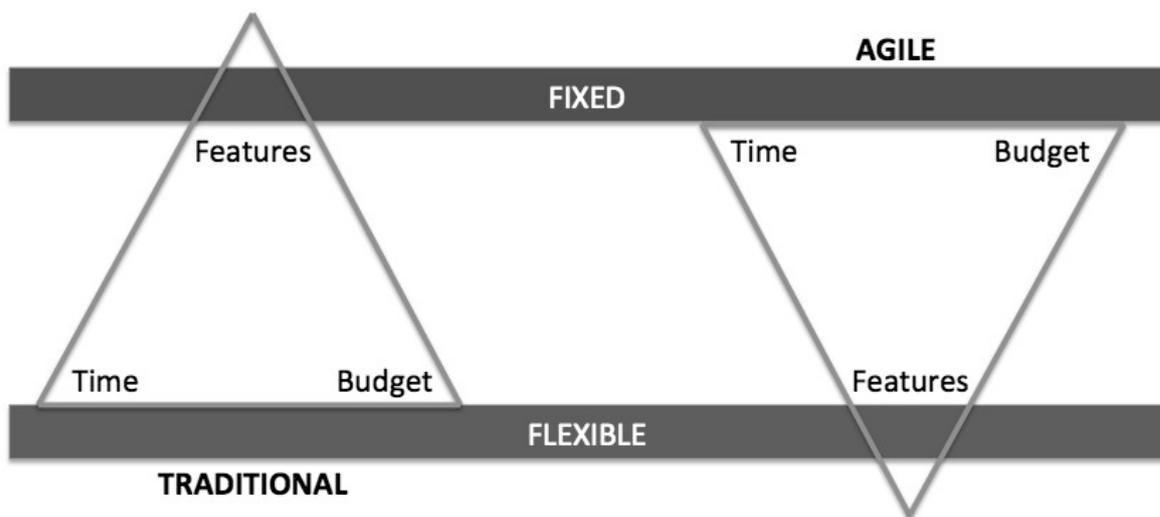


Figure 2: Traditional vs. Agile Constraints Triangle, (Highsmith, 2009)

In terms of planning, the TPM usually uses 33% or more of the anticipated project time in planning phase according to (PMBOK, 2000) and outcomes are usually planned to be delivered at the end the of the project. On the contrary, Highsmith & Cockburn (2001) suggest a maximum of 10% of the project time be dedicated for the up-front planning in APM and early delivery of outcomes is expected through an iterative process. As a result, business value is increased and at the same time reducing the risk that changes in the environment will lower the usefulness of the products before its delivery.

According to the PMI (2004), changes to the project in the traditional model are seen as threats and may cause chaos, thus need to be controlled and this may result in a project failure on the basis of quality and time delay. Eden et al. (2005) state that late change can be more expensive and result in a minimum beneficial effect on the project. Bowles (2012) says that the essence of APM lies in the fact that the project scope and objectives are defined in fewer details at the beginning of the project, and implementation is divided into equal iterations. To elaborate, the most significant requirements are started in the beginning, while the least important ones are left for the end or can be ignored based on the results of the finished iterations, client's requests or changes in the project environment. Moreover, Rothman (2007) states that detailed requirements and precise scheduling of specific tasks, performers and deadlines are created at the commencement of iterations considering current results and new requirements or changes. He further states that each iteration lasts from one to four weeks and unlike of the traditional approach, the execution of the plan is done by the project team and not by the project manager. Wysocki (2009) adds that if the client is satisfied with the current results, iteration is repeated.

Cockburn & Highsmith (2001) emphasis on the role of agile approaches play when it comes to managing a large group of people throughout the project. They say that instead of controlling all people, agile approaches aim at how to attain efficiency in a small team. To achieve this, they explain that flexibility is needed in team members' roles, in addition to effective communication both formal and informal. Thus, in a daily basis the team gather for fifteen minutes with a set of agenda and each team member briefs other team members on what he/she has done since last daily meeting, today's tasks and whether any obstacles are influencing the progress of the project (Schwaber, 2004).

## **2.5 Critiques of Traditional Project Management**

Over the last three decades, TPM has been criticised by many researchers in different fields such as Turner et al. (2012) because it does not always work successfully and nowadays projects often fail due to uncertainty and changing requirements that occur over the project lifetime. Moreover, it requires efficiency, significant resources and plenty of time for planning and documentation, while organisations around the world today are looking for project practices that are light, agile and less bureaucratic.

Boehm (2002) claims that too much initial planning may lead to wasted efforts and too much reworks at a later stage of the project, whereas not performing enough initial planning can also lead to project failure. Similarly, the research of Serrador & Turner (2013) indicates that there is a relationship between planning and project success. They found that putting a lot of efforts and time on planning might have a negative impact as little efforts and time. According to Turner et al. (2012), most small and medium companies can not hire dedicated project managers and establish a PM office with traditional management practices but prefer to use a light PM approach, which is less bureaucratic and straightforward.

Levitt R.E. (2011) remarks the strength of TPM as more controlled, detailed and centralised approach; however, it is not flexible and usually, planners are not competent enough to produce realistic and feasible plans. He adds that the project team tend to implement plans without variance as TPM relies on the management as planned philosophy as well as time, money and quality constraints, which kills the project team's creativity and knowledge. Karlesky & Voord (2008) say that TPM considers changes as harmful and expensive, thus, try

to strictly limit or avoid changes through up-front planning, documentation and customer sign-offs. Additionally, it is well known for a long time that not always easy to define all the requirements of the project up-front although there are many tools and approaches used for better identification of requirements. However, the client often cannot detail their requirements up-front as stated by (Brooks 1987).

Waterfront methodology is designed to deliver the outcomes at the end of the project; as a result, the client often gives his feedback when the project is completed. It is also associated with long-term efforts and results are delivered after months or even years. However, with the increasing pace of business competition, rising speed of technical innovation and constant changes of customer's needs, this approach has been criticised as it takes a long time. Whereas, organisations are looking for value and outcomes as quickly as possible, and project teams are being urged to adapt and respond quickly to change requirements.

Furthermore, Wysocki (2009) says that TPM is very structured, plan-driven as well as process and documentation heavy. He explains that TPM can only be applied to projects where goals and solution are defined precisely in terms of project complexity and uncertainty. Apello J. (2011) criticise the traditional approach in terms of power distribution. He says that the power is almost centralised for few top managers while the approach itself control and secure the whole process. Thus, employees at low level have only a few responsibilities and almost no motivation to perform their duties, which usually results in a low level of motivation and productivity.

The argument of Shenhar & Dvir (2007) against TPM is that the project team believes that success of the project focuses more on meeting the project requirement and neglects high-level goals such as achieving business goals and improving customer satisfaction. They dispute that the traditional models suit only few project's types, as today's projects are uncertain, changing, complex and influenced by the dynamic of the project's environment, new technology and market trends. Accordingly, changes will occur and plans must be modified to adapt to the new situation. As changes will happen, plans then need to be modified to reflect the new changes.

## **2.6 Characteristics of Agile Projects**

In this section, characteristics of a successful agile project, which are also considered as influential factors in the success of agile projects, will be briefly presented. According to the Agile Manifesto (2011), agile is built upon a set of principles that concentrate on customer value, intensive collaboration, iterative delivery, continuous improvement as well as small integrated and self-organised team. Agile Manifesto considers customer collaboration over the project course as a critical requirement in the success of an agile project and it is one of the agile principles according to (Lindvall et al., 2002). Whereas Misra et al. (2009) state that satisfaction followed by customer collaboration is seen as an element of the project success since they approve and prioritise the requirements each iteration, thus their commitment is also significant to ensure the project success Chow & Cao (2008).

In terms of an agile team, Cockburn (2002) says that they are self-organised and count on each other's strengths to manage the project and not others outside the project to guide them.

They have high autonomy to organise themselves and manage their tasks as well as take quick decisions; accordingly, decision-making is a critical element in agile project success. While TPM relies heavily on a documented plan, APM counts on internal planning and control within the team; thus, level of autonomy is a crucial factor.

The team members are co-located or use advanced technology tools to stimulate being together. Otherwise, misunderstanding issue may occur as stated by Cockburn (2002). He elaborates that working from different locations distributed worldwide may result in different cultures and time zones leading to a barrier in effective communication.

Another characteristic mentioned by Lindvall et al. (2002) is the team size, it is often claimed that APM works best with small teams, the smaller the team, the better and effective the communication. However, in a bigger team, face-to-face communication becomes problematic; thus team size plays a vital role in project success. According to Bustamante & Sawhney (2011), the optimal agile project team is small, self-organised, communicate face to face on daily basis, co-located and the number of team members does not exceed nine people. Besides, agile models such as scrum suggest an ideal team size of seven plus or minus two. Similarly, Gustavsson (2011) suggests five to nine members as a proper size for the project team; therefore, extra resources should be divided into several groups, each with specific responsibilities and new members joining the team need to be informed about the project as soon as they join to be able to assist in accomplishing the project. In terms of a minimum number of members in a group, Schwaber (2004) recommends three members otherwise the creativity and communication within the team will be lower.

Misra et al. (2009) say that agile project deliverables are broken into small rapid chunks of works, each iteration requires a minimum of short-term planning for a period of one to four weeks. It also involves a cross-functional team (whole team) working on all phases of the project and at the end of the iteration, at least one outcome is released. They say this approach reduces the risk of failure and enable the team to adapt to respond to any change quickly.

In addition, Coram & Bohner (2005) state that APM does not put more emphasis on up-front plans, but the critical point is to recognise that it does not mean to abandon front-end planning. Boehm (2002) says that more planning is made in agile methods; however, it is done across the entire project lifecycle rather than one-off manner. He also recommends a balance between TPM and APM for project planning taking into consideration the size of the project, known future requirements and safety requirements.

## **2.7 Agile Project Practices**

APs become widely used as they address directly the challenges usually occur in a dynamic project and require meaningful communication with the client to know the exact requirements of a project (Collyer et al., 2010). Ren et al. (2005) state that the practices are used as a way to accelerate the project progress, enable the project team to deliver the project piece by piece and allow making rapid modification as required.

According to Abrantes (2011), there is no evident list of practices that are considered as the industry standard; however, the website of Agile Alliance shows sixty different APs (refer to

Appendix B). While the systematic LR from 2010 identify seventeen practices, which are widely mentioned in researches. Abbas et al. (2010) explain that this is likely due to the reason that organisations may implement the set of practices that best fit for its needs or they use it unknowingly. The research of Meng et al. (2007) indicates that there are several agile methods being used; however, most of them share common practices which are demos, iteration planning, iterative development, less documentation, and most importantly these practices support the Agile Manifesto’s values and principles. They also says that methods such as extreme programming (XP) and scrum are widely used around the world. Therefore, a brief description of these two methods is presented in the appendix as the discussion of different methods is out of this paper scope (refer to Appendix C).

According to ‘VersionOne’ (2018) survey conducted between August and December 2017, a total of 1,492 responses are gathered and results show that agile methods are frequently adopted particularly scrum (see Figure 3) due to its many benefits (see Figure 4). The pie chart shows the outcomes of the survey concerning the most agile methods used. As can be seen, scrum is the most used with a percentage of over 50%, while other methods score 10% or less.

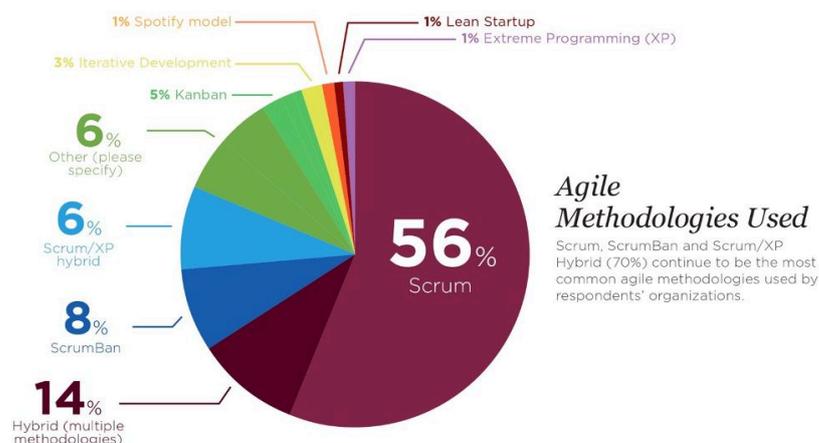


Figure 3: Agile Method Used, (VersionOne, 2018)

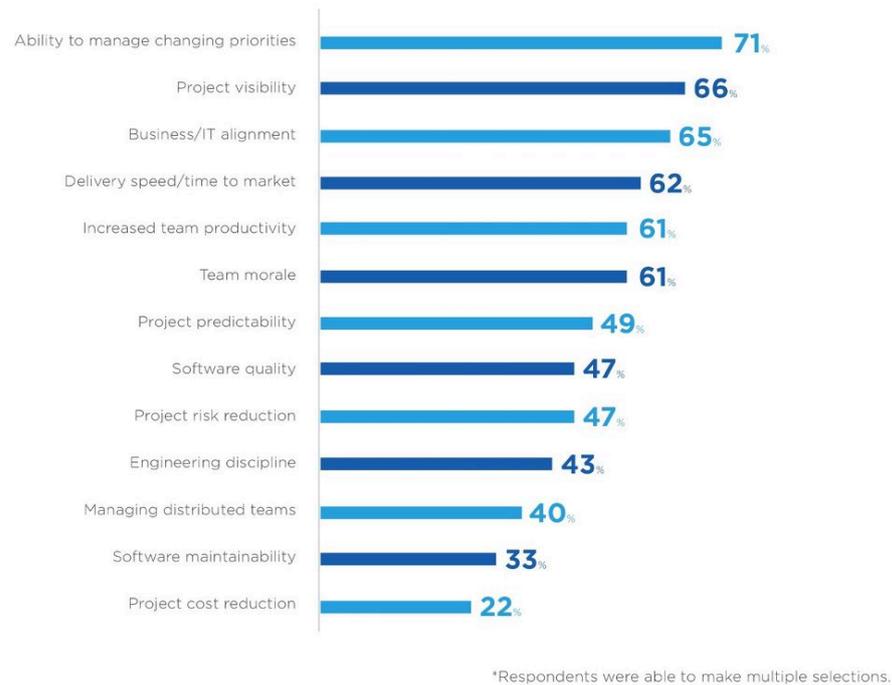


Figure 4: Benefits of Adopting Agile Practices, (VersionOne, 2018)

In the characteristics of agile projects, it has been mentioned that the project is executed in an iterative approach, which is one of the agile approach attributes in which the project is broken into small, doable tasks that leads the project members to achieve success in an additive nature. Misra et al. (2009) suggest that reducing requirement and breaking them into smaller activities is significant for the project team success. Karlström & Runeson (2005) highlight that the management of large and complex project can be seen as overwhelming, but they claim that these projects can most likely be broken down into smaller chunks, permitting the team members to focus on highly critical tasks and complete the work one step at a time. As a result, members will be more focused, less confused and have more control over their work. By scaling down a project into small work and then re-prioritising the requirements, the team will be able to deliver results faster, thus collect feedback on what they have achieved (Moogk, 2012). Karlström & Runeson (2005) state that gaining earlier feedback and using a feedback loop to finalise the iterative cycles leads to reduce the project time by promptly

combining and using the learning into the next sprint. The team then identifies the set of priority tasks for the next sprint until they meet the scope of the project. In the IT industry, the team found this approach to be effective in cutting the overall development time (Chakravorty et al., 2014).

As with any assignment involving teams, communication is a critical attribute in keeping each member updated and informed. The research of Grapenthin et al. (2015) shows that a team works in an interaction room (open office space) with a central place where they can meet and have open communication that encourages sharing information leads to increase communication effectiveness among team members and other stakeholders involved in the project. Additionally, provide a focused and reasonable way for them to correspond, thus leads to improve identification and planning of tasks necessitating accomplishment.

Another AP is the daily stand up meeting (hereinafter daily meeting). Stray et al. (2016) explain it as a brief communication activity that gathers all project members at a pre-arranged place and specific time daily and the purpose is to increase team awareness about the project status and each member's progress. In this meeting, each member will talk about three main things: what they have accomplished since the last meeting, what they will be doing today and what are possible obstacles that may hinder their performance. According to Stray et al. (2016), the daily meeting enables the team to share information and have the opportunity to discuss and resolve issues, which contribute to a positive attitude toward the project by the team. As daily meeting has several benefits to the project team, it also has a number of cons. To elaborate, the project team may show a negative attitude due to some factors such as the time needed to produce a status report, the too long and frequent meetings. Other adverse

effects include overreaction to the issues by the project manager; accordingly, the team members may withhold the information about the issues as stated by (Moe et al., 2010).

In addition, utilisation of task board is reported by Stray et al. (2016) to have positive effects since it allows team members to visualise the tasks and their status, thus the overall performance of the whole team and the project.

An essential requirement for successful PM is the willingness of project members to be agile, rapidly respond to the development requirement of the project and take different roles in the project to help other members accomplish this tasks (Gill (2014). Researchers such as Stettina & Horz (2015) have interviewed 30 people from European software development organisations to examine the concept of self-organising teams. Their research reports that APs encourage and empower the project team to accept and handle tasks that are traditionally carried out by the project managers such as managing and coordinating their tasks, which leads to increase interaction; as a result, experience increase collaboration and trust.

Although many APs have been identified and listed on the Agile Manifesto website, for the purpose of this research the selection of practices has been limited to seven in which some of them have been mentioned in the previous sections such as daily meetings, whole team, demo, iteration planning, iterative development and less documentation (refer to Appendix D). The reasons behind choosing these practices are that some of them are among the most widely used and each needs the collective participation of all members with an aim on teamwork, people and interaction. In addition, these practices do not require substantial experience and skilled people to be applied. However, every technique has two sides, which

will also be highlighted. According to the intensive LR, impacts of using APs fall into different categories and are presented as follows:

## **2.8 Impact of Using Agile Project Practices**

### **2.8.1 Impact on Communication Effectiveness**

Communication according to Pikkarainen et al. (2008) is significant for any project to eliminate conflicts, avoid misunderstanding and manage the dependencies between the project team in order to achieve the desired goals. They also consider it as an essential contributor for effective coordination among the project team. The study of McHugh et al. (2012) proves that APs enhance communication among all project team members in comparison with the plan-driven approach. However, it is crucial to create and define the tools for formal and informal communication for effective communication.

The studies of Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) find that the practice of open office space enhances the informal communication within teams and minimises the need for formal documentation. Another study in support of this outcome is done by (Karelsky & Voord, 2008) their study shows that the uniqueness of agile methods is that they are designed to use a minimum of documentation to give the team more time to focus on essential tasks, enable flexibility and rapid response to changing requirement that improves productivity. In comparison with TPM, APM is associated with less documentation,

and researchers such as Stettina & Hijstek (2011) highlight the reduced emphasis on internal documentation and argue that it may reduce knowledge in the long run, particularly in a situation where team setting is not stable, thus if knowledge is not documented it can be forgotten over time. In addition, members may also leave the project or resign; thereby undocumented knowledge goes with them. Another study by Petersen & Wohlin (2010) shows that face-to-face communication in an open office space is insufficient to capture and maintain knowledge, as verbal communication is more likely to be forgotten especially in the long term. Mishra & Mishra (2008) claim that some tools should be used such as papers and whiteboards for recording information for later use and enable corporate learning.

Moreover, Pikkarainen et al. (2008) say that a high level of informal communication facilitates problem solving, thus be a factor in the achievement of iteration goals. They claim that open space design improves access to team members and increase the interaction level among them; accordingly, several organisations have witnessed a high level of communication among teams, which leads to greater awareness about the project, increase knowledge sharing and fast learning by observations. In terms of benefits, their study reveals that the productivity of the team members who were laboured together for a period was double in comparison with the traditional office layout. However, nothing exciting is ever completely one-sided as open office workplace raises the chance of overhearing conversation risk among other team members resulting in pressure and stress, which will be further discussed in the impact of APPs on pressure and stress section. Nevertheless, a number of studies such as McHugh et al. (2012) Pikkarainen et al. (2008), Stray et al. (2012) and Lee & Xia

(2010) highlight the negative impact of APs on communication and project team. The study of Lee & Xia (2010) indicates that the whole team slow down communication and results in conflicts among the project team.

Concerning formal communication, iteration planning and demo are considered as a form of formal communication practice and shows an improvement in understanding the project requirements and manages the dependent tasks (Pikkarainen et al., 2008). However, the dedicated time for demo and iteration planning sessions is not enough to attend to and tackle all issues occur as the complexity of the project grows. Thus, for maximum benefits and efficient communication during demo and iteration planning sessions, all participants must be trained about agile methods and practices. The visibility of the project's requirement list improves communication about project requirements (Pikkarainen et al., 2008). Besides, the daily meeting is found to improve communication frequency and can be used as a way for face to face discussing and tackling problems (Li et al., 2011).

The following figure shows the identified impacts of APPs on communication effectiveness.

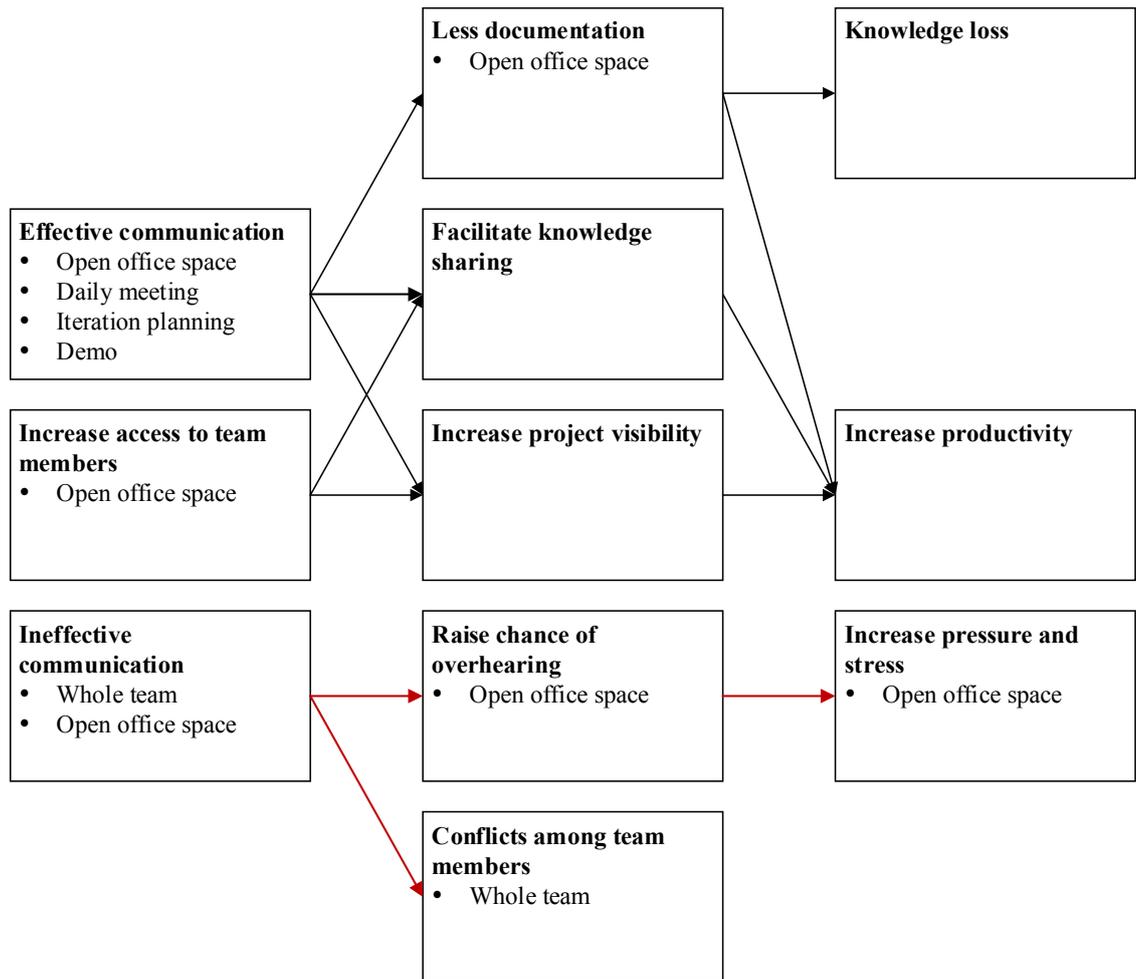


Figure 5: Impact of APPs on communication effectiveness, (By the author)

### 2.8.2 Impact on Knowledge Sharing

Based on the LR findings, there are a number of APs that promote knowledge sharing and learning (Gill (2014)). For example, Mishra & Mishra (2008) say that being in the same room with an adjacent desk, which is known as an open office space is claimed to encourage learning by improving communication. Strode et al. (2012) support this statement and claim that the availability of team members in one place, in an open space environment and sitting close to each other increase the awareness of who

knows what which may increase coordination effectiveness. However, team members should have high availability to each other for effective coordination and this can be achieved through entirely assigning them to the project.

Furthermore, daily meetings and iteration planning allow for constant feedback on the project status to project team and other stakeholders, thus enhance the awareness and sharing knowledge among members according to the research results of (McHugh et al., 2012). Their research also indicates that the project owner can quickly determine whether the project team members are knowledgeable and capable of delivering the project and if daily meeting works well, can lead to developing trust through goodwill as these practices require the team members to interact and communicate with each other. The research also shows that the team members become unafraid to raise their concerns and ask others for help or even to offer help, accordingly show a high level of trust. Fowler & Highsmith (2001) state that agile approaches establish a trust between the project team and their stakeholders because of the integration of the stakeholder with the project team and the regular communication. Moreover, to share and build upon each other's knowledge, a certain level of trust between team members must exist. Otherwise, if new members join a team with slow progress and fewer issues, the already existing members will begin to defend their work instead of sharing knowledge (Stray et al., 2012).

The report of Strode et al. (2012) highlights that APPs may lead to improving coordination within the project team. To elaborate, the whole team AP in which team members have enough knowledge and skills to do the tasks of other members will

result in effective coordination as it minimises bottlenecks, workload and let the team members know what each one does.

The following figure shows the identified impacts of APPs on knowledge sharing.

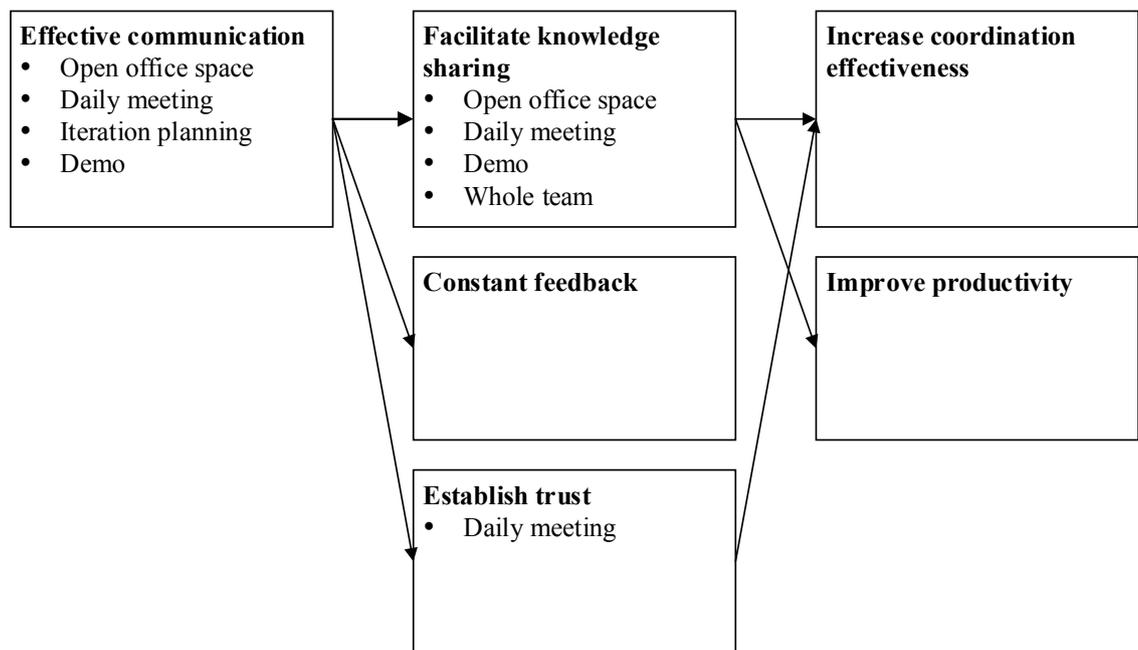


Figure 6: Impact of APPs on knowledge sharing, (By the author)

### 2.8.3 Impact on Project Visibility

The communication of the project's goals, plans and status to the project team such as the project team members, the management and customers is seen as an aspect of communication and referred to as project visibility in APM (McHugh et al., 2012).

The study of Pikkarainen et al. (2008) shows that a number of APPs prove to have positive impacts on the project visibility. To elaborate, iteration planning, for example,

improves the project team's awareness about the cycle goals and plans for the following iteration as does the open office space. It gives them the visibility on the remaining requirement, individual tasks and allows them to determine how much work they can commit to accomplishing by the end of the upcoming cycle. During this session, the team also discuss the feedback they obtained on what they have delivered or any change request, accordingly work is organised and re-prioritised (Chong, 2005).

Furthermore, Pikkarainen et al. (2008) and Stray et al. (2016) say that visible task boards display the project status and give a quick overview of the project progress for the project team and passers such as top management, clients or employees from other departments. It also enables the team to tracks their work and progress of each involved in, thus easily identify the risk of falling behind the schedule.

The iterative development allows for a constant overview of the team progress and is reported to increase visibility through providing a better summary of remaining tasks at a glance and managers can have regular feedback on the project status comparing to the plan-driven process. In fact, for agile to work best, it is suggested the visibility of what each member of the team is working on to avoid getting in the way of others (Pikkarainen et al., 2008).

The research papers of Strode et al. (2012) Stray et al. (2016) reveals that daily meeting provides transparency on the daily progression of activities and facilitates information sharing and keeps team members up-to-date in terms of what to do and

what each is doing, thus enhance the project visibility and potential delays or issues can be quickly addressed. Another practice mentioned by Strode et al. (2012) is a demo, which is said to improve awareness and understanding of the project features and requirement. To elaborate, preparing for demonstration may require the project team to work on different concepts and conduct some research about it to develop it further, which may include parts they have not worked on previously. The following figure shows the identified impacts of using APPs on the project visibility.

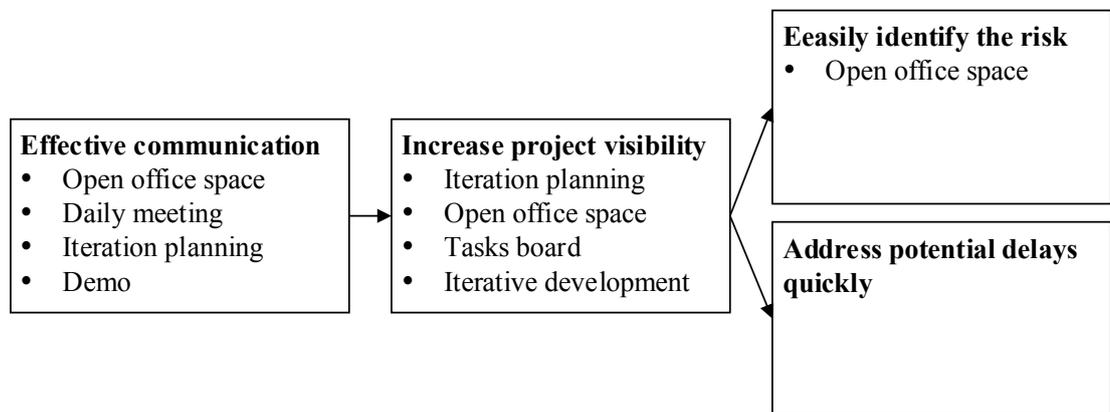


Figure 7: Impact of APPs on project visibility, (By the author)

#### 2.8.4 Impact on Change Requirement

Karlsky & Voord (2008) give a reason for the significance of the agility, which is change. They claim that projects are living things, therefore, need to adapt to the surrounding environment and the team must change as well along with it. In addition, DeCarlo (2004) state that the idea of an agile concept is to welcome and accept changes as the project moves forward. Collyer et al. (2010) say that contrary to the traditional PM, agile

management is characterised by continuous and early involvement of the client throughout the project lifecycle to set goals and give continuous feedback as the project progresses. This is due to the iterative nature of agile methods that allows for continuous modifications to project requirements and scopes in light of new information or client requests. Similarly, Wysocki (2009) also states that an agile model is a client-focused and client driven since it fully engages the client as the primary decision maker.

In addition, iterative practice allows for early delivery of the requirements and benefits to the client as a result of continuous interaction between the project team and clients (Boehm, 2002 and Wysocki, 2007). This way as stated by Gustavsson (2011), the client is more involved in decisions throughout the project since the project is divided into cycles and at the end of each cycle certain items will be delivered to the client. Therefore, forcing the client to involve more, make decisions and not to worry about whether the project is doing well or on track as the client is continuously updated and informed through these cycles. Moreover, incongruity can be detected earlier in the project, which allows the project team to make the necessary adjustment to meet the client's requirements faster (Gustavsson, 2011).

Furthermore, the study of Boehm & Turner (2005) shows that the continued involvement of clients in the project keeps them up-to-date and leads to minimise the confusion about what should be done next. As a result, not only supports faster implementation of the project, which is required due to tight time constraints, but also accomplishes better monitoring and controlling of the uncertain requirements and better prioritizing of requirement, which in turn results in minimizing the impact of uncertainty and improving

project risk management.

The following figure shows the identified impacts of using APPs on change requirement

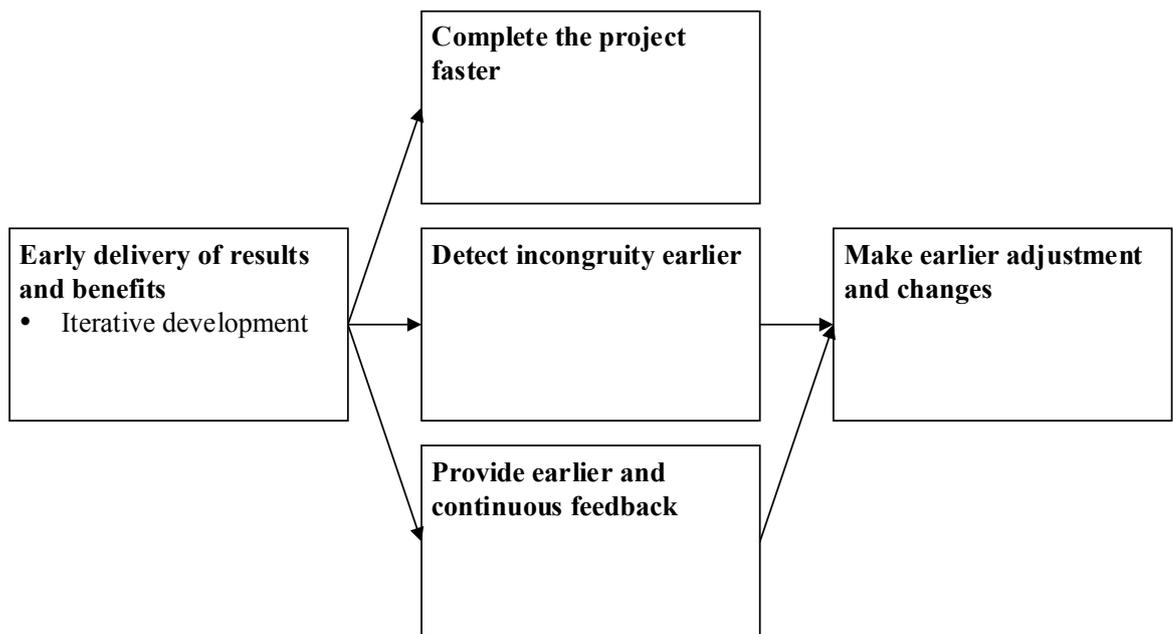


Figure 8: Impact of agile project practices on change requirement, (By the author)

### 2.8.5 Impact on Pressure and Stress

Despite its benefits for the project, APs and methods could cause many cons to the project as a whole. For example, working on demos may increase the stress and workload on the project team and give them challenging time to meet their deadlines (Moe et al., 2010 and Strode et al., 2012). Their research findings also show that daily meetings can also increase the pressure and cause stress especially in the absence of trust among the project team. They explain that daily meetings may become a place where different

members and parties feel the need to defend what they have done and that they are obliged to show progress since the last meeting. Moreover, during the daily meeting individual commit to accomplishing the set of tasks they have discussed and agreed on, which put more pressure on the project team as they feel that they are forced to finalise the tasks on time as they have committed (McHugh et al., 2012).

As mentioned in communication section, open office layout results in a significant noise problem, accordingly, causes a loss of attention and creates pressure on the team; accordingly, impact productivity negatively (Pikkarainen et al., 2008). As a solution, Mishra & Mishra (2008) suggest that individual desks, which are provided with half-height partitions, are an excellent way to separate the teams, minimise this risk and yet facilitate effective communication. In contrast, a project team that are separated by distance faces a high level of intra-team conflict due to communication issues. Therefore, additional formal communication is required to share information among the project team members (Mishra & Mishra, 2008).

Aguanno (2004) adds that the benefits of iteration planning include reducing the risk of poor definition of project scope, which results in better quality and controlling of the project as well as enhances the communication among the project team.

Additionally, Gustavsson (2011) state that in a project with strict deadlines where all team members are struggling to accomplish all tasks on time, the quality of the results can sometimes be negatively affected or deteriorated. However, through iterative development frequent deadlines can be set for each task, so each task is appropriately

performed resulting in acceptable quality outcomes and minimising the negative impact if a requirement is not met on time, as the next deadline is only a few days or weeks away.

Fathian et al. (2007) add further benefits of embracing agility such as increasing employees satisfaction and motivation, fostering progress towards set goals and improving organisation's efficiency processes, which lead to a better response to changes. To elaborate, if the project team is overburdened and forced to work unreasonable hours, the project may suffer from quality deficiencies. In an agile context, this can be eliminated by allowing everyone in the team to speak up and raise his/her voices, as a result, boosts their motivation and makes them feel respected.

The following figure shows the identified impacts of using APPs on pressure and stress.

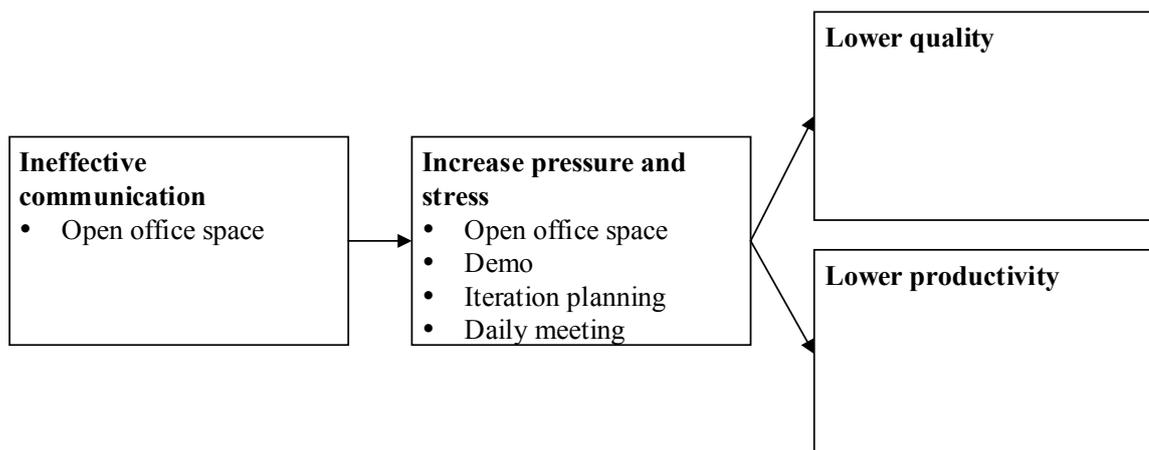


Figure 9: Impact of agile project practices on pressure and stress, (By the author)

### 2.8.6 Impact on Productivity

The previous outcomes of the APPs impact have shown that productivity can be influenced negatively and positively. According to Pikkarainen et al. (2008), the productivity of members laboured together in an open office layout during the project development found to be double in comparison with the TPM since interaction and communication increase which facilitate knowledge sharing. Furthermore, Karelsky & Voord (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) state that communication effectiveness due to using APPs particularly open office layout found to minimise the emphasis on formal documentation giving the project team more time to focus on critical tasks and respond rapidly to any change requirement, which improves their productivity. The practice has also some negative impact as it is found to impact communication effectiveness negatively since it creates noise and distraction that may lower the productivity as stated by (Fathian et al., 2007) and (Pikkarainen et al., 2008).

Moreover, Mishra & Mishra (2008), Lee and Xia (2010) and Strode et al. (2012) claim that frequent interaction and communication leads to establish trust among team members, which in turn improves coordination effectiveness, facilitates knowledge sharing; thus improves productivity. Another research conducted by Lee & Xia (2010) on whole team, which has an indirect influence on project productivity by affecting how the project team reacts to the changing requirements. The whole team will respond more extensively to any change requirement and build on each other strength and experience to improve the work. What distinguishes agile project team is that it

consists of people with cross-competences and less amount of expert functions (Gustavsson, 2011). He says the more competent the project team is, the better the progress of the project will be as things will run well without having to wait for external decisions. The advantage is the flexibility of everyone within the project team and being able to assist wherever it may be needed.

The study of Li et al. (2011) shows that the iterative approach results in a more efficient project development process through lowering the number of surprises and increasing the control of outcomes quality and delivery date. It allows for earlier delivery of results, thus enables the team to avoid significant changes later on and increases the possibility of delivering the project on time. Petersen & Wohlin (2010) note in one of their earlier research that a common issue with TPM is the amount of reworks related to requirements changes. However, implementing APPs make the requirement more reflective of the client's needs as the project is delivered in small chunks; accordingly, minimise the number of reworks needed, which improves the productivity (Moogk, 2012). Misra et al. (2009) suggest reducing requirements and breaking them into smaller activities is significant for the project success.

Karlström & Runeson (2005) highlight that the management of a large and complex project can be seen as overwhelming, but they claim that such a project can most likely be broken down into smaller chunks, permitting the team to focus on highly critical tasks and complete the work one step at a time. As a result, members can be more focused, less confused and have more control over their work. By scaling down a project into small work and re-prioritising its requirements, the team will be able to

deliver results faster, thus collect feedback on what they have achieved (Moogk, 2012).

The following figure shows the identified impacts of using APPs on team's productivity.

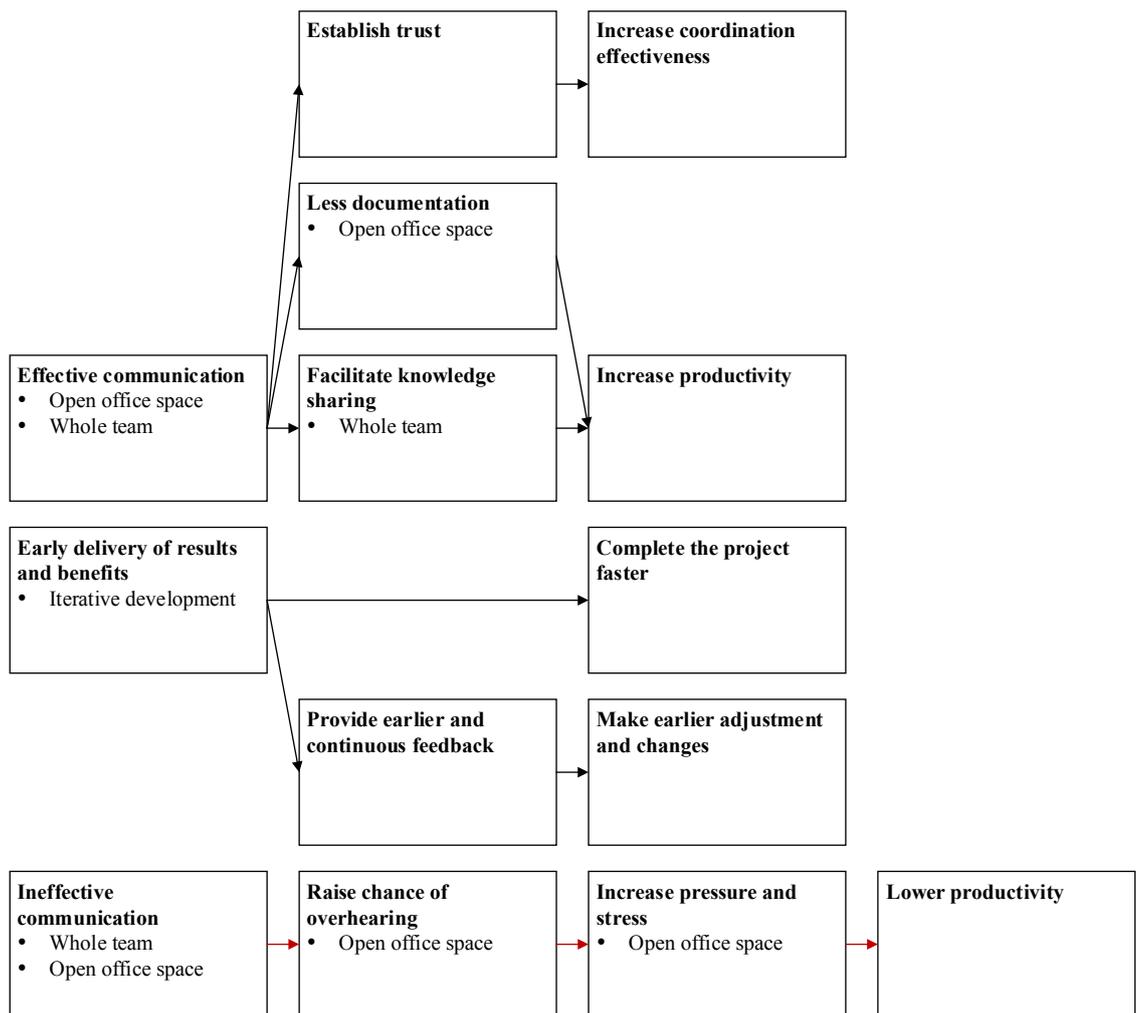


Figure 10: Impact of agile project practices on productivity, (By the author)

## **2.9 Summary**

This Chapter has presented relevant literature about APM and some APPs to support establishing a conceptual framework that will be used to examine the impact of using APPs on the project. Besides, the differences between TPM and APM have been highlighted and why APs are broadly used. Under each impact the identified effects of using APPs and the practices related to each zone is illustrated based on the empirical evidences found.

### **3. Chapter (3) – The APPs Framework**

#### **3.1 Introduction**

In this Chapter, a APP framework will be created based on the findings of the LR in the Chapter (2), which will present the identified effects of using APPs on the project overall and team productivity in particular. The concept behind the framework is to be used as a guide in structuring the research question for data collection and then to be used in the analysis and discussion of the findings.

#### **3.2 The Proposed APPs Framework**

As stated earlier in a Chapter (1), this study will examine the influence of using APPs on the project and how does it affect team's productivity in order to identify their possible negative and positive results. Therefore, to answer this central question, the following framework has been drawn based on a thorough review of the literature.

Since it will not be feasible to examine all identified influences in the previous Chapter, the number of impacts and outcomes has been reduced as shown in the proposed framework in the next page (see Figure 11). The selection is based on the most critical impacts such as communication effectiveness that leads to other outcomes and those impacts that are related mostly to the project team and their productivity or can be examined at the team members level as interviewing with stakeholders is not possible since the selected projects for this study

are already accomplished. Based on the LR, it is found that some impacts have a direct influence on others; accordingly, their causal relationship is also presented and the arrows represent this relationship.

To make it easier to understand the relationship, the identified influences of using APPs have been divided into impact and outcomes. The impact can be seen and observed throughout the project such as less documentation and knowledge sharing, and outcomes refer to the result of the impacts, and that usually can be noticed or observed mostly at a later stage of the project if not by the end of the project such as productivity. Accordingly, the arrows represent the interrelation between impacts triggered from using APs and outcomes triggered by the impacts, which give us an overview of how they are interrelated. Accordingly, this study will examine if possible relationship exist.

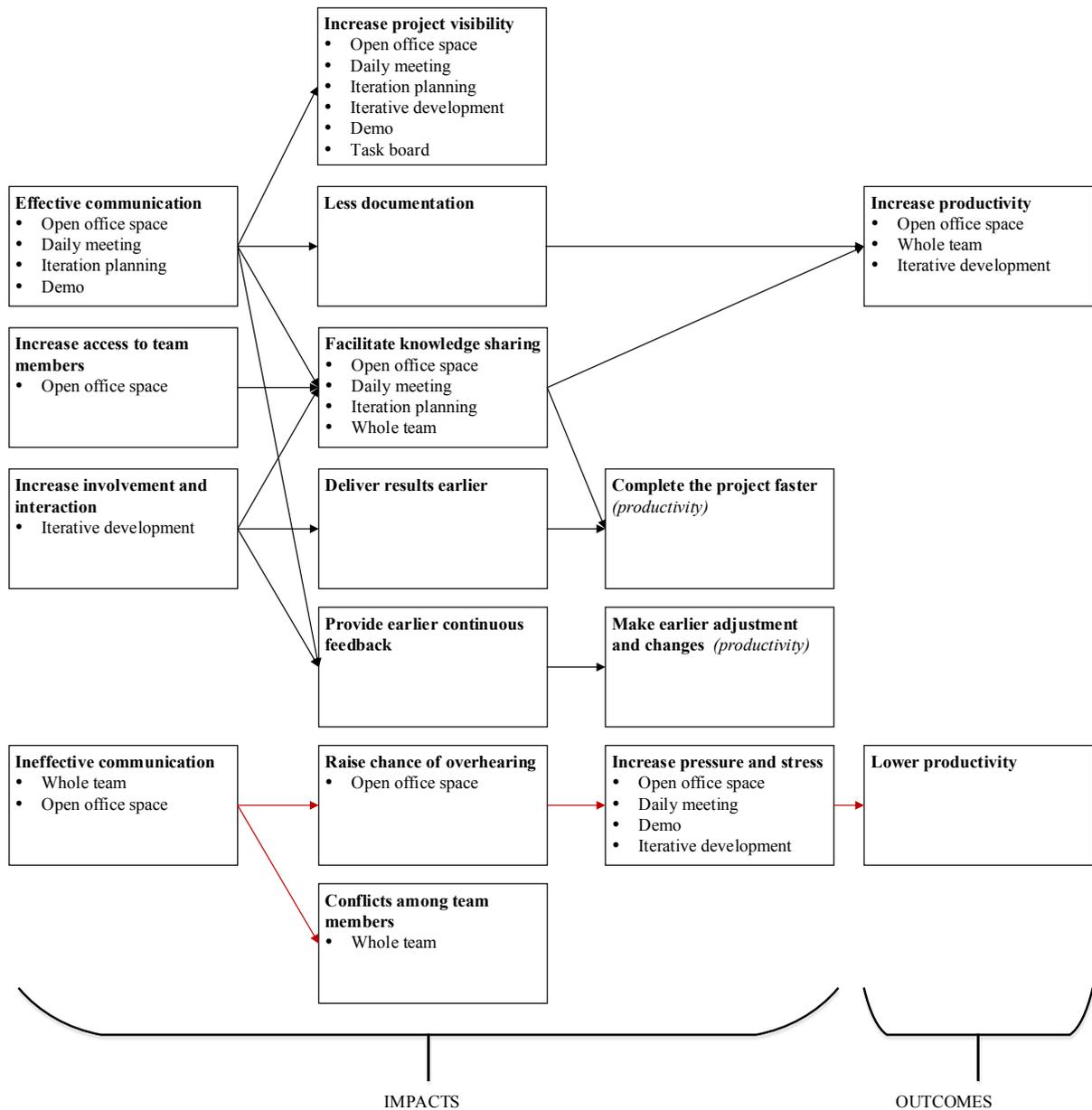


Figure 11: The Framework of the Influence of using APPs, (By the author)

The following is a detailed explanation of the framework and the selected impacts that will be examined in this research.

### 3.2.1 Impact on Communication Effectiveness

Communication is a critical factor for the project in keeping everyone updated to avoid conflict and misunderstanding and it is considered as a significant contributor for effective coordination and rectifying issues; however, it is important to define the tool of formal and informal communication. The thorough LR and findings of Fowler & Highsmith (2001), Cockburn (2002), Pikkarainen et al. (2008), Petersen & Wohlin (2010), Li et al. (2011), McHugh et al. (2012), Stray et al. (2012) and Grapenthin et al. (2015) have shown a number of evidences that different APPs have impacts on communication effectiveness both negatively and positively. The APPs namely open office space, iteration planning, daily meeting and demos improve communication effectiveness (formal and informal) through increasing access to members, interaction and communication frequency among them. As a result, facilitates knowledge sharing, increases project visibility and establishes trust that leads to enhance coordination effectiveness and enable both flexibility and rapid response to any tasks required achievement. As a result, enhances the team's productivity.

Whereas the findings of Mishra & Mishra (2008), Pikkarainen et al. (2008) Lee & Xia (2010) show that APs such as the whole team and open office design have a negative impact on the communication effectiveness. For instance, the whole team may slow down the communication, thus result in conflicts. While the practices of open office layout increase the noise level in the area, leading to loss of attention and increase the pressure and stress. Therefore, the researcher will investigate whether the used of APPs in the selected projects have resulted in positive or negative impacts on the

communication effectiveness. Other factors that found to impact communication effectiveness are distributed team as claimed by Cockburn (2002) due to the differences in culture and time zone.

Whereas, some researchers such as Mishra & Mishra (2008), Stettina & Hijstek (2011) have argued that less documentation and relying on other forms of sharing information such as verbal communication may have a negative impact on the knowledge and team awareness particularly in the long run as verbal communication is more likely to be forgotten or members leave the project. The researchers recommend as well using some assistive tools for recording essential information to be used later. Therefore, project team's perception of documentation will be studied to identify to what extent the use of different documentation in their project is adequate, the efforts and time spent on documentation work and whether other assistive tools are used to record necessary information for later use. Since the selected project are already completed, and the duration of them was less than a year, then it would be difficult to investigate the effect of less documentation on knowledge loss, accordingly, it will be omitted.

- APPs namely; daily meeting (Li et al., 2011), iteration planning (Pikkarainen et al., 2008), demo (Pikkarainen et al., 2008), open office space (Grapenthin et al. (2015), (Pikkarainen et al., 2008), improve communication effectiveness
- APPs such as open office design (Pikkarainen et al., 2008), and the whole team (Lee & Xia, 2010) have a negative impact on communication effectiveness

- Effective Communication results in less documentation (Karelsky & Voord, 2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015)

### 3.2.2 Impact on Knowledge Sharing

In APM, the willingness of the team members to support and build on each other's strength and experience is a key for a successful project. Similarly, Agile Manifesto considers collaboration between the client and the project team as a critical requirement for success.

Based on the findings of Fowler & Highsmith (2001), Lindvall et al. (2002), Mishra & Mishra (2008), Pikkarainen et al. (2008), McHugh et al. (2012), Strode et al. (2012), Stray et al. (2012), Gill (2014) and Stettina & Horz (2015) APs such as whole team, iteration planning, daily meeting, demos and open office space facilitate knowledge sharing and learning among the project team through increasing communication frequency and provide earlier feedback which encourage them to take tasks that are traditionally done by project managers. The findings of communication effectiveness show that knowledge sharing can be facilitated through communication effectiveness. However, to share and build upon each other's knowledge, a certain level of trust among members must occur and the findings show that this can be achieved through constant interaction and communication, which enhances collaboration effectiveness over time. Furthermore, having good knowledge and skills do perform the tasks of

other members will also facilitate knowledge sharing and coordination effectiveness, which will reduce the workload on members. Thus, the influence of these practices will be examined in term of how team members support and help each other or whether they ask for support and how this affects productivity. Additionally, the researcher will investigate which of the highlighted practices have mostly facilitated knowledge sharing in the selected projects. Moreover, whether trust is established among them and encourages them to share and build on each other's knowledge and raise their concerns.

- Effective communications facilitates knowledge sharing (Pikkarainen et al., 008)
- APPs such as open office design (Mishra & Mishra (2008) Strode et al. (2012), whole team (Strode et al., 2012) iteration planning and daily meeting (McHugh et al., 2012) facilitate knowledge sharing

### 3.2.3 Impact on Project Visibility

Based on the LR, it was found that effective communication leads to increase interaction and communication frequency among team members, which enhances project visibility. The clarity of the project in general, being aware of the project overall progress and remaining tasks allow the team to organise and re-prioritise tasks and determine how much work they can commit to accomplishing by the end of the upcoming cycle. The findings of Chong (2005), Pikkarainen et al. (2008), Strode et al., (2012) and Stray et al. (2016) show that APs such as iteration planning, open office space, iterative development, daily meeting, demo and tasks boards

(information radiators) have a positive impact on the project visibility and found to improve team's awareness and understanding about the project goals, plan, progress and remaining tasks as well as enables the team to tracks their work and progress of each involved. Therefore, this research will study if APs increase the project visibility in the studied projects as perceived by the project team only. This is because the researcher lacks the opportunity to interview external stakeholders since the selected projects are already completed. Thus, they are considered as unfeasible.

- APPs such as iteration planning (Chong, 2005) and (Pikkarainen et al., 2008), open office layout (Pikkarainen et al., 2008), iterative development (Pikkarainen et al., 2008) and task board (Pikkarainen et al., 2008), (Stray et al., 2016) daily meeting (Strode et al., 2012) (Stray et al., 2016) and demo (Strode et al., 2012) enhance the project visibility

#### 3.2.4 Impact on Changes in Requirement

The importance of being agile is to adapt to the surrounding environment and welcome changes that are requested as the project moves forward. A number of researchers such as Boehm (2002) DeCarlo (2004), Boehm & Turner (2005), Wysocki (2007), Karlsky & Voord (2008), Misra et al. (2009), Collyer et al. (2010), Gustavsson (2011) Moogk (2012) highlight the importance of agile approach, which is welcoming changes in requirement throughout the project development due to the continuous involvement of the client and frequent interaction with the project team. This is

because of adopting an iterative approach that allows for early delivery of the requirement as the project is divided into small chunks. This encourages frequent involvement and interaction with the client and other members over the project course to review and obtain feedback on what has been delivered so far, thus keeps them aware about the project updates. Additionally, feedback is obtained sooner rather than waiting until the end of the project when the whole project is delivered at once, which reduces the risk of failure and allows the team to adapt and respond to changes quickly. Furthermore, incongruity and problems can be identified earlier allowing the team to quickly resolve problems and deliver the project faster. Therefore, the influence of using APPs will be examined to identify whether APs like iterative development increase the involvement of the client and encourage the project team to welcome and accept changes as the project moves forward and how does it affect the project outcomes.

- APPs whole team (Misra et al., 2009), iterative development (Boehm, 2002), (DeCarlo, 2004), (Boehm & Turner, 2005), (Ren et al., 2005), (Wysocki, 2007), (Collyer et al., 2010), (Gustavsson, 2011) and (Moogk, 2012) improve project outcomes through enhancing change requirement

### 3.2.5 Impact on Pressure and Stress

The LR findings show that using APs have also negative impacts on the project team resulting in challenging time for the project team to accomplish their tasks. The study

outcomes of Aguanno (2004), Fathian et al. (2007), McHugh et al. (2012) Stray et al. (2012) and Strode et al. (2012) show that a number of APPs may increase both stress and pressure on the project team to finish the tasks as agreed. Consequently, the quality of the results will be affected or deteriorated. Such practices include demos that put more workload on the team, and open office layout is found to increase sound level in the area that distracts the project and may make them lose their attention, which in turn impacts their productivity level. Moreover, as daily meeting has several benefits to the project team, it also has a number of cons. To elaborate, the project team may show a negative attitude due to some factors such as the time needed to produce the status report, the too long and frequent meetings. It could also be worse in the absence of trust as it is considered a place where team members have to show progress since the last meeting. Other practices include iterative development as findings shows that focusing on continuous delivery put more pressure and stress on the project team to deliver faster which may triggers other problem that affect the project.

Since stress and pressure are subjective and can vary among people as what constitutes stress and pressure for one person may not be perceived in the same way by another. Therefore, stress and pressure will be examined at an individual level and how this has impacted their work in terms of result's quality.

- The use of APPs such as open office design (Pikkarainen et al., 2008), demos (Moe et al., 2010) and (Strode et al., 2012) iterative development (Gustavsson,

2011), (Stray et al., 2012) and (Strode et al., 2012), daily meeting (McHugh et al., 2012) increase stress and pressure on the project team

- High pressure and stress lower the productivity of the project team (Fathian et al., 2007) and (Pikkarainen et al., 2008)

### 3.2.6 Impact on Productivity

The initial findings shows that APPs boost productivity while LR findings reveal that the productivity of the project team can be affected either positively or negatively due to implementing APPs. A number of researchers such as Karelsky & Voord (2008), Pikkarainen et al. (2008), Misra et al. (2009), Petersen & Wohlin (2010), Moogk (2012), Stray et al. (2012), Grapenthin et al. (2015) state that have stated that APPs increase productivity. While others such as Fathian et al. (2007) and Pikkarainen et al. (2008) highlights the negative impacts on productivity. Interestingly, it is found that some practices have both negative and positive influence on the productivity such as open office layout; however, some solutions have been suggested to minimise or eliminate the negative effects of the APPs. Thus, the productivity of the selected projects will be investigated to find out whether the used APPs have had any impact on productivity both negatively and positively. Furthermore, it is found that effective communication due to open office design reduces the emphasis on formal documentation and researchers have argued that reduced amount of project documentation could increase productivity as less time and efforts will be spent on the preparation and production of these documents, giving the team more time to focus on

critical tasks and respond quickly to any change request.

The productivity will be studied from two different perspectives, which are the project team and individual. On the project team level, the LR findings of Lee and Xia (2010), Petersen & Wohlin (2010) and Grapenthin et al. (2015) show that communication and coordination among team members lead to increased productivity through allowing the team to count on each other's strength and support each other to accomplish the tasks. On an individual level, the less emphasis on documentation found to enhance individual productivity and allow them to focus on other important things (Karelsky & Voord, 2008). However, the findings also state that some practices such as open office space may disturb an individual from being productive (Pikkarainen et al., 2008)

- APPs such as open office design (Karelsky & Voord, 2008), (Pikkarainen et al., 2008), (Petersen & Wohlin, 2010) and (Grapenthin et al., 2015), whole team (Lee and Xia, 2010) and (Strode et al., 2012) and iterative development (Misra et al., 2009), (Petersen & Wohlin, 2010), (Li et al., 2011) and (Moogk, 2012) facilitate knowledge sharing, thus increase productivity
- Less documentation has a positive influence on productivity (Karelsky & Voord, 2008)
- APPs such as open office design increase the noise level which results in lowering productivity (Fathian et al., 2007) and (Pikkarainen et al., 2008)

### **3.3 Summary**

All in all, this research paper will examine the influence of implementing APPs in six different areas, which are communication effectiveness, knowledge sharing, project visibility, change requirement, pressure and stress and finally the productivity of the project team. The thorough LR has shown that the impacts may be negative or positive and proper implantation leads to stronger results.

## **4. Chapter (4) – Research Methodology**

### **4.1 Introduction**

This Chapter is about the research methodology deployed in this research. It presents and explains the research design, participants, confidentiality of data and the procedures of data collection and analysis, which are most suitable for this research. The findings of the LR accentuate the importance of APPs in developing and enhancing the project team's agility; consequently, respond effectively and quickly to any changes and challenges to successfully deliver their projects. The LR and framework in the previous chapter along with the research design and methodology outlined in this chapter show the method to address the research question and objectives mentioned in Chapter One.

### **4.2 Research Strategy**

To obtain in-depth answers to the research question and objectives, it is vital to plan and design the research strategy. It is also essential to use a combination of research tools that are relevant to the finding of the LR. Moreover, the collected data must be critically analysed to ensure its validity. The research strategy for this dissertation begins by gathering information concerning the concept of agility in the field of PM from various scientific articles; accordingly, the research question and the aim and objectives of this study have been decided. In the following chapters, the results of the primary and secondary data will be critically examined and discussed to identify the most significant results. Accordingly, a conclusion and

some recommendations will be made. The research methods and questions of this paper are designed based on the findings of the intensive LR on agility and the following figure (see Figure 12) presents the research strategy of this dissertation in a graphical representation.



**Figure 12: The Research Strategy**

The first two stages are answered in the previous Chapter and the subject of this research is introduced in Chapter One. To reiterate here, the overall aim of this research is to investigate the impact of implementing APPs on the project. While investigating the impact of the APPs, the researcher will also attempt to identify the most influential and used APs that may help in the analysis and discussion of the findings. The focus will be mainly on the significant APs that lead to enhance the team's productivity and deliver the project successfully.

### **4.3 Research Design**

Bryman & Bell (2007) explain the two types of research that are commonly used for data gathering, which are quantitative and qualitative methods. The first one involves systematic empirical studies in which data is transformed into numbers that are tested to identify if a relationship occurs, accordingly draw a conclusion. On the other hand, a qualitative method allows obtaining specific information as participants give much richer answers to researcher's

questions and may also give valuable insights that might have been missed if using other methods, thus, offers a detailed description of the case being studied (Stake, 1995). In addition, it focuses on meaning, process and context: the “why” and the “how”, rather than the “how many” as with the case of quantitative method (Cohen & Manion, 1994 cited in Litosseliti, 2003, p. 11).

For this study, a qualitative method will be used where a number of projects will be examined by conducting group interviews with members of each project; then the outcomes will be compared to reach a conclusion. It is chosen; as it is fit the objective of identifying how the using of APPs impacts the selected projects and the team’s productivity. In addition, it is widely accepted and used although it has had its critics in the past as mentioned by Simon (1996). Generally, the qualitative method is considered as a slow and a time-consuming process; however, through it, the researcher attempts to gain a better insight into the subject of this research and gather in-depth data necessary to identify the various factors, which may be of influence. Moreover, multiple case study design allows compare and contrasting results of different cases and identifies similarities as well as uniqueness across the cases. Therefore, the practices of chosen projects will be compared in order to gain insight into how the APPs influence the project team and if there is any similarities or difference can be identified.

Flick et al. (2004) say that one of the most commonly used qualitative research methods is interview, and according to Mason (2002, p. 65), qualitative interviewing refers to in-depth, semi-structured or loosely structured forms of interviewing where open-ended questions are asked so much information can be generated from interviews in order to make analytical comparisons. The interview will be composed of a number of open-ended questions that are divided into main questions (bold questions) and sub-questions to obtain further information.

Below is the list of the questions.

### **Used Agile Practices**

- 1. What agile practices were used in the selected project?**

### **Communication**

- 2. How did the use of agile practices affect the communication effectiveness, thus the productivity?**
  - How did you perceive the influence of using APPs on the communication effectiveness?
  - Explain the impact of lack of communication or misunderstanding on the project in case it happened?

### **Knowledge Sharing**

- 3. Was knowledge more easily shared among team members?**
  - To what extent do members support and offer to help each other?
  - How and what was the impact of APPs on knowledge sharing?
  - If trust occurred, did it encourage team to be more open in term of knowledge sharing?

### **Project Visibility**

- 4. How did the application of APPs made the project more visible?**
  - How did the use of APPs make the project more visible?
  - Did team members feel that they were aware about each tasks and the project overall progress?

### **Change Requirement**

- 5. How did APPs enable frequent changes in requirement/ scope?**

### **Pressure and Stress**

- 6. How did the use of APPs affect the pressure and stress on team members?**

- a. What is the perceived level of stress and pressure?
- b. What practices caused stress and pressure on individual and what was the result?

## **Productivity**

### **7. What was the influence of using APPs on team's productivity?**

- a. Did effective communication and coordination increase productivity?  
(Team level)
- b. Did less documentation and distraction due to embracing open office space affect productivity? (Individual level)

Through the above questions, the researcher will attempt to confirm the impacts of APPs as mentioned in the previous Chapter and investigate whether new impacts can be identified due to implementing APPs, accordingly, updating the proposed framework.

## **4.4 Participants and Sample Size**

The selection of government organisations for this research is based on secondary sources mainly published newspaper articles, website and their periodical newspapers or reports. According to the secondary data findings, the selected organisations carried out several projects throughout the year such projects include the automation of the business performance management, developing a system for innovation to collect creative and innovative ideas, which both represent the IT industry. While the third project is an event project management that has been selected for comparison and identifying whether the context of the project also has an influence and due to the need for this type of research in domains other than IT.

Surprisingly, the findings show that the project team of the selected projects have managed to successfully deliver their projects as expected without exceeding the budget, but Osool and the reasons are mentioned in the description of each project. Most importantly, all organisations have implemented a number of APPs during the implementation of their selected projects.

Demographic characteristics criteria for participants are also defined to ensure the quality of data given. The two criteria are 1) all participants have been employed in their current organisation for a minimum of one year and 2) most participants sit in an open office layout and implement at least five of the mentioned APPs in this study. Accordingly, the researcher contacts managers and directors at the selected entities to participate and they have been asked to recommend other possible participants based on the above criteria. Kvale (1996) recommends 5-25 participants for the interview. Thus the total number of participants for this research is thirteen as will be mentioned in each studied project description.

#### **4.5 Confidentiality of Data**

Before conducting the interviews, the purpose of the research is explained to all participants, and they are informed about the confidentiality of their information, and it will be respected throughout this study. Furthermore, the right to withdraw at any time is communicated to them. In addition, the participants have been informed that all recorded data will be destroyed once data is transcribed.

#### **4.6 Data Collection and Analysis Procedure**

For analysing qualitative data, there are various approaches such as content analysis, which will be used in this research. It is one of today's most widely used analytical tools and defined by Cole (1988) as a way of analysing written verbal or visual communication messages.

In this dissertation, both primary and secondary sources are used, where secondary data has been critically evaluated to ensure its validity and quality. Secondary sources that are used in this research are scientific articles, trusted documents such as periodic documents of the selected government organisations for this study as well as their websites. The primary data is gathered by conducting three group interviews and two individual interviews using semi-structured questionnaires as mentioned previously.

After deciding on the projects for this study, appointments with key participants are scheduled and the venue of all meetings preferred to be at participants' offices. Accordingly, they can easily access information, if needed, and to experience and observe the design of the offices. An interview agenda that includes details about key participants contact details, meeting date, time and venue are also prepared in addition to other vital details such as the ultimate aim and critical objectives of this research. The purpose of the agenda is to avoid the risk of meeting conflicts and to send e-mails to participants a week before the meeting and a gentle reminder a day prior to the interview.

At the start of the meetings, a short general statement about the study is given to participants and assurance of their data confidentiality, and they are also reminded that they can withdraw at any time. For the safety of data, permission to record the interviews is obtained and a

smartphone is used for this purpose.

During the interview, the researcher focus more on keeping all participants focus on the main subject and avoid discussion irrelative topics, while recording of interview sessions allows the researcher to interact freely with participants and take notes of key points that need further clarification without interrupting the participants.

At the end of the interview, the researcher thanks the participants and politely ask about the possibility of contacting them for more details to further enhance the study, if necessary.

After each interview, thank-you e-mail is sent to participants for their time and valuable inputs.

In total, five interview sessions are conducted, in which three done as group interviews for each project and then two individual interviews to obtain further information. As mentioned, all interviews are transcribed and if a translation is needed, the researcher does the necessary and replays the audio couple of times to ensure the accuracy of the transcripts and review it with the notes from interviews. The findings combined with the findings of secondary sources in order to write a brief about each organisation and the project.

The interviews with selected projects' teams was conducted in Arabic, and a summary of each significant question is transcribed. The generated data are then analysed using qualitative content analysis to analyse interview transcripts highlighting the main findings that address the research main question and objectives and giving emphasis to the meaning.

An initial list of coding categories is generated from the LR and framework findings which include; effective communication, ineffective communication, project visibility, knowledge sharing, involvement, changing requirement, pressure, stress, quality and productivity. The researcher as well adds different categories under each code categories when possible such as advanced technology under visibility or communication effectiveness. These codes are used to analyse all interview data once it is translated and transcribed. In case a text chunk represents a single theme, a code will be assigned to it regardless of its size. While data that does not fit under any of the pre-defined category is discarded.

The following figure is an example of the interview coding used in this research.

Row	Speaker	Text	Code
8	IT Manager	From IT point of view, the <b>advanced technology allows us to have access to our email 24/7 from anywhere</b> . Emails are also setup on our smart phone for immediate respond to urgent matters. It allows project team to communicate better, share information and updates. Even our <b>internal system <u>TAKAMUL</u> can be accessed 24/7 from anywhere</b> , which leads to faster approvals on request. We also increase the email size to 10MB so our staff can share files of large sizes like images and PDF files.	Visibility + Advanced Technology
	Event Manager	In terms of events, changes happen to almost all our events, small or big events. For us changes are welcome and we are flexible and respond immediately to any change. We care about the end results of our events. Delivering continuous results allow us to obtain feedback and make changes sooner	Change Requirement

Figure 13: An Example of the Interview Coding

In order to ensure the consistency and reliability of the coding for this research, the whole coded texts are rechecked consistency to minimise human errors, thus ending up with a more sensible and logical report. Finally, the relationship between categories is identified to make inference in order to write the report.

#### **4.7 Validity of the Results**

In order to ensure the validity of the results, the researcher uses a semi-structured approach to allow interviewees to express their views freely. The same questions are used to ask all interviewees, so a comparison between the case studies can be made and to ensure the compatibility of the cross-case analysis.

During the interview sessions, the researcher encourages participants to further explain their colleagues' points through giving examples, correct their contributions or omit any statement that has been shared. Moreover, observations and notes are taken while conversations are recorded and transcribed subsequently. To probe into the main subject and avoid discussing irrelevant topics, the researcher uses an interview guideline and research questions are circulated to all participants to be reminded throughout the interview of the leading research questions. The guideline minimises the risk of misunderstanding and increases the objectivity.

Furthermore, hiding the identity of both the organisations and participants, which leads to obtaining detailed answers including answers related to the issues and negative impacts. Based on the definition of agility, specific selection criteria are defined to help to determine which projects to be included in this research. Thus, the researcher ensured that selected projects enjoyed a certain level of uncertainty where the requirements of the project were vague and not easy to be fully defined up-front or expected to be changed and re-prioritised at any point during the project developments. Additionally, the researcher conducted two more individual interviews with members from both Evventi and Osool to further ensure the validity of the findings.

## **4.8 Summary**

This Chapter outlined the research method will be deployed and how the research will be conducted to answer the research question and meet the set objectives. It also presented the research design and process to gather data from the selected participants. In addition, it highlighted the approach will be used to analyse data which will be detailed in the next Chapter.

## **5. Chapter (5) – Data Analysis and Results**

### **5.1 Introduction**

In this Chapter, an overview of the interviewees will be presented, highlighting their years of experience in their current organisation. Subsequently, the data of the group interviews on the impact of using APP will be analysed separately for each project; accordingly, the outcomes will be presented and discussed against the findings of the LR. In order to enhance the findings, a brief description of each project will be first introduced followed by the APP used in the projects.

### **5.2 Interviewees Profile**

The following table (Table 1) shows the interviews participant's profile. According to the table, most of the participants have more than five years experience in their current organisation, while four of the participants have one-year experience. However, the project managers of the three projects have the highest experience in comparison with their project team members. By comparing with other projects, two of the project managers have more than eight years of experience in this current organisation; while the other manager has two years of experiences, but in total, they all have more than ten years of experience in different organisations.

Table 1: Interviewees Profile

Project Name	Interviewee Title	Abbreviation	Years of Experience	Key Responsibility
Evventi	<b>Event Manager</b>	<b>EvtMag</b>	<b>8</b>	<b>The project manager and the link between the superior management and the project team</b>
	Graphic Designer	GRdes	1	Responsible for designing all marketing collaterals
	Marketing Executive	MktEx	4	In charge of the marketing plan and the execution of the plan
	IT Manager	ITMag	9	Managing technical requirement
	PR Executive	PREx	9	Handling the corporate communication and media coverage o
Osool	<b>Strategy Director</b>	<b>StraDir</b>	<b>2</b>	<b>The project manager, works closely with top management and concerned department to identify their requirements</b>
	Strategy Specialist	StraSpec	1	Test the system and ensure it meets the set goals and features
	Graphic Designer	GRdes	1	Work on the graphic design and the beautification of the system
	IT Manager	ITMag	1	Identify the system requirement and provide all IT support needed Test the system and ensure its compatibility
Innov	<b>Innovation Manager</b>	<b>InnoMag</b>	<b>10</b>	<b>The project owner and responsible for providing the requirement of the project and verifying the deliverables</b>
	IT Manager	ITMag	13	The project manager
	Business Analyst	BusAna	6	In charge of analysing the gathering and categorizing all the requirement
	Software Developer	Developer	11	In charge of developing the system

The table also shows that most employees at Osool have one year of experience, this because the organisation is newly established. Furthermore, interviewees of each project come from different departments within their organisation, but two participants from Osool are from the same department, the strategy department and this is because the project is owned by their department as stated by theme. According to the interview results, all participants have experience in previous organisations, but two participants, the graphic designers from Evventi and Osool.

Based on the above table, the likelihood of facing challenges in Osool is high as the organisation is recently established and most employees have less than two years of experience at the organisation, which means that the employees are still in the stage of knowing each other, thus cohesion and trust is still not well established between the employees. While the other two organisations, it is expected to see a strong relationship among employees, which may have a positive influence on the team's productivity.

### **5.3 Project (1) EVVENTI**

Evventi is a semi-government organisation established to manage the development projects being carried out in Sharjah and promote the city as a leading cultural and tourist destination. Therefore, the organisation ensures that its yearly event calendar is full of various activities that differ in term of complexity, duration, size and type of event. The U.A.E. National Day Celebration is an outdoor mega event that takes place on the 2nd of December every year and it is full of activities that spread across the main cities within Sharjah such as Al Dhaid, Kalba, Dibba and Khurfakkan. Similar to other mega-events being organised by Evventi, this event is subjected to many changes throughout the project lifetime, particularly during the execution stage due to the involvement of different stakeholders such as the traffic department, special mission department, municipality, ministry of education, the Ruler's Office and different suppliers like lighting and sound system, decoration and marketing collaterals. In addition, Her Highness (H.H.) who is also the chairperson of Evventi, also involves in heavily and monitors the progress of the event since it will be attended by VVIPs and broadcasted live on TV and YouTube, which means will be watched by thousands of people in the U.A.E. and other areas around the world.

One of the main reasons for selecting this project is that it is characterised as a project with uncertain requirements since the exact requirements are difficult to define at the beginning of the project and approval is given on the initial concept only, which is expected to be changed or further developed as the project is progressing. Besides, the complexity of the project due to the number of stakeholders who are involved in as well as the constant changes in the project's priorities over time. Moreover, Evventi has done a number of changes at the organisational level to increase the level of agility in order to support its people to achieve its strategic objectives, which in turn have impacted the project team performance. Such enhancement is the adaptation of a flat and flexible structure as it minimises the layers of management between the project team and top management; consequently, the speed of communication is a significant outcome. The EvtMag says for big projects that need to be done in record time (less than three months) the team usually creates their own structure and reports directly to the CEO; accordingly, approvals are routed through fewer layers and obtained quickly. She emphasises on the importance of the structure as it defines the roles and how the power, interpersonal communication and information flow among the members. Thus, conflicts are reduced, as each one is aware of his responsibilities and other as well.

For this project, the project team has not implemented any of the agile methods such as scrum and kanban; however, they have developed their customised method, which is based on different APs that they think best suit their project needs. It is worth mentioning that APM of Evventi is developed by the event team, top management and an outsourced management consultancy. Their approach has proven to be effective based on previous events' results using the traditional approach. Moreover, their event management model is being reviewed and developed frequently as the team gain experience.

### 5.3.1 Agile Practices

The following table shows the APs used in Evventi project and a brief description about each is given underneath it.

Table 2: Evventi’s Identified Agile Practices

A list of Used Agile Practices			
<input checked="" type="checkbox"/> Daily Meeting	<input checked="" type="checkbox"/> Demo	<input checked="" type="checkbox"/> Whole Team	<input checked="" type="checkbox"/> <b>Iteration Planning</b>
<input checked="" type="checkbox"/> <b>Iterative Development</b>	<input checked="" type="checkbox"/> Open Office Space	<input checked="" type="checkbox"/> Information Radiator	<input checked="" type="checkbox"/> Others, advanced technology

The interview findings show that Evventi does not stick to any of the agile methods and have their customised approach; however, a number of APs are used in this project as shown above in table (2). In terms of the daily meeting, all event team members attend it, but some members do not attend it on a daily basis. The interview findings show that in the project (1), the team meets on a daily basis to get updates about the project progress. However, at the earlier stage, not all members attend the meetings unless they have updates and something to share with everyone. The main reason is that they are not entirely devoted to the project and have other duties to be performed. The meetings usually conducted at the event’s office, which is designed as an open office layout and provided with advanced technology such as a projector and a whiteboard. All interviewees agree that this practice is crucial especially that not all team members are located in the same space. The EvtMag also added that the office is

mainly used by the event team, can fit all members and provided with assistive tools and technology such as a whiteboard, a flipchart and a projector.

*“The daily meeting is important as it gathers the project team in one place to share their updates and issues they face” – Event Manger*

Demos or as called by the GRdes (design concepts) are on the other hand are infrequent, mostly done at the earlier stage of the project by the GRdes for the event’s brand concept and marketing collaterals. However, the stage design is done as a 3D concept by one of the suppliers in order to allow Evventi team and management to visualise the design and discuss whether it will fit all the shows or changes should be done.

*“We usually propose three design concepts at an earlier stage of any project we are involved in that translate our understanding of the design requirement based on the initial briefing meeting with the requester” – Graphic Designer*

Due to the tight schedule of the project, almost every week, there is at least one outcome delivered. Thus, it can be considered as continuous releases. In terms of the task board, the team uses advanced technology tools to share information about the project status. The results also show that all members sit in an open office space, but in different areas within the same building. It is also found that the event venue is about ten minutes away from their building; however, the site is provided with a meeting room for the project team’s meetings. Moreover, the findings show that the project team is somewhat autonomous, but top management makes critical decisions and communication with them is only done through the project manager. Thus, it is hard to say that the team is strongly empowered.

Iteration planning is done weekly, particularly on Tuesday morning as it works fine for them. They call it planning meeting as they plan for the next week and suppliers are welcome to attend it. During this meeting, updates and issues are also shared for effective planning. While iterative development allows the team to meet frequently and obtain information about the project status as well as remaining tasks.

The project team is formed based on the required skills and/ or experience. Evidently, the EvtMag acts as an expert in the field of event project management since she has the necessary knowledge to manage the project successfully. The ITMag states that they do not have an expert in the audio/ visual system; thus they have been working closely with their supplier over the last four years.

*“We have been working closely with an outsourced A/V supplier for years now whenever we have big or external events that need this type of requirement as our existing system is only suitable only for small internal events” – IT Manger*

The EvtMag states that as the project progressed, new members are added. The selection of new joiners is made based on their competency and they could add value to the project. The GRdes argues that being responsible and committed are essential than competency. She adds that she does not yet have the adequate competency, but she is obtaining continuous feedback and learning from her line manager. She claimed that she is showing commitment and taking responsibility to contribute positively. The EvtMag said that we believe in her talent and ability to perform her tasks as expected.

### 5.3.2 Impact on Communication Effectiveness

The interview data show that the organisation implements open-office concept and ensures that pieces of furniture can be moved around for more flexibility, which breaks down communication barriers and creates better relationship particularly for those sit in the event office. It also enables members of the committees who sit in the same location to communicate face to face and discuss updates without the need to schedule meetings and book the meeting room. In order to ensure effective open communication and encourage discussions about any matter of importance, the event office's door is always open. Accordingly, members feel free to talk and raise their concerns at any time and not wait for the daily meeting, which raises their motivation and improve their productivity. This practice is part of the organisation's policy according to the EvtMag.

*“We embrace open door policy and it is part of our employee handbook” – Event Manager*

The data reveals that the team relies heavily on advanced technological tools particularly smartphones to improve communication as it keeps them in touch throughout the day and during non-working hours. Phone calls, emails and “Whatsapp” are the main forms of communication to share information and updates among members. However, the tight schedule and load of tasks make it difficult for the team to notice all texts sent via “Whatsapp”, even though they check it regularly and sometimes texts are misinterpreted. As a result, misunderstanding occurs, but through daily meetings and face-to-face communication at their office, the issue is tackled.

*“Smartphones are used heavily among us and throughout the day to updates and share information related to the project... We frequently communicate even after working hours and weekends through Whatsapp, email or phone calls if needed” – Event Manager*

*“Problems in events occur suddenly and frequently for many reasons that’s why we hold daily meeting” – Event Manager*

In addition, daily meeting and open office design allow for better communication, sharing the project status and most importantly, support face to face communication among members; consequently increases the effectiveness of communication. It is found that the daily meeting is not time-boxed to fifteen minutes and takes between twenty to sixty minutes usually as they also discuss the issues and challenges. The EvtMag states that the daily meeting is important to identify whether the project is progressing well and lets them attend to issues before they get complicated. Moreover, not all members are forced to attend the meeting due to their other responsibilities that not related to the project but are encouraged to do so or assign any member to show up who in turns will brief the team during the meeting.

*“The open office concept help me a lot to get updates on the project, I don't have to leave my office or use other things like the office phone for example to get the information I need, just call the person name and ask the questions I want” – PR Executive*

In term of iteration planning, the MktEx says it is better not to plan out the next weeks regularly due to the high amount of change requests in priority and requirements as the event date gets closer, so planning for the coming weeks is a *“time consuming”*. Additionally, some challenges force the team to change their plans or cancel some of the activities especially those that require plenty of time to be accomplished at a high quality, but in their case, the

date of the event is something can not be negotiated. The minutes of meeting (MOM) are taken during this session to be circulated to the top management and keep them aware, and tasks are added to the Gantt chart, which allows those who missed the meeting to know their tasks.

*“Changes requested a lot, so we prefer to keep our planning for days or weeks. Planning for the whole event activities at earlier stage is a time consuming” – Marketing Executive*

Moreover, the GRdes says *“demos are more influential and persuasive than words”*, and rather than spending a considerable amount of time with the team trying to explain the different brand concepts, demos save the project team’s time and efforts and encourage them to share their thoughts about the proposed design concepts. As a result, requests for design modification or approval on the concept can be easily and quickly obtained. Throughout demos, colours and sizes of printed artworks can be visualised before going ahead with printing out the designs, which makes it also more comfortable to select the best design concept for the event.

*“We designers believe that visuals are more powerful and influential than words, thus we always support our ideas with images and designs” – Graphic Designer*

In terms of the negative impact on communication effectiveness, the whole team according to the findings does not hold up the communication, although the team is made up of people from different departments. This is because a leader is assigned for each committee that comprises of a number of individuals between two to five maximum who report to the committee’s leader and are not required to attend the main daily meeting. The findings point

that each committee manages its tasks and conducts meetings to update the leader who in turns updates the project team. Whereas, the open office design is found to cause some issues related to the noise level, which will be further discussed in the later sections.

Although Evventi's team uses their customised approach in this project, the emphasis on internal and formal documentation is low, which means that only necessary documents are produced. Such documents include event's concept presentation that includes the project structure and responsibility of each committee, the event's venue layout as well as the Gantt chart and MOM. All documents are stored in the shared folder and shared with all project team via emails and the company's network (intranet) that can also be accessed online from anywhere.

According to the EvtMag the amount of produced documents is adequate to share project's information among the project team and new members joining the team at any time, thus no need for other documents to be included. Furthermore, the team regularly communicate throughout the day, and critical information is shared through emails or Whatsapp group, which leads to minimising the emphasis on formal documents. Moreover, sticky notes are used to record essential tasks or updates and are posted on the individual's laptop or office for actions.

*“I think the documentation for this event is enough to know necessary information about the event and I don't think we need more documents” – Marketing Executive*

In general, the findings are unexpectedly positive in terms of the impact of APPs on communication effectiveness, although some APs are not performed accurately such as the

daily meeting as it is not attended by all members. The examination reveals that APPs improve communication effectiveness among members and have contributed to a positive impact on the overall performance of the project and this finding can be linked to the research outcome of Pikkarainen et al. (2008), Li et al. (2011) and Grapenthin et al. (2015). This is maybe because the team members take the initiative and ask about the project status and requirement if they have not shown up or assigned someone from their team to attend it for updates sharing, which may also be a reason for the low issues related to misunderstanding.

The analysis also shows that the use of the APPs such as open office design, daily meeting, iteration planning and demos improve the communication effectiveness through breaking down the communication barriers and encouraging discussion among members, leading to enhance the awareness about the project overall requirement, team members progress as well as changes in priorities, and obtain feedback quickly that results in applying modification quickly. It also allows the team to raise their concerns and that leads to improve their motivation and productivity level, which confirms the findings of Karelsky & Voord (2008), Pikkarainen et al. (2008), Li et al. (2011) and Grapenthin et al. (2015) in the LR about the positive impact of these practices on communication effectiveness that lead to increase the project visibility of the project, facilitate knowledge sharing and minimise the risk of misunderstanding.

Moreover, effective communication leads to minimise the emphasis on the internal documentation, which concurs with the findings of Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015). The team spends little time preparing formal documentation and only concentrates on important documents that

necessary to new members to get necessary information about the project and its current status. This is maybe because the team relies heavily on verbal communication for fast sharing of information. It is also found that other tools are heavily used to share critical information such as Whatsapp, emails, whiteboard and sticky notes, which are considered sufficient for information sharing, which may indicate the reason for the low emphasis on formal documentation.

The following figure shows the identified impact of APPs on communication effectiveness.

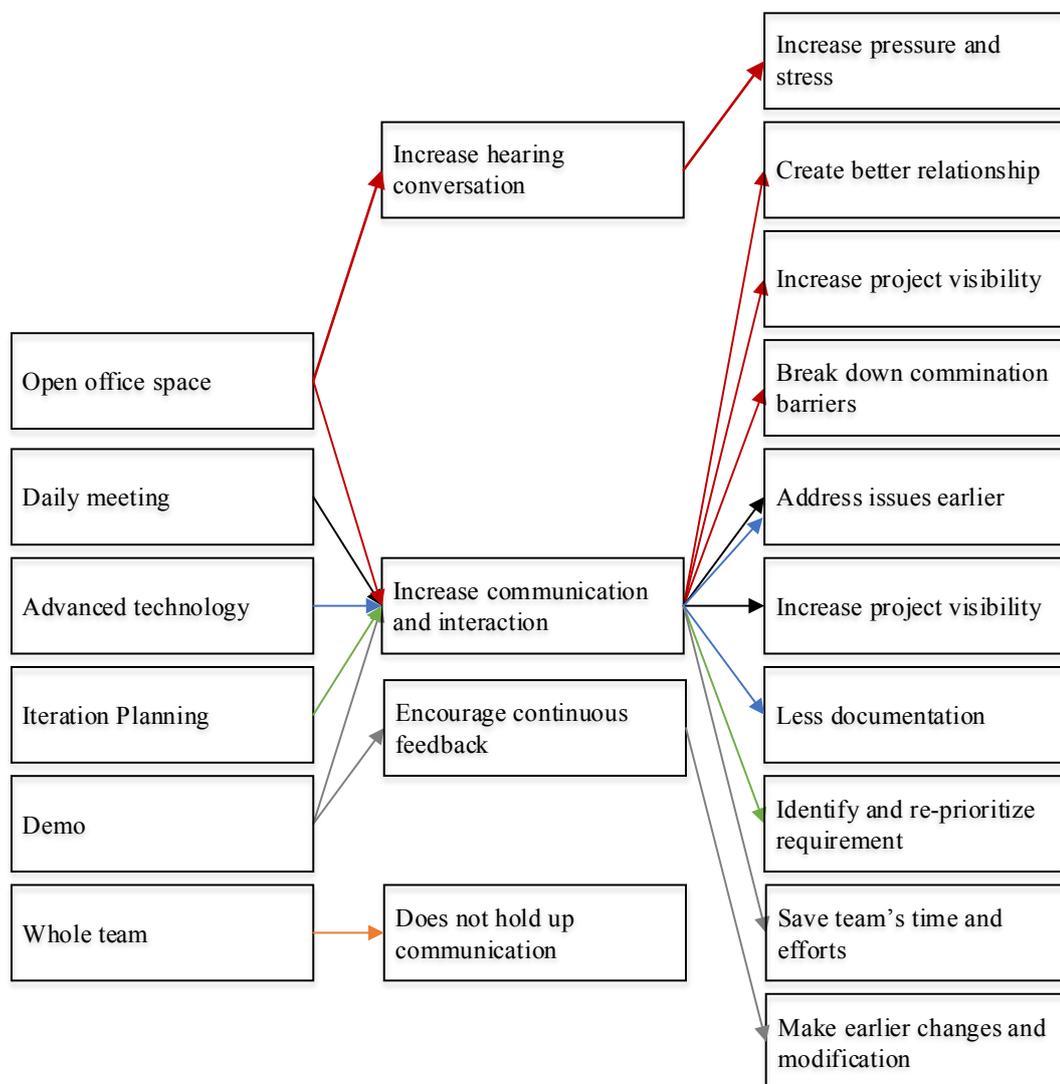


Figure 14: Identified impact of APPs on communication Effectiveness in Evventi

### 5.3.3 Impact on Knowledge Sharing

According to the interviewees, a number of used practices facilitate knowledge sharing among team members, which can be linked with the findings of (Gill (2014)). The EvtMag states that daily meeting has the most significant impact on knowledge sharing as it assists in identifying issues earlier and before they get complicated, thus helps the team gets together to discussing and solve them quickly. This is because it enables the team to be aware of the project status and each member's progress. While MktEx adds that through daily meetings if any member faces a problem or finds it difficult to accomplish a task, the team supports him as they build on each other's strength and all have a shared goal, which is the success of the event.

*“We have a shared goal, which is a successful event which will reflect on our corporate image. We count on each other's strength to face the challenges or have some difficulties in finalising any tasks” – Marketing Executive*

The interview data reveals that the team are cross-functional and that most of the project members have worked on previous events together and are familiar with the requirements of each task, thus strive to accomplish it. To elaborate, finalising marketing collaterals requires the collaboration of both the marketing and communication teams to finalise drafting all texts that will go on artworks. Accordingly, both teams work closely and collaboratively with the GRdes to finalise the artworks and do not wait for the designer to request the texts as stated by the MKtEx. They get together to draft some of the missing texts and that support in accomplishing the task on time.

*“Since we have experience in working on events, we know the procedure and the requirement very well, thus you will find us sometime prepare the text in advance or have a draft text” –*

*Marketing Executive*

The EvtMag says that iteration planning gives them awareness about the following tasks and a better understating of the project remaining tasks and its status. It also gives the team an insight into the most important tasks or requirements and what actions should be taken in order to accomplish these tasks. Accordingly, if more resources are needed to finalised any critical tasks quickly, those with knowledge and adequate competency get together to accomplish it. As a result, it boosts the team’s performance and supports them to finish some of the critical tasks in a shorter time. While open office space as mentioned above enables the project team to see and interact with each other, thus capture necessary information.

*“The team is very supportive if there is a need for the support they do not hastate to lend their hands” – Event Manager*

Moreover, it allows the team to listen to the conversation between any members and encourages others to join their conversation and share their knowledge with others to improve or tackle any issues.

The following figure shows the identified impact of APPs on knowledge sharing.

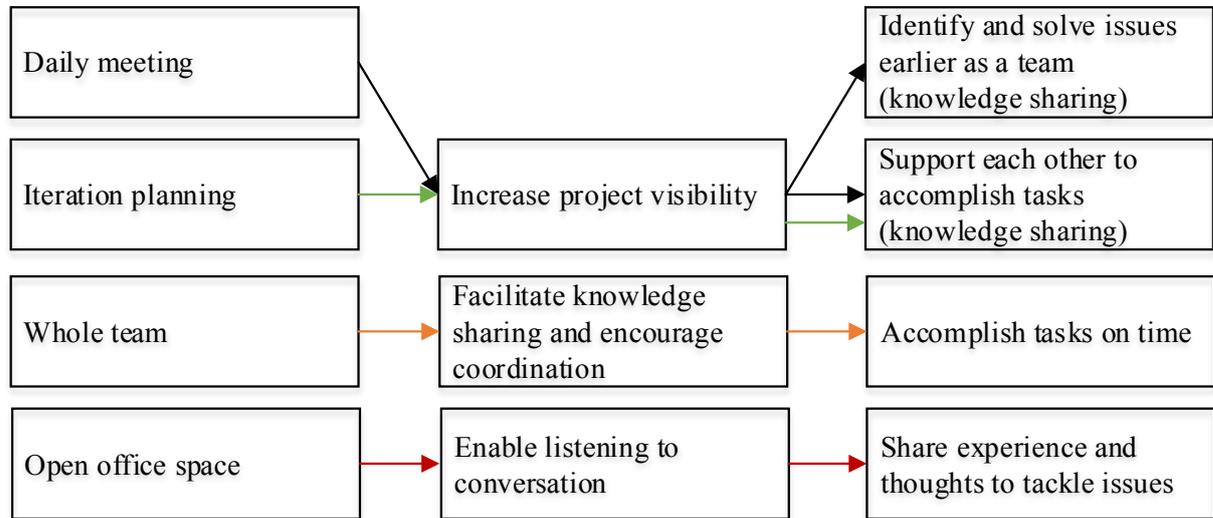


Figure 15: Identified impact of APPs on knowledge sharing in Eventi

The interview results reveal that the used APs make it more easily to share knowledge among the team members leading to improve it. It is also found that both daily meeting and open office design have a significant impact on enhancing knowledge sharing, which can be lined with the findings of Mishra & Mishra (2008), McHugh et al. (2012), and Strode et al. (2012). It is also found that all team members focus on the project success as the primary objective; thus they count on each other's strength that builds collaboration between them to accomplish the project goals. The study shows that daily meeting reduces the risk of issues as it allows the team to quickly respond to them, and it also encourages them to count on each other's strength, which improves team collaborates and establish trust among theme as it is revealed in the LR of Fowler & Highsmith (2001) McHugh et al. (2012) and Stray et al. (2012). The Open space design is found to increase interaction and hearing level, which allow the team to

capture necessary information which can be linked with the findings of Mishra & Mishra (2008) and Strode et al. (2012) that the presence of team members in an open space increase awareness and promote communication, thus improve knowledge sharing and learning about the project.

#### 5.3.4 Impact on Project Visibility

Based on the interviewees, a number of practices are used to increase the visibility. Since open office space increases access to the team and supports conversation, members become aware of what each other is doing and the status of tasks, which increase the visibility. The EvtMag states that they also rely heavily on the MS-Project and their in-house developed system called “Takamul” to increase the project visibility. According to the ITMag, the concept of “Takamul” is similar to the ERP and built to automate the business processes and used to manage the tasks between departments, monitor and visualise the status of tasks. The interviewees stated that the system enables them to initiate tasks and monitor the progress of each.

Interestingly, the system sends notification three times a day to all those involved in the process of each task to remind them about it as stated by the ITMag. The EvtMag highlights that since the launched of the system, they have noticed a dramatic improvement in productivity as it makes it easier to monitor the project tasks and visualise where each task stand at a particular moment. She adds that they also have a whiteboard located in their office

and the only necessary information is written on it, so those coming to the office can obtain information about the project.

*“We developed our online system, which is Takamul. The system allows employees/ project team to send their requests to the concerned departments, accordingly, they will take the necessary action and the status of the request can be viewed as the action is executed... and supported with notification features which are linked to employee’s email account” – IT Manager*

In addition, relevant information and updates are circulated through emails or shared via new technologies as “Whatsapp” and SMS between all. The GRdes asserts that the use of “Whatsapp” helps her a lot in obtaining feedback on her thoughts about the event branding concepts. The EvtMag adds that the designer keeps sharing photos about her initial concepts with the team, which gives immediate feedback that makes her responds quickly to change requirement. All interviewees agree on the significance of advanced technology in increasing project visibility and how it supports them to minimising the misunderstanding due to lack of knowledge.

Furthermore, the ITMag says that a shared folder is created for this event so all members can have access to the documents. Interestingly, all members can access the folder remotely from anywhere and at any time, which allows them to edit or share the information with others such as suppliers upon request without the need to be at the office or waiting for the next working day in order to share the needed files.

*“Feedback on branding concepts is shared through the Whatsapp group. It works faster” – Graphic Designer*

*“For each event we organise, we create a group on Whatsapp and we share updates and information about the event and raise any concern” – Event Manager*

While the GRdes says that demo allows the team to see and feel the end design before sending it out for production and it works as “tangible visual evidence” that support her explanation of the design. Most importantly, the demos enable the team to avoid surprises due to misunderstanding, as the design concept is tough to be visualised. Other APs found to improve project visibility such as the iteration planning, in which it gives the team an overview on the remaining tasks and where the bottleneck is or important tasks that need more focus as stated by the EvtMag.

The following figure shows the identified impact of APPs on project visibility.

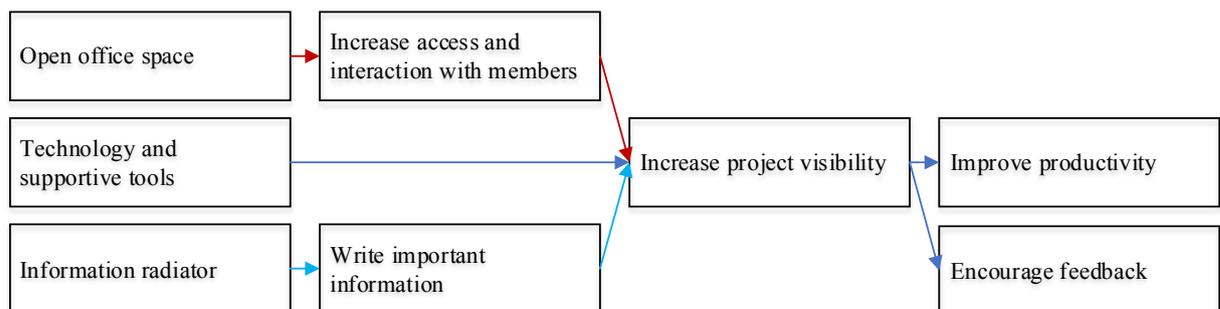


Figure 16: Identified impact of APPs on project visibility in Evventi

In general, it can be said that the use of APs increases the project visibility among the team members particularly, open office design, demo and information radiators which can be linked with the findings of Pikkarainen et al. (2008), Strode et al. (2012) and Stray et al. (2016). The results also reveal that other factors such as the use of information radiators; in this project advanced technology and the in-house system (system based tasks board) support in increasing the project visibility. Additionally, it is found that all team members are in the know about the critical project information and other member's progress, and they are continuously updated on any matters that will affect their tasks. This outcome is supported by the studies of Pikkarainen et al. (2008) mentioned in the LR that state information radiator increase project visibility. Moreover, to the APs, the high visibility may be supported by other factors such as the team cohesion and each member of the team takes the initiative to obtain and share information with others, or the organisation embraces open door policy and the project structure created at earlier stage of the project, which defines the role and communications ways. This is proved in the research outcomes of Pikkarainen et al. (2008) and McHugh et al. (2012) about the important of defining the role and communication tools for the team.

Interestingly, results show that the high level of project visibility improves the productivity and the EvtMag clearly states that high project visibility leads to enhance the project team productivity. The open space design is also found to improve interaction and instant conversation, which allows the team to capture necessary information about the project. This outcome agrees with the findings of Mishra & Mishra (2008), Pikkarainen et al., 2008 and Strode et al. (2012) that the presence of the team in an open space increase awareness and facilitate communication, thus improve learning about the project.

### 5.3.5 Impact on Change Requirement

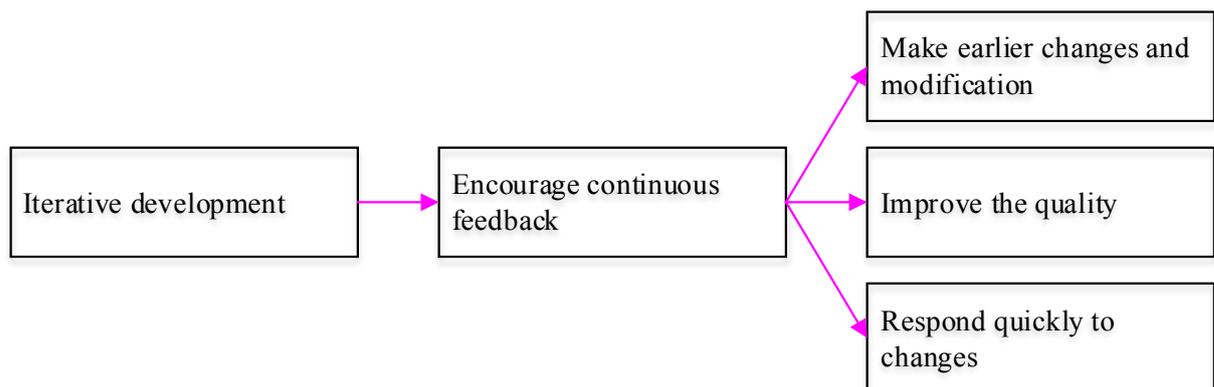
To become agile, the project team must be able to respond quickly to changing priorities. Therefore, the regular continuous cycle allows EvtMag team to be agile. Both the EvtMag and GRdes agree that this practice is highly important as it supports continuous feedbacks from different people involved in the project including top management on the project progress, deliverables and changing priorities. They say that releasing in small iterations enables the project team to do necessary changes and create products that are according to the client needs. For instance, although the creative concepts of the event were done at earlier stages of the project, outcomes were only delivered days prior to the event because the exact requirements of the design were vaguely defined at earlier stages and usually conceptualised based on the event theme according to the GRdes. Thus, continuous feedback leads to further enhancement in design. This outcome is in accordance with the finding reported by Collyer et al. (2010) and Gustavsson (2011) that continuous feedback due to iterative nature allows for continuous modification and improvement. When asked how this practices contributed to the success, the GRdes says:

*“When things are vaguely defined and changes are expected at any time, then it is nice to be flexible” – Graphic Designer*

Through continuous iteration, feedback is obtained continuously allowing for improving the quality of the final design. The EvtMag claims that it will be difficult to imagine how the project will progress without constant iteration throughout the project lifetime as it allows them to react to changes in priorities and requirements quickly.

*“I don't think we will manage to do the project successfully without continuous iteration because it allows us to respond fast to any changes or solve the problem quickly” – Event Manager*

The following figure shows the identified impact of APPs on change requirement.



**Figure 17: Identified impact of APPs on change requirement in Evventi**

The interview results show that the project team continuously delivers outcomes and seeks feedback from different stakeholders such as top management (the client) and concerned suppliers. Interestingly, the interview findings show that they do not use fixed time interval; however, over the course of the project, the number of outcomes increases gradually even when they reach to a point where they concentrate on the operation side of the event. Even though they have not had a fixed time bound for their interval, working iteratively gives them the ability to deliver products that are closer to what H.H. and top management needs. Thus, it is reasonable to say that this improves their performance and enables them to deliver faster and better outcomes.

The results show that the project team welcomes changes, which are mostly requested by the top management, while only a few changes are as a consequence of these changes or due to unforeseen circumstances. Modifications are performed quickly due to the project's tight schedule and its importance as well as the skilled people working on the project and who have worked on similar projects previously. The analysis results support the studies of Boehm (2002), DeCarlo (2004), Boehm & Turner (2005), Wysocki (2007), (Collyer et al. (2010), Gustavsson (2011) and Moogk (2012) that iterative development allows the team to be flexible and accept changes to deliver faster and reprioritise their tasks according to the client's needs and achieve better in terms of quality of results. Thus, improves the project success and allows releasing early benefits.

### 5.3.6 Impact on Pressure and Stress

The interview analysis shows that the primary cause of the pressure and stress on the project team is the tight schedule of the project, which can not be pushed forward and what makes the situation even worse is that the management keeps changing their priorities and requirement throughout the project cycle which discussed during the iteration planning, which increases the pressure and stress on the team. According to the EvtMag, one of the expected outcomes was not achieved, which was the video that highlights the opening of the new Flag Squares in the other cities happened in the afternoon. The video was supposed to be part of the main show (night show) and expected to be delivered at least an hour before the main show. It was only delivered a few minutes before the show. Consequently, the director of the show and programs cancelled the video show and informed all performers about its cancellation.

However, none of the APPs causes this delay according to the analysis results and it was out of their control.

*“We had to cancel the video show which was supposed to be within the main activities of the night show because of the delay in delivering the video because of the traffic” – Event Manager*

In addition, continuous deliverables have made the top management more aware of the team’s ability to carry out this project successfully despite the challenges they continuously face and tight time allocated for this project. The EvtMag says *“the CEO continuously inquires about the project progress that causes stress for them as they feel that a lot is expected of them and to show progress”*. However, the CEO does not hesitate to lend a hand. For example, when he knows about the delay in releasing one of the payments due to technical issues in “Takamul” system, he promptly contacts the financial team and requests them to issue the payment immediately and not to wait till the system issue is fixed so that the supplier can deliver the items on time. Thus, minimises the stress on the project team.

Furthermore, the GRdes states that demo is more powerful and convincing; however, working on demos is a chore and requires much research to be done before working on the concepts to ensure the originality of the proposed concepts. This task increases the pressure on her and what makes the task tougher is the tight schedule of the project, which gives her a tough time to work on the design concepts. Thus, it can be said that demo increases pressure and stress and this finding ties well with the previous research of Moe et al., 2010) and (Strode et al., 2012). According to her, the frequent changing requests lead to increase the stress on her and other team members working on the marketing collaterals as all designs need to be delivered

at least a week prior to the event's start date to give enough time for printing agency to produce and put all marketing artworks up as per the plan. Therefore, it can be said that iterative development welcomes changes, but increase the stress on the team, which proves the previous results of (Gustavsson, 2011), (Stray et al., 2012) and (Strode et al., 2012).

*“Every time I work on any design concept I have to do a research before deciding on the concept to see the new trends in design and get a glance on the design of similar events, which put more workload on me and the squeezed schedule of the event make it very challenging” – Graphic Designer*

Moreover, the daily meeting is considered by the project team as a place where they have to show that they have accomplished something. Accordingly, put pressure on them because some tasks are interdependent and this itself generates pressure on the team to accomplish the tasks, or it may impend the progress of other team members. This finding can be lined with the studies outcome of (McHugh et al., 2012). However, the EvtMag does not compel the committee's leaders to attend the daily meeting, as they are working on other projects simultaneously. However, she expects that other members in the committee to show up and share updates concerning the committee's tasks as well as to communicate with the committee the updates that have been discussed in the meeting and any requirements. According to the leaders, this reduces the pressure on them and distributes it to other members within the committee.

*“I know the team has other responsibilities, that's why I don't force them to attend the daily meeting. But I expect them to assign other members of their committee to attend” – Event Manager*

Since the open-office concept is implemented and not all members sit in the same office, this causes a distraction as others around them talk about others topics; thus, members have a challenging time accomplishing their tasks, resulting in more stress and pressure on them. This outcome is in line with the findings of Pikkarainen et al. (2008) that open office space increase pressure and stress on team. However, the PREx states that most members are laptop users, which boosts their mobility and allows them to work from anywhere. Thus, to overcome distraction issues they move to any of the unoccupied meeting rooms or event's office if necessary, which allows them to stay in the most productive mental states. The ITMag adds that the culture of the organisation supports "*do not disturb*" policy, which is initiated in the organisation to enhance productivity, so desktop users usually put "do not disturb" sign in a visible place when the concentration is needed. As a result, other teams go to other places or lower their voice level.

To conclude, working on this project has put more pressure and stress on the project team not only because of using APs as mentioned above, but also due to its strict deadline that can not be negotiated. Based on the findings, APs such as demos, daily meeting, open office design and iterative development generate pressure and stress on the team to accomplish tasks quickly without affecting the quality of the outcomes. The outcomes support the research results of Pikkarainen et al. (2008), Moe et al. (2010), Gustavsson (2011), McHugh et al. (2012), Stray et al. (2012) and Strode et al. (2012), which claim that these APPs increase pressure and stress on the project team. The following figure shows the identified impact of APPs on pressure and stress.

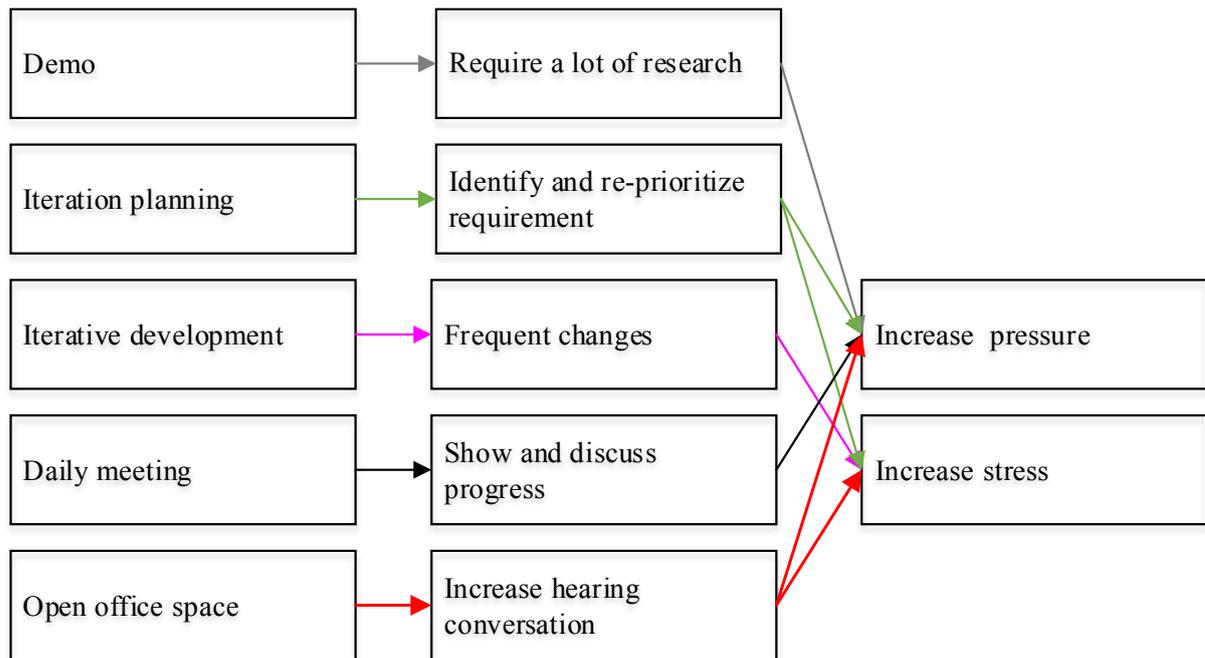


Figure 18: Identified impact of APPs on pressure and stress in Evventi

### 5.3.7 Impact on Productivity

The PReX says that the open office concept and daily meeting breaks down communication barriers and creates a better relationship particularly for those sit in the event office. She adds that the event office interestingly can be easily converted into a meeting room by moving a few pieces of furniture around and according to the interviewees, this layout allows for many people to fit in, facilitates communication and enables discussions to be heard much easier. Accordingly, encourages collaboration, which positively influences productivity. This outcome proves the findings of Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010), Strode et al. (2012) and Grapenthin et al. (2015) about the positive impact of open office design on communication, thus productivity. However, based on the findings

presented in the pressure and stress states, this practice causes a distraction to the project team. As a result, it takes them a bit longer time to accomplish some of the tasks, and over the time the team manages to overcome this issues through taken different actions as mentioned previously. This findings proves the results of both Fathian et al. (2007) and Pikkarainen et al. (2008) about the negative impact of open office layout on productivity due to distraction and noise level.

*“The office design and furniture allow us to move the furniture pieces around to convert the room the meeting room” – PR Executive*

The data analysis shows that iterative development is found to improve the outcomes as feedback is continuously obtained throughout the project cycle, which enables them to apply changes sooner rather than later and making a huge rework. Furthermore and as the project progresses, the number of release increases as the team stated, which proves that iterative development increases productivity. This outcome signifies the positive impact of this practice on productivity and it can be linked with the findings of Misra et al. (2009), Petersen & Wohlin (2010), Li et al. (2011) and Moogk (2012) about the positive impact of iterative developed on reducing reworks and improving the quality of end results.

The interview analysis reveals that communication effectiveness of the team is very high and it is clearly stated by the EvtMag as mentioned above that continuous and instant communication leads to decrease their reliance on documentation. The findings also show that both Gantt chart and meeting minutes are done and controlled by the administrative assistant who sits in the event’s office, so it does not affect the productivity of key members. The main presentation is done by the EvtMag and takes a couple of days to gather necessary

information and propose it to top management and then a few hours to update it and share it with the team. The event's setup layouts and designs are done and updated by the concerned suppliers. All interviewees agree that the amount of documents produced is enough and almost for each event the same amount of documents are prepared, and at the closing stage, a post-event report is done to record all necessary information whether negative or positive as it is used as a reference and lesson learnt for future events. Accordingly, it can be said that effective communication due to using APPs particularly open office layout improves productivity which can be tied with the finding of Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) in the LR.

*“For each event, we prepare the same documents which are enough to share the information about the event and its activities” – Event Manager*

*“I think they are enough” – Graphic Designer*

*“I don't think we need more documents” – Marketing Executive*

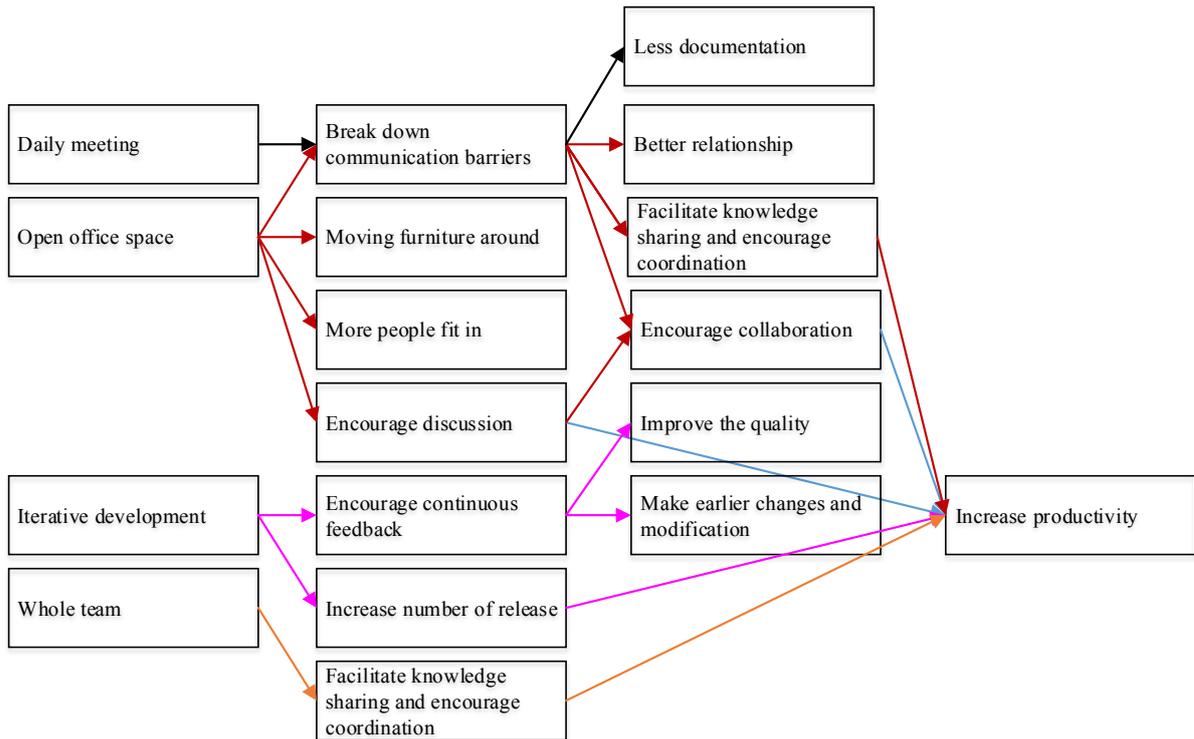


Figure 19: Identified impact of APPs on productivity in Evvent

Based on the data analysis, it is found that a number of APPs have contributed positively in enhancing the productivity in this project. At the team level, the analysis shows that the team enjoys a high level of communication effectiveness due to the use of APPs particularly, daily meetings and open office design as both increases the access to the team members and interaction, which increase the visibility of the project and facilitate knowledge sharing. Thus, it can be said that these practices improve productivity which proves the finding of Karelsky & Voord, 2008), (Pikkarainen et al., 2008), (Petersen & Wohlin, 2010) and (Grapenthin et al., 2015) which state that open office design improves productivity. Whereas, the discovery of daily meeting positive impact on productivity needs to be further studied to prove it.

The previous analysis of data reveals that collaboration exists between the team in which they count on each other strength and experience to solve the issues and accomplish the project on time when resources are in shortage. The example of the accomplishment of the marketing collaterals is considered as an evidence of the collaboration among team members, and the practice of the whole team supports this. Thus, it can be said that whole team practice improves productivity and this outcome can be linked with the findings of Lee and Xia (2010) Strode et al. (2012) about the positive impact of the whole team on enhancing teams' coordination which in turn minimise the bottleneck and workload, thus improves team's productivity.

At the individual level, the initial proposition was that effective communication reduces the emphasis on the documentation, which gives the project team more time to focus their attention on important tasks. Based on the findings, the amount of the documentation is found enough to spread knowledge among the project members and share it with the new members joining the team, which is because of the effective communication between the team and the use of advanced technology. It is also clearly stated by interviewees that no need for further documentation for this project and they have been preparing almost the same documents whenever they have an event. This finding proves the research of Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) that effective communication leads to putting less emphasis on documentation.

#### **5.4 Organisation (2) – Project (2) Osool**

Osool is a semi-government entity established in 2014 to be the financial arm of the emirate. Since it is a new establishment, the organisation sets a plan to design and develop an online performance system to monitor its yearly operational plan and ensure the alignment of its project and initiatives with its strategy. The automation of their manual system will save the team's efforts, time and make it easier for each department to update their progress and provide supportive evidence against their performance. While the strategy team will be reviewing what has been uploaded; accordingly arranging meetings to discuss essential points or obtain further clarification. Therefore, the strategy team has done some research and benchmarking to give them an insight into the requirements of the system and benefit from other experience.

The system is developed based on a pre-defined strategy and operational plan and will be incorporated with a risk management assessment in the future as the organisation manages the investment funds of the Emirates. To develop the system, the StraDir form a team that consists of people from different departments to benefits from each skill, experience and knowledge. The team includes the strategy team who are the project owner, the IT manager, a freelance graphic designer and other members who are mostly involved at the initiation stage such as the procurement manager, contracts specialist, a legal adviser and the finance manager.

At initial stage the developer with the IT team conduct a readiness assessment to ensure that the organisation has all the requirement to build the system throughout the development of the

project, the team has faced lots of challenges that hinder the delivery of the project; however, with the support of the management they have managed to overcome these challenges.

The project is estimated to be delivered in six months at the cost of around AED 250,000; however, the team delivered the project in nine months at the cost of around AED 300,000 as the management has decided to close its office in Singapore suddenly, which forces the team to do some modification and changes on their strategy leading to minors modification in a part of the system as reported.

The team considers the project as a successful project although it takes a longer time to be finalised. It is found that it is still used and considered as valuable assets since it contains the history of the organisation's strategy and performance. From time to time, the team works on its improvement and beautification to make it a friendly user and fix any bugs to improve its features and performance.

In this project, the team uses a few APPs and the entire development of the system is executed in an iterative approach and done by a cross-functional team who reports to the project manager (StraDir). In addition, there are a number of supportive members from each sector that are only involved in a certain point of the project to test the part of the system that is related to their sector along with the project team. However, they are not counted in this project as stated by the StraDir.

It is found that the team does not have a project structure that determines the power, line of authority and how information flows among the project team members. It is because the strategy team has the ultimate authority to assign tasks to different team members based on

their original role in the organisation and all decisions related to this project are to be taken by the StraDir apart from critical decisions to be made by the top management.

The reason for choosing this project is that it requires continuous tests throughout to ensure it works smoothly, fix any bugs and improve its performance. However, minor issues are to be fixed by the IT team after its delivery, while significant issues by the outsourced developers according to the system maintenance agreement. The team works in an iterative method, and each sprint is three weeks long, and after that, a demo is presented to the concerned sector to explain the system and obtain their feedback.

Since all sectors will use the system within the corporate organisation, and there is a plan to add other sub-entities, evidence shows that stakeholders are involved in the project to obtain their feedback and requirement. This is because each sector has specific requirements in terms of the type of supportive evidence to be uploaded against each KPI, authorised person to enter the data and management approval layers.

#### 5.4.1 Agile Practices

The following table shows the APs implemented in Osool project and a concise description about each is given underneath it.

Table 3: Osool’s Identified Agile Practices

A list of Used Agile Practices			
<input checked="" type="checkbox"/> Daily Meeting (ineffective)	<input checked="" type="checkbox"/> Demo (prototype)	<input checked="" type="checkbox"/> Whole Team	<input checked="" type="checkbox"/> Iteration Planning
<input checked="" type="checkbox"/> Iterative Development	<input checked="" type="checkbox"/> Open Office Space	<input checked="" type="checkbox"/> Information Radiator	<input type="checkbox"/> Others,

The team uses iterative development to deliver the project in chunks, thus focus more on the requirements of each sector in terms of the type of evidence or reports they will be uploading into the system against each key performance indicator (KPI). In addition, the system will cover other sub-entities, which are still not yet delivered and expected to be finished within a year.

The interview findings show that the project is done using basic APs although it is considered as an IT online system. This is because the organisation is still new and its policies and processes are under development. Furthermore, the IT team are too busy working on the establishment of their IT system.

The findings show that daily meeting is conducted, but mainly between the developers and the strategy team as well as the graphic designer because other members are not devoted to this project and have other priorities that they need to focus on as well. However, meetings are conducted once every three weeks with other members to share updates and tackles any issues. It is also found that mostly the strategy team works closely with the outsourced developers who sit next to the GRdes and StraSpec in an open office space, which supports

face-to-face communication, enables discussions and instant feedback among them. It is also found that team members are all located on the same floor, but not fit in the same room.

Moreover, the strategy team does a prototype at the initiation stage to give the developer an idea about their system concept and interface design to know how it should look in term of the home page, dashboard page and content pages. In term of the information radiator, a whiteboard is placed in the strategy office where vital information is written on it especially when they have an urgent or unplanned meeting with the developers. Moreover, MOM and project status reports are prepared and shared with the team to keep everyone updated about the status and requirement of the project.

The team members in this project are cross-functional with different years of experience and competencies; however, critical decisions are to be made by the StraDire as she is the project owner and manager at the same time.

#### 5.4.2 Impact on Communication Effectiveness

The StraDir says that she has defined the role of each member in the team including the outsourced developers to minimise conflict among the project team and circulates the responsibility sheet to all members at the earlier stage of the project. This action allows the team to become aware at earlier stages of the project about what is expected from them and avoid misunderstanding in term of who should do what and with the clarity of tasks, their energy is saved for important things that serve the purpose of the project. She also outlines the

communications channels and when and where to use each one. To elaborate, all formal meetings are to be done in the designated meeting room and meeting minutes must be taken and circulated to all members through emails and the executive office to be copied in the emails for their reference.

Moreover, all requests that have not been discussed or arisen later are to be communicated in written through emails to the strategy team who in turn will communicate all requests to the developers. Direct communication with developers from non-members to request modification or additions is considered unacceptable and should be done through strategy team. This practice leads to better control of work and ensures that all requirements are recorded and requested in a systematic approach as stated by the StraDir. Based on the results, it seems that the strategy team takes most of the responsibility in this project in term of decision making, allocating tasks and spreading awareness about the project among all team members. According to the results, the StraDir is firm when it comes to organising and controlling the requirement of the project. The results agree with the findings of McHugh et al. (2012) on the importance of defining the tools for formal and informal communication, and individual's role, which results in effective communication that leads to reducing conflicts and preventing misunderstanding.

*“I defined the responsibilities of each one in the team and the outsourced developers at the beginning of the project to ensure that everybody is aware of what is expected from them and to avoid misunderstanding in roles and doing similar tasks as others” – Strategy Director*

The demo about the system enables the team to show the concerned sectors how the system works and how to feed the system in order to obtain the results, which saves them efforts,

time and makes it easier to obtain feedback from different sectors as well as enhances the understanding about the system. The ITMag states that Iteration planning improves their understanding not only about the project requirement but also the project status and members' tasks; however, *"it tasks a long time"* and sometimes two days to finalise the requirement for the sprint. The StraSpec clarifies that the earlier hours of the meeting are dedicated to sharing updates about the project progress and each member's updates, then issues and challenges are discussed and finally the requirement for the next sprint is identified.

Based on the findings, it seems that the team combines the daily meeting with iteration planning, thus, no wonder the meetings drone on too long. The results of the impact of both demo and iteration planning support the findings of Pikkarainen et al. (2008) who state that both iteration planning and demo enhance the understanding of the project requirement and the time allotted for these practices is insufficient to discuss the project issues. Therefore, it is recommended to dedicate another meeting for sharing updates with the team or encourage members to attend the daily meeting, which should not takes more than 20-30 minutes daily and all members are to be trained about agile method and practices for greatest benefits as suggested in the research of Pikkarainen et al. (2008).

*"Meeting of iteration planning takes a long time and sometimes two days to finish the requirement list for the next cycle" – IT Manager*

According to the StraSpec open office layout supports continuous face-to-face communication, which is highly used, but mainly among the developers, GRdes and the StraSpec as they sit together in the same area that is very close to the StraDir, who sometimes joins their discussion if there is a need for further clarification and guidance. The StraDir

states that the performance of this group is very high and always communicates with each other to discuss the project. Whereas the performance of other members is low and they keep chasing them to accomplish their tasks as they are busy. The StraSpec claims that sometimes challenges occur suddenly, which results in some confusion and missing deadlines that affect the interrelated tasks, as a result, leads to a slight delay.

When they are asked about the perceived amount of documentation, the response was too little as the developers do most of the documentation such as requirement specifications, design documents, change request and system process documentation as stated by the ITMag. This finding proves the findings of Karelsky & Voord (2008), which indicates that less emphasis on documentation leads to more time allocated for other tasks. Although developers are considered important members in this project because they develop the project and the documents they have prepared are necessary, it will not be included in this study as the researcher lacks the opportunity to interview the developer since the project is delivered. Accordingly, the overall impact of the documentation on the project will be hard to be studied at the individual level. Thus, it will only be examined as perceived by Osool team, mainly interviewees.

*“Most documentation related to the system is done by the developers including change requests” IT Manager*

*“I noticed that the performance of the strategy specialist, the designer and developers was high. Maybe because they sit next to each other and communicate regularly” Strategy Director*

The following figure shows the identified impact of APPs on communication effectiveness.

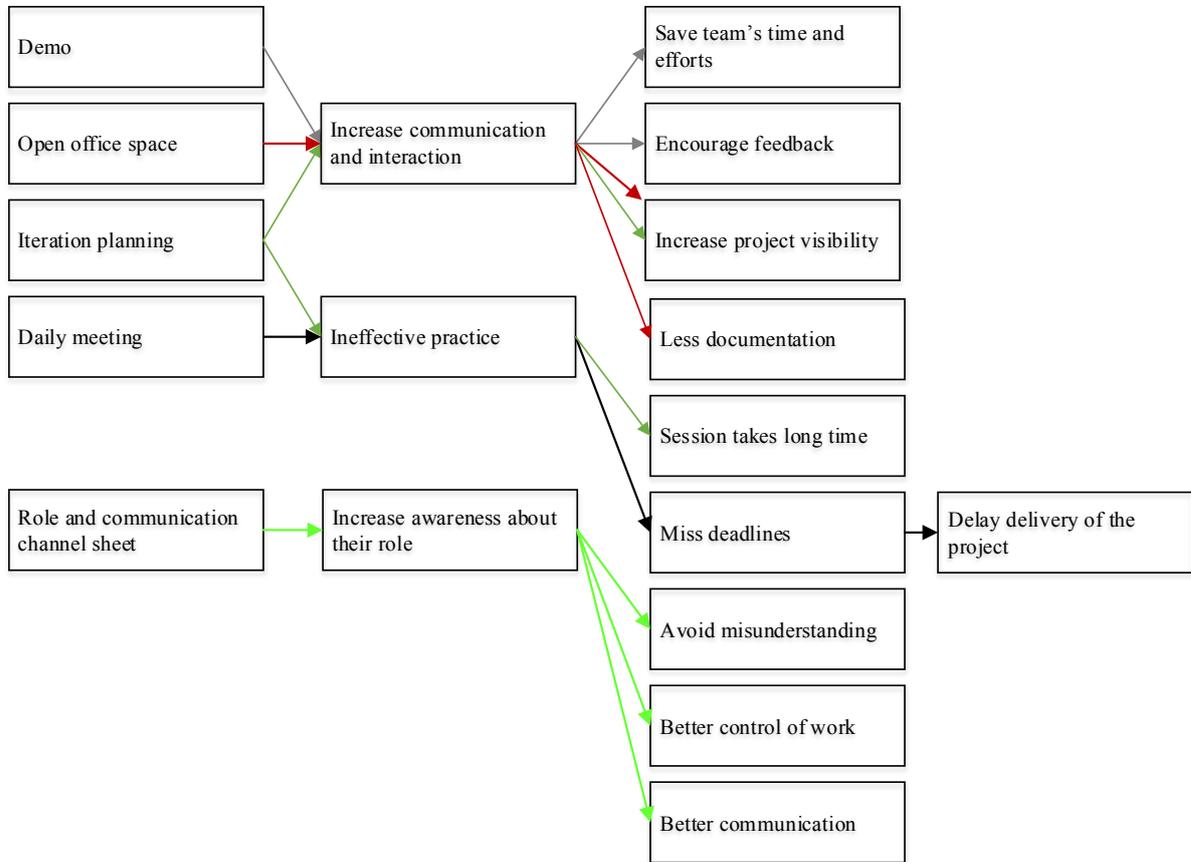


Figure 20: Identified impact of APPs on communication Effectiveness in Osool

Although the team uses a number of APs, the findings show that the communication effectiveness very low among members and overall it is considered weak and recommended to work on improving it for better outcomes and minimise the occurrence of issues triggered by the lack of communication. The analysis shows that demo is the most influential practices in this project and increases team's awareness and understanding about the project features resulting in obtaining feedback quickly, and that saves their time and efforts. This outcome

proves the findings of Pikkarainen et al. (2008) about the positive impact of the demo on the team's understanding of the project.

According to the findings, not all team members sit in the same area, which means that access to the team members is low as well. It is also found that daily meeting is not effectively done since not all team members attend it; thus daily meeting is not considered as one of the effective APPs that improve communication effectiveness. The only meeting attended by all members is the iteration planning where the project's updates and team's progress are shared; accordingly, it can be said that updates are usually obtained once or twice a month. It is also found that the team conduct both daily meeting and iteration planning at once with all team members, which is done almost once a month, this indicates that the interaction and communication frequency is very weak in this project and as the implementation of these two practices is ineffective. Based on the LR findings, the researchers such as Pikkarainen et al. (2008) states that the time of iteration planning is not sufficient to tackle all the issues, whereas, Li et al. (2011) suggest the practice of daily meetings to discuss the problems and challenges of the project. Therefore, it is not surprising the slow progress of this project and the occurrence of issues or misunderstanding that leads to missing deadlines. Furthermore, it is well known that missing a task deadline may derail the whole chain of tasks, consequently, hinder the progress of other team members. The outcomes of Li et al. (2011) state that daily meetings improve communication and can be used as a way of discussing and solving problems. Therefore, it is recommended to increase the frequency of meetings to increase interaction and knowledge sharing, thus receiving updates and information promptly. It is also suggested to have a mechanism to enable the flow of information.

### 5.4.3 Impact on Knowledge Sharing

As the team are a whole-team, all members are expected to run the test with the concerned persons in each sector to ensure that the system is running smoothly with no errors. During the test sessions, the strategy team and the developers gather all feedback and issues in the system for modification and enhancement. This collective work with key people in each sector has supported the team in minimising the load on the project team. A constant discussion and interaction occur among the developers, GRdes and StraSpec as they sit close to each other, unlike other members. The open office design supports them to communicate freely and get needed information from each other on the spot, encourage their knowledge sharing and develop a certain level of trust. Over time, this interaction and trust enable them to collaborate and test the system before showing it to other members as stated by the GRdes.

*“Before presenting the work the rest of the team, we usually conduct a test to ensure the alignment of the design work with the system requirement and ensure that the sizes fit well” –  
Creative Designer*

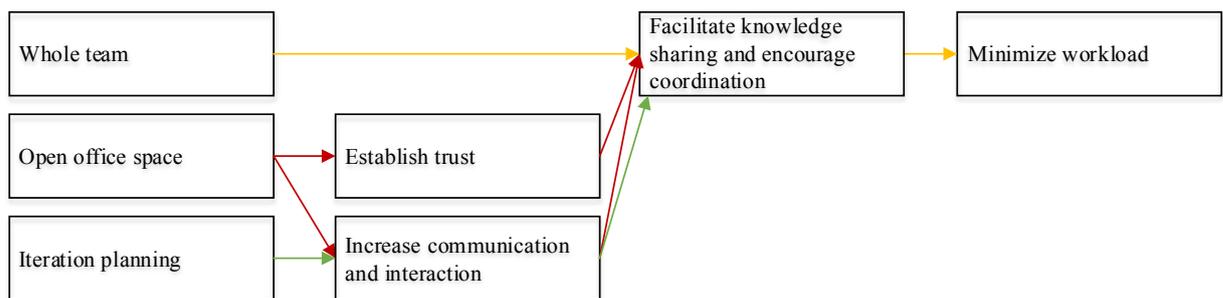
All interviewees indicate that iteration planning is the most beneficial practices used in this project in term of sharing project updates because it gathers all members and allows them to share their feedback and share their experience to improve the work. To elaborate, the strategy team know the strategy and operational plan in which the system is based on, so they share their perspective about how the system should work and what information should be viewed by each sector. This outcome supports the research outcomes of McHugh et al. (2012) of enhancing knowledge sharing through constant feedback.

*“This is the only meeting attended by all, so it is important for obtaining and sharing information with others in order to improve the system” – Strategy Director*

*“I agree with my line manager on its importance for the same given reason” Strategy Specialist*

*“For me, it allows me to know the requirement in term of the design work and learn from the developers the design measurement that best fit the system” – Creative Designer*

The following figure shows the identified impact of APPs on knowledge sharing.



**Figure 21: Identified impact of APPs on knowledge sharing in Osool**

Based on the above analysis, the team shares knowledge and discusses updates through meetings and rarely outside the meeting times apart from emails and phone calls for updates. Additionally, as the communication is found ineffective, consequently the knowledge sharing is not easily facilitated among team members since not all members are located in the same area, and the daily meeting is not done effectively and combined with iteration planning. This result reverses the outcomes of Mishra & Mishra (2008), Pikkarainen et al. (2008), McHugh

et al. (2012) and Strode et al. (2012) about the interrelation between the impact of using APs and its outcomes, which state that effective communication improves knowledge sharing. Therefore, this outcome is not surprising, and it can be said that ineffective communication may reduce knowledge sharing among members. The results also show that iteration planning is the most influential APPs used in this project, which supports the findings of (McHugh et al., 2012). However, as mentioned previously it is not implemented effectively and used for discussing updates and the progress as mentioned in the communication section. This finding indicates that ineffective implantation of iteration planning also enables knowledge sharing and increase the visibility of the remaining tasks, but the impact is weak.

Furthermore, it is found that open office design also has the most significant influence on the knowledge sharing, but only among the GRdes, StraSpec and developers, which justifies the reason for the excellent relationship and the establishment of trust between them. Testing the system among them before showing it to other members may indicate that a certain level of trust and coordination exists and perhaps this is why they offer the developers to test the system before showing it to other members. These outcomes confirms the findings of Fowler & Highsmith (2001) Mishra & Mishra (2008) and Stray et al. (2012) that being in the same area increases both interaction and communication between team members which leads to developing trust among members and increase coordination effectiveness. Thus, open office design improves knowledge sharing.

#### 5.4.4 Impact on Project Visibility

Overall, the interview analysis shows that the strategy team are mostly aware of the project status and its daily progress because as mentioned previously not all team members attend the daily meetings. Other members are less aware of other's tasks and updates but aware of the project goals and their responsibilities as the StraDir prepares a sheet that defines their overall responsibilities and project goals. The investigation reveals that both project status reports and MOM are used to increase the project visibility and keep all members knowledgeable about its progress and members' tasks. The team believes that the MOM is significant in their case as new requirements and changes are logged and considered as evidence that these points have been discussed. All MOM and project status reports are kept in the shared folder and can be accessed by all project team except the outsourced developers. However, the results show that the folder can only be entered through the organisation's network, which means it can not be accessed from home or anywhere else.

The StraSpec states that the MOM is used to crosscheck what has been delivered against the requirement for verification purpose and move on with the next sprint. In term of efforts she says that preparing the MOM does not take much time; however, the crosschecking takes many efforts since it is compared with the actual deliverables. For more visibility, the MOM and project status reports are kept in the shared folder and can be accessed by all members except the outsourced developers. However, the results show that the folder can only be accessed through the organisation's network, which means it can not be accessed from home or anywhere else according to the StraDir. She adds that the amount of internal documentation is considered sufficient to spread knowledge about the requirement and the

status of the project. She also states that since the organisation is still new and does not have an automated system to track the progress of our project, the project status report is enough. The investigation also shows that there is not any use of the smartphone's applications such as Whatsapp or SMS to share information concerning the project. The only used technology is email on their PCs and managers' smartphones.

*“I use the MOM to crosscheck the deliverables against the points discussed during the meetings to verify the completed tasks or provide feedback” – Strategy Specialist*

Moreover, although the developers sit next to the StraSpec and communicate face-to-face most of the time, email is considered as an official method to request any modification or additions not requested in the meetings. It is also found that the team has agreed since the initiation of the project to use emails as an official method to request anything that is not discussed in the meetings and keep the strategy team copied in all emails so that they can track all requests and requirements. Although the strategy team ensures to send the MOM after each meeting and the project status report once a month, the interview analysis shows that not all team members are aware of others task and only become aware when attending the meetings, which is conducted once every three weeks. The results also show that all members apart from the strategy team refer to their tasks and the critical points highlighted when checking out the meetings minutes; consequently, they are not fully aware of other tasks. The ITMag claims that the information that they obtain from the meetings is enough for them to do their tasks and it is not necessary to know all the details of this project.

*“I only go through important tasks and highlighted information in the MOM, I already got the information I need during the meeting and going through the whole minutes every time to*

*know about other's tasks will take time ... what is important for me is to know my tasks and what should be done by me to" IT Manager*

Other APs that have an impact on project visibility and used in this project is iteration planning since all members in addition to the concerned sector's key persons to identify and priorities the requirement for the next sprint. Interviewees state that through iteration planning, the project visibility increase and they become more aware of the project progress and remaining tasks. Moreover, all interviewees stress on the importance of iteration planning sessions for their awareness of the project. This outcome is consistent with the findings of both Chong (2005) and Pikkarainen et al. (2008).

*"This meeting helps me to get updates about other members' progress and if anything to be modified or done from my side" Graphic Designer*

*"Because of this meeting, my knowledge about the progress is enhanced" IT Manager*

Once the requirement of the sector is finalised, a video demo of the finished part is presented during the review meeting to the team and concerned sectors for final test and approval. The video prepared by the developers assists in obtaining fast feedback from users and supports in spreading the understanding about the system as each department has the responsibility of sharing the video with their team and respond to the strategy team within three business days with their feedback. While, the prototype done for the developers helps to visualise the final result expected by clients, accordingly work with the GRdes and give her the sizes of the system landing page, home page and other contents. The findings support the outcome of Strode et al. (2012) that claim demo increases team's understanding of the project.

Whereas, the open space design enhances the visibility among the StraSpec, GRdes and developers because they have the opportunity to communicate and discuss the design of the system while still being developed by the GRdes, and to talk to each other face-to-face more often without leaving their desks, unlike other members. This finding proves the outcome of Pikkarainen et al. (2008) about the positive impact of this practice on increasing project visibility. Whiteboard, as mentioned previously, is used as well to write relevant information and such as new requirement or points to be discussed during the next meeting with all members. It seems that the low visibility of the project and the load of work the team members handle make the progress of this project a bit low, thus the productivity.

Generally, we can say that the level of the project visibility in this project is low as not all team members are in the know about the project's critical information and other member's progress, apart from the strategy team. This may be because they are the owner of this project and the system will be managed and monitored by them once fully delivered. Whereas, other members only become aware through meetings, mainly iteration planning as well as MOM and the status report. This signifies that communication and interactions at the project level is vital to increase the awareness and reveal the project information to all members.

The following figure shows the identified impact of APPs on project visibility.

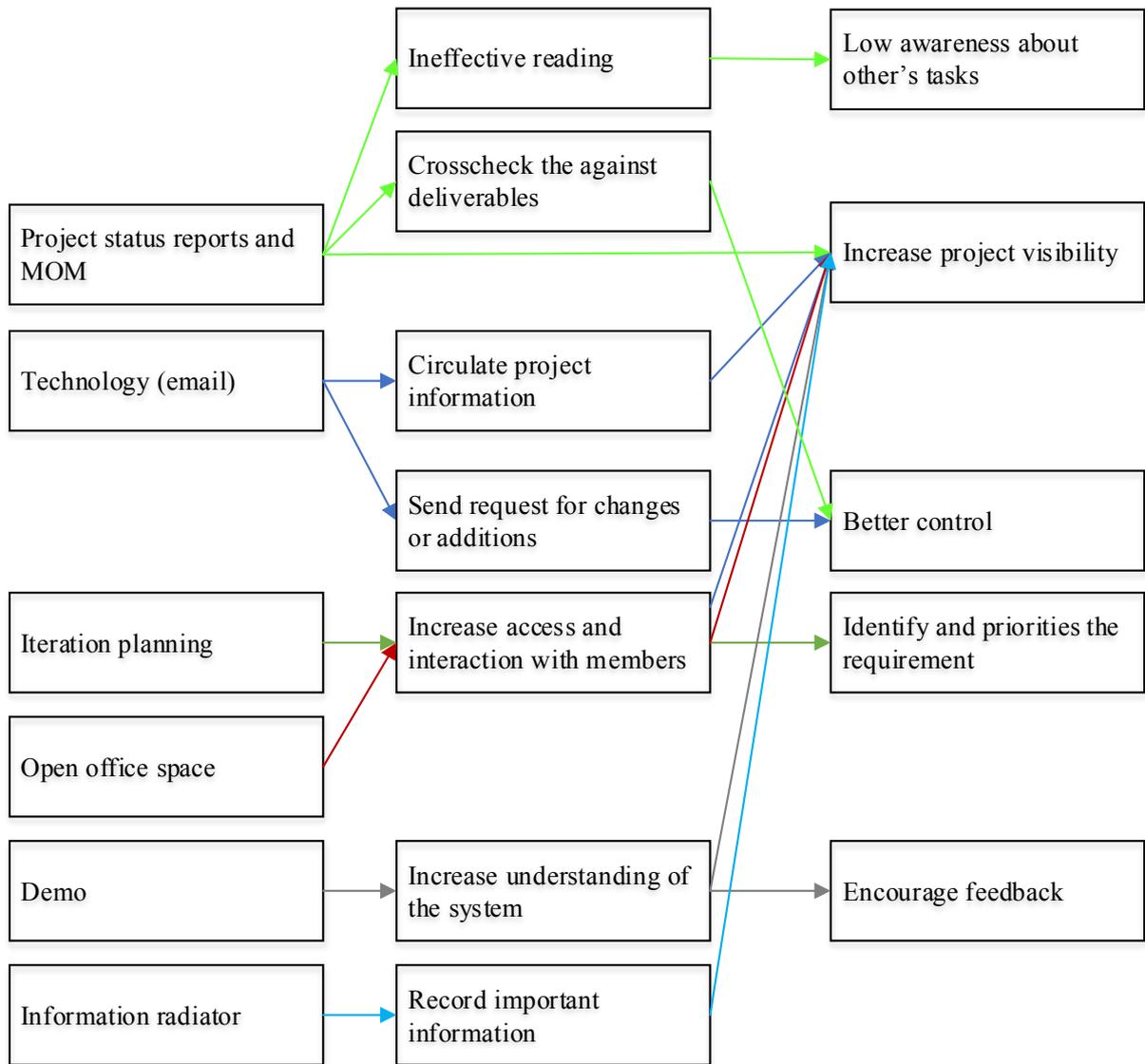


Figure 22: Identified impact of APPs on project visibility in Osool

Based on the analysis, the team shares knowledge and discusses updates through meetings and rarely outside the meeting times apart from emails and phone calls for updates. In addition, as the communication is found ineffective, consequently the information about the project is not easily shared among team members since not all members are located in the

same area, and all do not attend the daily meeting. This result is reverse to the outcomes of Mishra & Mishra (2008), (McHugh et al., 2012) and Strode et al. (2012) about the interrelation between the impact of using APPs and its outcomes, which state that effective communication improves knowledge sharing. Therefore, this outcome is not surprising and it can be said that ineffective communication may results in deteriorating knowledge sharing among members and impede it.

Based on the LR, Mishra & Mishra (2008) McHugh et al. (2012). Strode et al. (2012) the practices of open office design, daily meeting and iteration planning lead to high interaction and communication among the team members, whereas the data analysis in this project shows that these practices are poorly implanted. Therefore, the result of the low level of project visibility is not surprising in this project. Thus, it can be concluded that the use of APPs makes the project more visible and members more aware of each other tasks and progress. This finding proves Pikkarainen et al. (2008) study about the positive impact of APs on the project visibility.

In addition, the group discussion among the GRdes, StraSpec and the developers found to enhance the communication and cooperation between them, which explains the high visibility among them in comparison with other members. This indicates that being in the same area in an open office layout increases project visibility, which supports the outcomes of Mishra & Mishra (2008) and Strode et al. (2012). It is evident that both the iteration planning and open office design increase the visibility in this project, which signifies the importance of these two practices. Accordingly, it can be said that the study outcomes of Mishra & Mishra (2008) and

Strode et al. (2012) of the positive impact of these two practices on increasing project visibility.

Furthermore, not all team members are greatly involved in this project, as they are not entirely dedicated to this project and still working on developing their departments and handling many other projects. For this reason, the low level of visibility in this project is expected, and since communication in this project is found to be ineffective, this may be another reason for the low visibility based on the study outcomes of McHugh et al. (2012). Thus, it can be concluded that the use of APs makes the project more visible and members more aware of each other tasks and progress. This finding proves the outcomes of Pikkarainen et al. (2008) about the positive impact of APs on the project visibility.

#### 5.4.5 Impact on Changes of Requirement

The project was in the middle stage when the team knew about the closing of Singapore's office. As a result, the strategy team had to keep the project on hold for a while to amend the strategy and identify the changes that should be done to what has been delivered. Consequently, the project progress has been hindered and the cost increases. Luckily, the project is delivered in chunks, which support the team to make slight changes and allows them to return to previous works for the amendment. The StraDir states that iterative development enables them to get continuous feedbacks and reflect the new changes in the strategy immediately; as a result, it saves their time, efforts and supports them in delivering

the project in nine months. Furthermore, it allows them to be more flexible as new circumstances occur and use the feedback to modify the project plan regularly.

*“Minimal changes have been done to what is delivered. We then focus our attention to deliver the project in less than a year to use it for the next operational year of our current strategy”*

*Strategy Director*

The StraSpec claims that the ITMag and outsourced IT team suggested working in an agile model to deliver the system in small pieces, so they can learn quickly from the work they have done and apply it to the next cycle of the project and finish faster. They also wanted to avoid working on a long development cycle where work is done without client feedback, although they have worked on many similar projects previously. The most important is that the vendor does not want to force Osool’s team to accept the system as they originally imagined it and expected that their client would change their mind for unforeseen reasons.

*“It was a suggestion by the developer to work on the project piece by piece and to focus our efforts on one sector at a time. This way we can apply the knowledge gained into the next cycle and also to avoid working on a long cycle without getting feedback on the work done” –*

*Strategy Specialist*

It is obvious that the change in the strategy results in changes to the scope and requirement of the system. Based on the findings, the APP of iterative planning allows the team to get constant feedback as the project progress. Thus, as the strategy has been revised the team adapts to this change and make necessary modification to reflect the updates made to the strategy. This finding supports the outcomes of DeCarlo (2004) and Karlsky & Voord (2008) in that a project is a living thing and needs to adapt to its environment and so the project team.

The following figure shows the identified impact of APPs on the change requirement.

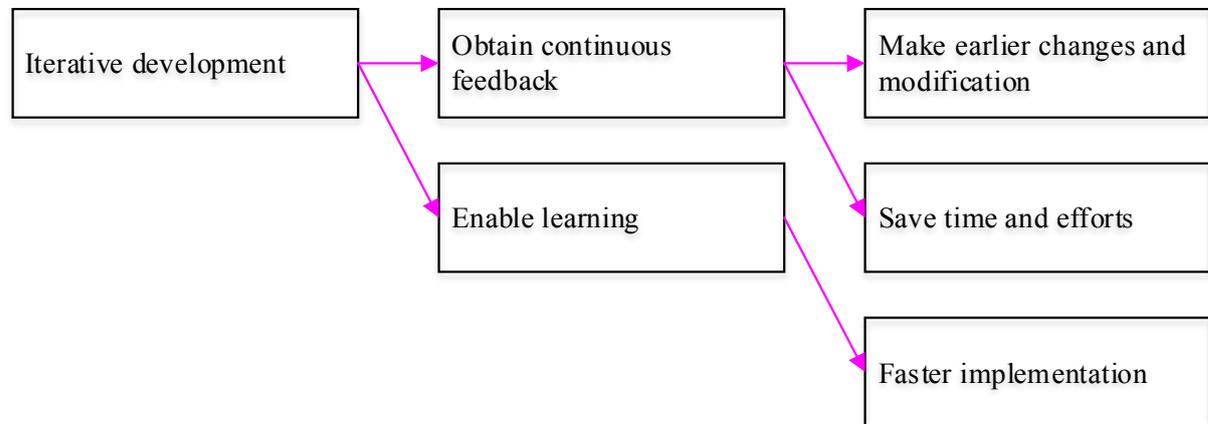


Figure 23: Identified impact of APPs on change requirement in Osool

Moreover, the outcome proves that delivering the project in chunks makes it possible to request changes in each iteration, thus support faster execution while working against the time instead of waiting till the end of the project and make the changes as in the case of the TPM. Accordingly, deliver early benefits that best meet the client requirement and expectation, which is consistent with what has been found in previous studies of Boehm (2002), Boehm & Turner (2005), Wysocki (2007) and Collyer et al. (2010). Thus, it can be concluded that iterative development welcomes changes at any time in the project and improves the end results due to constant involvement of the client.

#### 5.4.6 Impact on Pressure and Stress

Overall, the team in this project state that they are moderately stressed and pressured by the work in this project. The findings show that most of the workloads are on the developers who develop the system. However, among Osool's team, most of the loads are on the strategy team who works closely with the developers on obtaining sector's requirements in term of documents types to be used against each KPIs, who will be feeding the system and so on for access authority. Whereas, the ITMag states that the level of stress and pressure for him is moderate.

The demo prepared by the strategy team at earlier stages of the project puts a little pressure on the StraSpec as it was her first time to do a prototype design using Ms-Visio. Whereas, the demo video increases the pressure on the team as they have to ensure it is simple, but comprehensive at the same time. The team indicates that working on demo video is the most stressful APs and puts them under extreme pressure since they have to make sure it covers all features and aspect of the system and at the same time not long. Most interviewees agree that demo is among the most APs that cause high stress and puts them under pressure although outsourced developers help them in making it. This outcome is consistent with the previous findings of Moe et al. (2010) and Strode et al. (2012); thus it can be said that demo increase pressure and stress on the project team.

*“Most documentation related to the system is done by the developers including change requests” – IT Manager*

*“We were stressed and loaded, but most of the workload was on the outsourced developer” –  
Strategy Director*

*“For me the level of stress was normal in this type of project and it was during a certain time  
mostly when preparing the demo” – Graphic Designer*

The findings also reveal that daily meeting puts the team under pressure to communicate their significant progress daily. As a result, makes them feel that they are monitored and subject to intense scrutiny although not all members attend it. However, they are expected to show up in the iteration meetings, which are conducted once a month and expected to finish the critical tasks on time to avoid causing any delay. Since some members, as well as the developers, attend the daily meeting, the interview results show that the pressure level among them is very high as reported by them. This finding can be lined with the research outcomes of McHugh et al. (2012) of the increase level of pressure and stress on the team due to daily meeting.

*“Daily meeting is like a chore as I have to prepare for the meeting” – Strategy Specialist*

*“It was a bit low as I rarely attended it, the only times I attended the meetings were at an  
earlier stage of the project” – IT Manager*

The results also show that sharing responsibility is very weak in this project and the tasks are not distributed evenly among all members. To elaborate, working on both the project status report and meeting minutes puts high negative pressure and stress on the strategy team mainly if they are working on demos and doing the test for the system. Accordingly, leads to work overtime sometimes in order to meet deadlines and ensure that all team members are aware of the project progress especially those who do not attend the daily meeting, so they do and

accomplish their tasks as expected. The following figure shows the identified impact of APPs on pressure and stress.

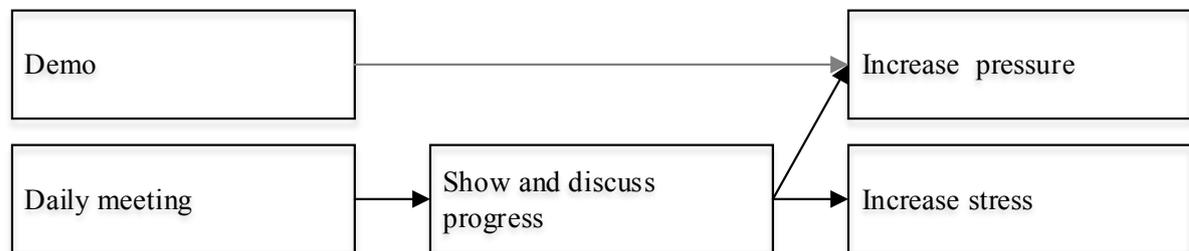


Figure 24: Identified impact of APPs on pressure and stress in Osool

Generally, the findings show that using APPs increases the pressure and stress on the project team. Among the used APPs, it is found that demo is the most stressful and causes high-pressure due to its tight schedule. This is followed by the daily meeting; however, the perceived level of stress varies among the interviewees as the ITMag says that the level is reasonable. This can be since he does not attend the daily meeting or involve heavily in this project in comparison with other members. This finding proves the outcomes of Moe et al. (2010), McHugh et al. (2012) and Strode et al. (2012) that APs such as demos and daily meeting increase the pressure and stress on the project team as both practices give the team a challenging time and become a place where the project team needs to show a sign of progress and defends their works. In this case, it is advised to inform the team members that skills and experience vary from one person to another and members who are less skilled and experienced are expected to produce less and encourage not comparing their performance with others and are expected to do their best.

Although iterative development is found to cause average stress and pressure, the project team deems it as a positive. This is because it allows them to see result quickly and improves the quality of their work. The outcomes agree with the findings of Aguanno (2004) and Gustavsson (2011) on the benefits of iterative development that results in minimising the negative impacts and risk of poor scope definition, thus enhancing the quality of the end results.

#### 5.4.7 Impact on Productivity

Based on the results of the previous analysis, the overall productivity level is moderate, as the team does not use APs effectively. To elaborate, not all members attend the daily meeting; thus reduces the effectiveness of communication or interaction with the team members, which in turn results in missing deadlines that impact the interrelated tasks and cause a slight delay. Furthermore, updates and project's progress is discussed during the iteration planning meeting instead of focusing on identifying and prioritising the requirement; therefore some team members have complained that it takes a long time as mentioned previously. Therefore, we can not say that these practices have improved the communication effectiveness among team members, thus the productivity. This outcome contradicts the finding of Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) that effective communication leads to improve productivity.

*“We faced some problems that impacted some tasks and their related tasks” – Strategy Specialist*

Interestingly, the findings show that as the project draws to a close, the time spent on activities becomes shorter as the project team become more expert in doing their tasks and activities takes less time to be accomplished. Furthermore, the complexity of the project becomes low, as most sprints are a repetition of previous sprints and the team becomes more efficient. Those who are not aware of APM and its practices say that this approach allows them to see quick results and divides the project into small pieces to plan iteration carefully and in more details. The StraDir says that at each sprint, the quality of work is improved as the team becomes more knowledgeable and experienced and the issues take less time to be resolved. Whereas, the GRdes states that iterative practice enables her to focus on the most critical designs and obtain feedback on them quickly. Moreover, as the project progress, her workload becomes less since finalised designs at previous sprints are repeatedly used in the next sprints.

*“As we moves forward, the time spent on tasks become shorter and shorter because we become aware and more familiar about the requirement and what to do next cycles. I also have seen noticeable improvement in the quality of work and tasks are done faster in comparison with the previous sprint” – Strategy Director*

*“As we approach the end of this project, the amount of work become less as designs done for earlier stages were used again for the later stages” – Graphic Designer*

The previous results show that a certain level of coordination exists between the project team that leads to enhancing their productivity in comparison with other members involved in the project and this is consistent with the research findings of Lee and Xia (2010) and Strode et al. (2012). However, this is only among the group of members found to be sat next to each other. Accordingly, it can not be said that productivity is enhanced by effective coordination

among all team members, which reverses the findings mentioned above of Lee and Xia (2010) and Strode et al. (2012).

The following figure shows the identified impact of APPs on productivity.

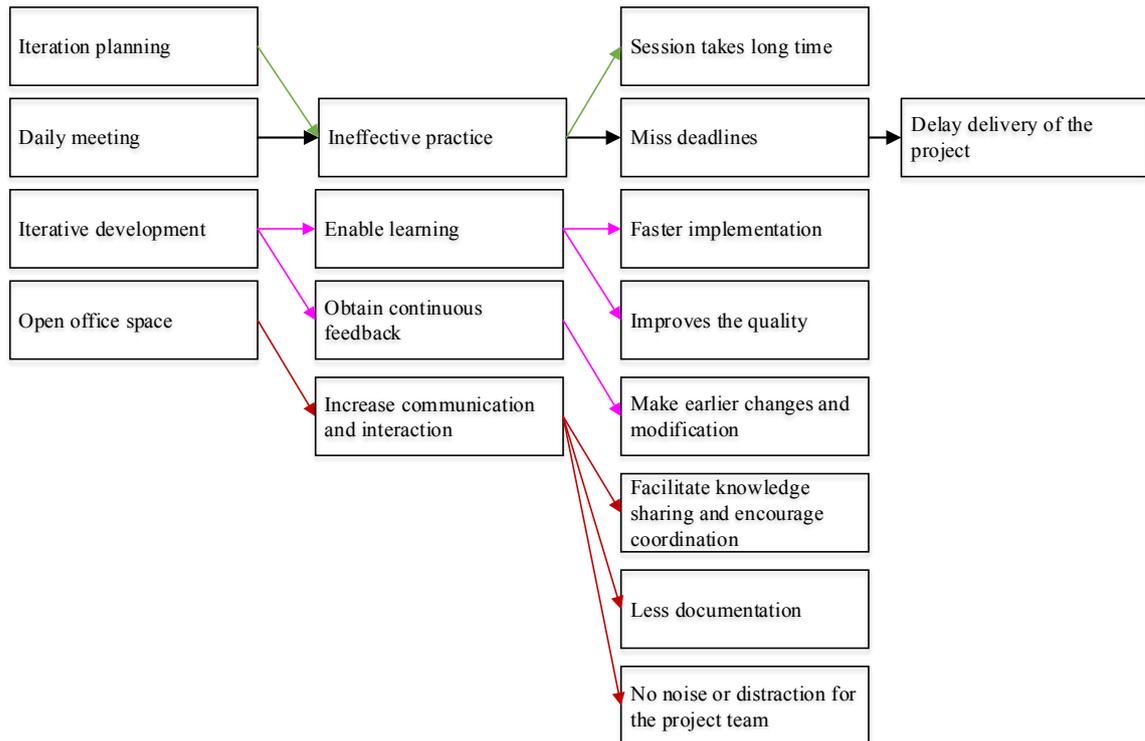


Figure 25: Identified impact of APPs on productivity in Osool

As previously mentioned, the amount of documentation in this project found just right which is not include the work done by the developers as the researcher lacks the opportunity to interview the developers and ask about the perceived amount of documentation at individual level. Thus, it is only examined as perceived by interviewees who are from Osool The outcomes of previous analysis show Osool's team does not do a lot of documentation, which means more time is given to focus on other activities such as demos, testing and planning and

it is found that collaboration exists between the group sitting next to each other. This outcome proves the findings of Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) that less emphasis on documentation gives the team more time to focus on other tasks.

Furthermore, the team does not complain about any distraction due to open office layout and claims that they may cause a distraction to others while talking and discussing the project particularly the GRdes, StraSpec and developers. The GRdes justifies that their cubicle is a bit away from other teams and the floor is covered with carpet, which may absorb noise.

Moreover, the open office design also found to enhance effective communication, which in turn facilitates the development of a good relationship among this group, which encourages collaboration at their level. So as mentioned previously, their performance is said to be high in comparison with other members as stressed by the StraDic. Therefore, the open office design is not considered a source of distraction in this project, and it can be concluded that the initial hypothesis of the open office layout does not cause pressure or influence the productivity negatively as suggested by Fathian et al. (2007) and Pikkarainen et al. (2008). This is because the team is located away from other groups, which supports the suggestion of Mishra & Mishra (2008) of separating the teams to minimise the risk of hearing and facilitate effective communication. Since not all team members sit in the same area, it is difficult to say that open office space improves the productivity of the team, especially that the team misses deadlines. To sum up, the results of data analysis of Osool found that the impact of using APPs on productivity is weak and the overall productivity is found to be moderate.

### **5.5 Organisation (3) – Project (3) Innov**

Innov is a federal organisation established in 1996 to regulate and oversee one of the critical industries in the UAE. The organisation has two main offices one is based in Abu Dhabi and the other one is in Dubai; thus employees are distributed. However, the organisation provides all the necessary technology to facilitate effective communication between the two offices to overcome the issues triggered as a result of lack of communication.

In November 2014, the UAE has announced that 2015 is the year of innovation to support the efforts of the government in attracting national skills, encouraging disruptive innovation in the key sectors, promoting research and improving the efforts to develop a national cadre who are capable of leading the future of the country as stated by Sheikh Khalifa, the President of the UAE.

In this regard, the organisation has embraced and introduced a number of projects and initiative that align with the government strategy in term of innovation. One of the projects is to build an innovation management tool to support and promote a culture of innovation within the organisation and encourage its staff members, and external organisations such as academia, private organisations as well as public individuals submit their innovative ideas.

The top management has approved the framework of the innovation system assigned the innovation section to form a team to work on the development of the system. Thus, the innovation team forms a team of members from different departments to work on this project.

In this project, the project team uses several APPs and the interview results show that the organisation operate in a very dynamic environment, thus constantly has to improve its process and systems to meet the standard of the international organisation around the world.

The reason for choosing this project is because the staff members of the organisation are distributed between the two offices which make it a challenging project to be developed and unusual to be examined and compared the outcomes with the other two projects.

### 5.5.1 Agile Practices

The following table shows the APs applied in INNOV project and a brief description of each practice.

Table 4: Innov Identified Agile Practices

A list of Used Agile Practices			
<input checked="" type="checkbox"/> Daily Meeting	<input type="checkbox"/> Demo (prototype)	<input checked="" type="checkbox"/> Whole Team	<input checked="" type="checkbox"/> Iteration Planning
<input checked="" type="checkbox"/> Iterative Development	<input checked="" type="checkbox"/> Open Office Space	<input checked="" type="checkbox"/> Information Radiator	<input type="checkbox"/> Others, retrospective meeting

### 5.5.2 Impact on Communication Effectiveness

The ITMag says that although the members assigned to this project are distributed between the two offices, the meetings are conducted daily in the morning and the communication is perceived good for a number of reasons. One is due to the advanced technology being used

for communication that includes email, phones, video conferencing, intranet, which are perceived to be used heavily in this project and in general. He adds that both offices have a number of meetings rooms provided with video conference facility that makes it easy to have online meetings and encourages online collaboration. The meeting rooms also have other features such as screen sharing, which enable the project teamwork to project the system to all teams at both locations simultaneously. Accordingly, it cuts down on time wasted in travelling to be physically present in the same room or waiting for someone's reply to the emails. Most importantly, through video conferencing the practice of daily meeting allows all team members to have a real-time virtual presence; thus all members have the same amount of information and updates about the project. The BusAna says that the use of advanced technology also makes it easier for the team to do the iteration planning as planned, where he can gather, prioritise and send all the requirements of the following cycle to the IT team, so they estimate the time for each task and start the work.

*“Members of this project are distributed between Abu Dhabi's office and Dubai, but thanks to the advanced technology like video conferencing that facilitate conducting the daily meeting and make communication more manageable and effective ... the video conferencing allows us to conduct virtual meetings where we share information and updates concerning the project and challenges we face” – IT Manager*

*“Just to add that planning the system requirement become easier with the video conferencing” – Business Analyst*

The InnovMag says the team consists of people from different departments (whole team) and misunderstanding is common as not all members understand the jargon related to IT and software development. This outcome However, the IT team attempts to use words that are

easily understood and known by a broader audience and if they have to use any jargon, then explain it to the team members, so all members have the same understanding about the technical details of the system and its requirement.

*“Members of the team are from the different department with different skills and years of experience. I think it is normal to have some issues especially like for example whenever we deal with IT team they use words related to IT field in which we do not understand or ask them to clarify the meaning and they try to use common words whenever they can” –*

*Innovation Manager*

According to the InnovMag, the open office layout is implemented in both offices, which supports “visible communication” between the team sits near each other and enables them to speak more. The ITMag adds that due to open office design communication becomes more rapid and the level of reporting issues becomes simple, just saying for example “developer (1), please fix the issue in this part”. Thus, reduces the need for scheduling meetings or relying on emails to discuss problems with the project team. In this way, issues related to the project are quickly addressed as they arose and resolved rapidly. He also notes that the IT staff members are located in block (A), whereas the innovation team is in another building, which is five minutes away. Thus, the level of engagement with them is a bit low in comparison with the IT team. Both the DEVELOPER and BusAna claim that daily meetings and open office design are the most significant APs use at the project level and lead to reduce the number of documents and paperwork to be done including emails for obtaining clarification and further information.

*“I think the daily meeting is the most significant practice and open office design” – Business Analyst*

*“Both open office space and daily meeting are significant” – Developer*

The following figure shows the identified impact of APPs on communication effectiveness.

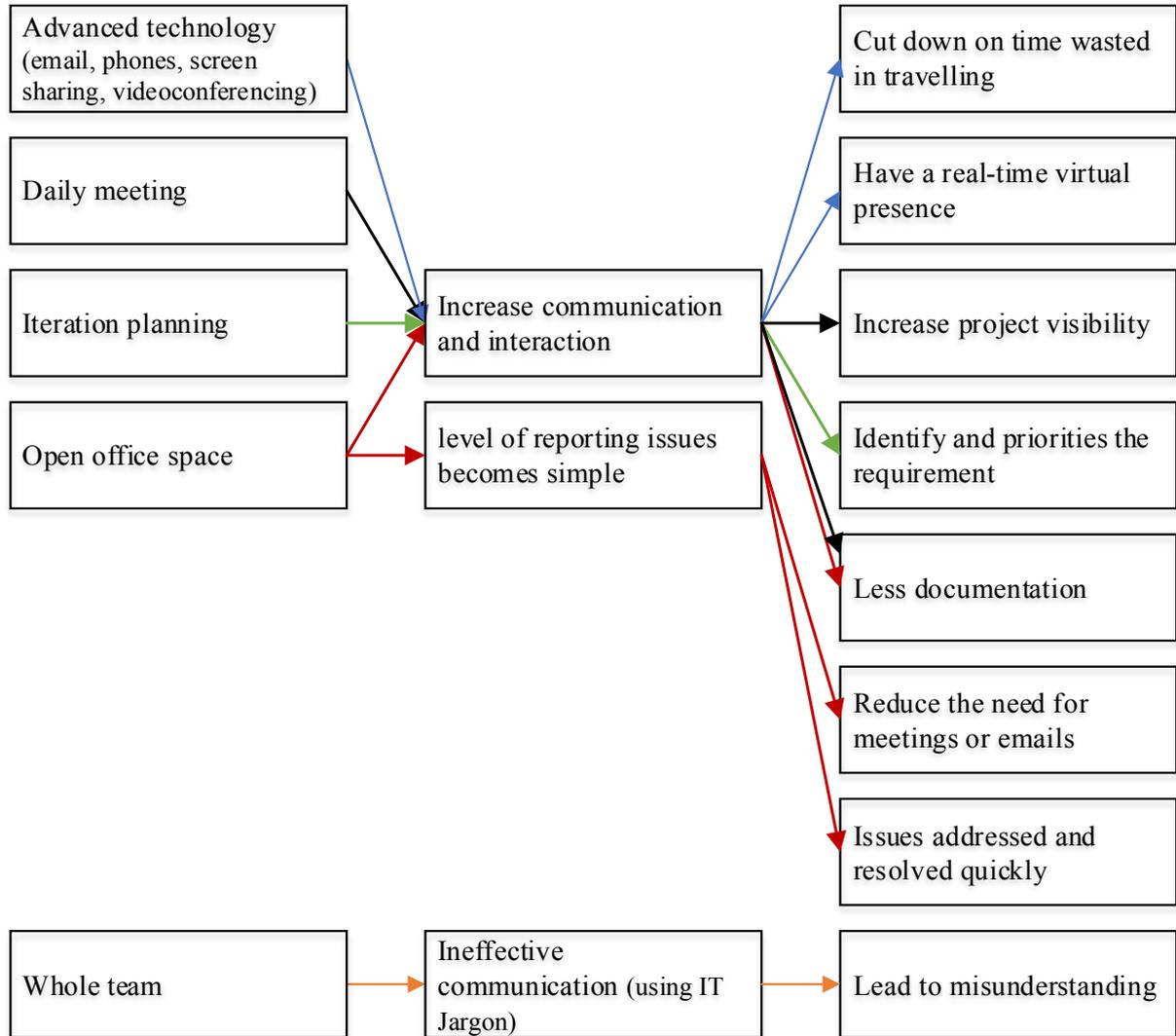


Figure 26: Identified impact of APPs on communication Effectiveness in Innov

According to the outcomes, it can be said that APPs contribute aggressively to improving communication effectiveness between the project team, particularly daily meeting and open office layout, which prove the findings of Pikkarainen et al. (2008) Li et al. (2011) Grapenthin et al. (2015). This result may be because the team uses other tools that facilitate communication and break down the communication obstacles especially that the team is distributed between Abu Dhabi and Dubai offices. Miscommunication is found to occur in this project due to using of jargons that are not well known by other members. This finding proves the research outcome of Lee & Xia (2010) of the negative impact of the whole team on slowing down communication effectiveness. However, no conflicts are reported due to this negative; this is may be because the IT team attempts to explain difficult words, so all members are on the same page. The interview results agree with the research findings of Pikkarainen et al. (2008), Li et al. (2011), Petersen & Wohlin (2010) McHugh et al. (2012) and Grapenthin et al. (2015) that the mentioned APPs increase communication frequency (both formal and informal), facilitate problem-solving, thus improve its effectiveness.

### 5.5.3 Impact on Knowledge Sharing

The ITMag highlights that most offices in the organisation are cubical-less and equipped with whiteboards and worktables for efficient and effective interactions and communication between team members. Thus, achieve greater knowledge and awareness about the projects. He adds that the office design supports knowledge sharing particularly at IT team level, as they are located in the same area. According to him, whenever they have an issue, they quickly gather around the worktable or the whiteboard for a short ad-hoc meeting and share

their knowledge or inputs to resolve the problem quickly. This finding is consistent with what Mishra & Mishra (2008) and Strode et al. (2012) found about the positive impact of open office design on knowledge sharing.

*“Most offices in this organisation are cubical-less and you can find whiteboard or worktables in different departments... We gather around the worktable or use the whiteboard if challenges and problem arise” – IT Manager*

The Daily meeting and retrospective meetings as stated by the InnovMag enables the team to be updated about overall project progress constantly, keeps them focus on high-prioritised requirements and increase their awareness about outstanding problems. Thus keeps them focusing their attention on resolving or minimising the impact on the project by sharing their thoughts and knowledge to tackle these problems, which contributes to making continuous improvement. Accordingly, it can be said that daily meeting facilitates knowledge sharing in this project, which proves the finding of McHugh et al. (2012) in the LR. When asking them about the impact of APs on trust, the InnovMag claims that the daily interaction establishes collaboration between the team over the time through the established trust that contributes to easily transfer knowledge with other members from other departments and be more flexible in adapting to change. This result can be linked with the research outcomes Fowler & Highsmith, (2001), McHugh et al. (2012) and Stray et al. (2012) in the LR which states that trust is established through an effective daily meeting.

*“Members of the team support each other and when issues arise, all member work together to resolve them” – Innovation Manager*

Moreover, the BusAna says that during iteration planning, requirements are gathered and since the team is from different departments, they count on each other experience to further improve the requirement or suggest better options to accomplish the tasks, which facilitate collaboration and knowledge sharing that leads to reducing the development time. This result confirms that the iteration planning facilitates knowledge sharing with proves the findings of McHugh et al. (2012). The following figure shows the identified impact of APPs on knowledge sharing.

*“The system requirement are gathered during the planning meeting which allows the team to know the requirement for the next cycle and facilitate needed changes in the requirement based on the feedback. Accordingly, the team shares experience on how to enhance the work based on the given feedback which improves the efficiency of the team” – Business Analyst*

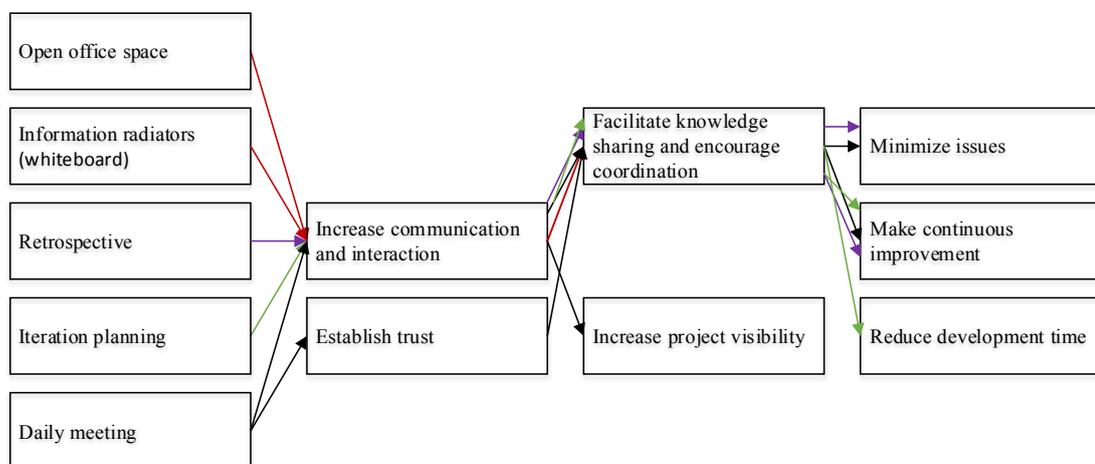


Figure 27: Identified impact of APPs on knowledge sharing in Innov

To sum up, the used APPs facilitate knowledge sharing among team members and allows the team to build on each other’s experience to tackles the issues arise during the development phases. In term of knowledge sharing, it can be said that knowledge sharing is well facilitated

in this project and the interviewees considered themselves very supportive especially when issues arise. The practices of open office design, daily meeting, retrospective meeting, iteration planning has considerably supported the team in sharing knowledge, which verifies the study of Mishra & Mishra (2008), McHugh et al. (2012) and Strode et al. (2012). Based on the analysis, a certain level of trust has been established among team members due to constant interaction and communication or maybe because both the project team and the client from the same organisation, which leads to increase collaboration effectiveness, which supports the study outcome of Fowler & Highsmith (2001) Stray et al. (2012) and Strode et al. (2012) in the LR. Interestingly, the high collaboration effectiveness in this project enables the team to be more flexible in accepting changes, and some of the activities take less time to be accomplished, which gives the team more time to focus on major or complex tasks. Moreover, the data analysis shows evidence that retrospective meeting facilitate knowledge sharing, which indicates that this practice as well facilitate knowledge sharing and further research is suggested to prove it.

#### 5.5.4 Impact on Project Visibility

Overall, the interviewees considered themselves very aware of the project and each member's progress due to the use of different APPs. As mentioned previously, open office layout increase interaction and communication among team members; thus increases the project visibility. Additionally, the DEVELOPER states that the wall of the open office design enables them to keep project's important documents such as the product requirement up to be readily displayed and seen by all members for greater transparency and visibility, accordingly,

showing the actual progress of each member tasks and overall progress of the project. On one of the walls, the tasks are posted and divided into four columns, which represent the following stages; to do, in progress, in testing and done that makes the project visible all the time. As a result, mitigates the risk related to lack of transparency and improves the project visibility among of the entire team. The ITMag says *“the purpose of enhancing our project visibility is to reduce the delay and ensure delivering the project on time and according to the client’s requirement that surely will be changed over the course of the project”*. Subsequently, for them high project visibility leads to reduce risk, and as a result, the chance of delays are reduced. Accordingly, it can be said that open office layout increase project visibility, which supports the outcomes of Pikkarainen et al. (2008).

The practice of iteration planning according to the BusAna increases the visibility of the system requirement and features for each cycle for all members, thus enables them to make changes based on the client’s requirement and feedback (the innovation team). The constant inputs from the client improve the scope of work as new requirements are added, or the list of the requirement is re-prioritised to meet the client’s needs. Accordingly, makes the necessary adjustments to enhance efficiency and team productivity. Overall these findings are in accordance with findings reported by (Chong, 2005 and Pikkarainen et al., 2008). He adds that the daily meeting along with the sprint review (retrospective meeting) facilitate communication among members and make the project visible to all members and allow each one to better know the status of the project and each member’s tasks and progress. To elaborate, during daily meeting members report on what they have done since the last meeting and state their goals for the day as well as voice their suggestion and issues or obstacles they face. Moreover, holding the daily meeting gives the project team the opportunity to discuss

the tasks they have accomplished and any obstacles arise in their way. As a result, facilitates project process inspection and helps in exposing any issues related to the process as occur, which allows swift modification and promotes continuous improvement as the project progresses. Such meetings provide visibility of individual's tasks to other members and raise their awareness of who has done what and knowledge about the project requirements. He also highlights that these meetings encourage communication and interaction between the team who may not work together before or talk regularly. These results tie well with the previous studies of both Strode et al. (2012) and Stray et al. (2016) that daily meeting provides transparency and increase the visibility of the project progression.

*“Members of the team support each other and when issues arise, all member work together to resolve them... The continuous interaction between the team develop cohesion and facilitate knowledge sharing with the support of trust” – Innovation Manager*

In term of iterative development, the InnovMag says that dividing the project into pieces and continuous delivery of the system gives them an overview of the remaining works and shares continuous feedback with the IT team. A similar result is found in Pikkarainen et al. (2008) about the positive impact of iterative development on increasing project visibility.

*“Broken down the project into frequent deliverables enable us to have an overview of the remaining tasks and give continuous feedback to the IT team over the course of the project” – Innovation Manager*

The following figure shows the identified impact of APPs on project visibility.

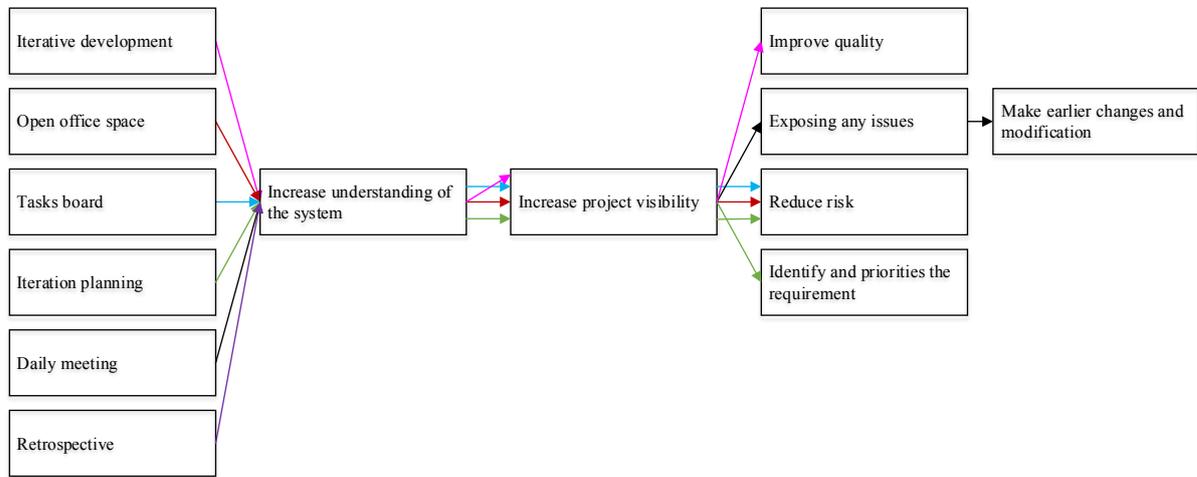


Figure 28: Identified impact of APPs on project visibility in Innov

To summarise, the visibility in this project is very high and it is found that a number of practices are used to increase visibility such as open office layout, iteration planning, iterative development, daily meeting and retrospective meeting. Interestingly, the wall of the office is used as a tasks board to report the overall project status and to post relevant information about the project. This practice may indicate that the team is very transparent and care to spread the project information even to others not involved in the project. The high visibility in this project is found to reveal issues sooner and obtain feedback earlier, thus mitigate the risk of re-doing tasks and apply modification swiftly. In the LR, it is mentioned that high project visibility has a positive impact on the project overall, so based on the findings it can be said that the team has benefited from using APs. These findings are consistent with results of Chong, 2005), Pikkarainen et al. (2008), McHugh et al. (2012), Strode et al. (2012 and Stray et al. (2016) about the positive impact of APs on project visibility.

### 5.5.5 Impact on Change Requirement

One of the benefits of the APPs is to welcome change, even late in project development. The ITMag states that APPs such as iterative development help in managing changes in the requirement and gaining clients feedback sooner rather than later. He adds that this approach improves the quality of works and reduces the risk of redoing tasks. It is also reported to make changes quickly and earlier rather than waiting until the project is wholly delivered and then obtain feedback on the system as in the case of the traditional approach. Thus, delivering a project that best meets the client's requirement.

*“Continues interaction and inputs from the innovation team on the system during the meeting improve the outcomes and new requirements are included and the list of priority is re-arrange according to the innovation need or to what have agreed on during the meetings” –  
IT Manager*

Moreover, the DEVELOPER notes that since the client is the innovation section team, which is part of the organisation, they attend the daily meeting if required to get more clarification on the innovation framework or the system requirement which result in having better control on the tasks and requirement. It also improves the outcomes of the end results and lets the developers focus their efforts and time on essential requirements. Since the client attends the daily meeting regularly, the impact of changing requirements on the project delivery date can also be discussed, which minimises the risk of uncertainty as stated.

*“As necessary, the innovation team attend our daily or urgent meetings for more clarification on the framework and some requirements which allows us to have more control on the tasks and reduce the risk of doing something that is not meeting their needs or expectation... We also discuss the risk of requested changes on the delivery date and other things” – Developer*

Whereas, the task board, which makes task and requirement of the system to be visible to everyone in the team and others as well, enables the team to see clearly the impact of changing requirements on the project dependencies. Accordingly, picture the risk of change on the project overall.

*“Daily meeting, which is held at the same time each day give us the chance to discuss our daily accomplishment and any obstacle arise. The task board as well allow us to see the risk of changes as we can see the volume of work, which will be re-done in case we change anything” Developer*

The following figure shows the identified impact of APPs on change requirement.

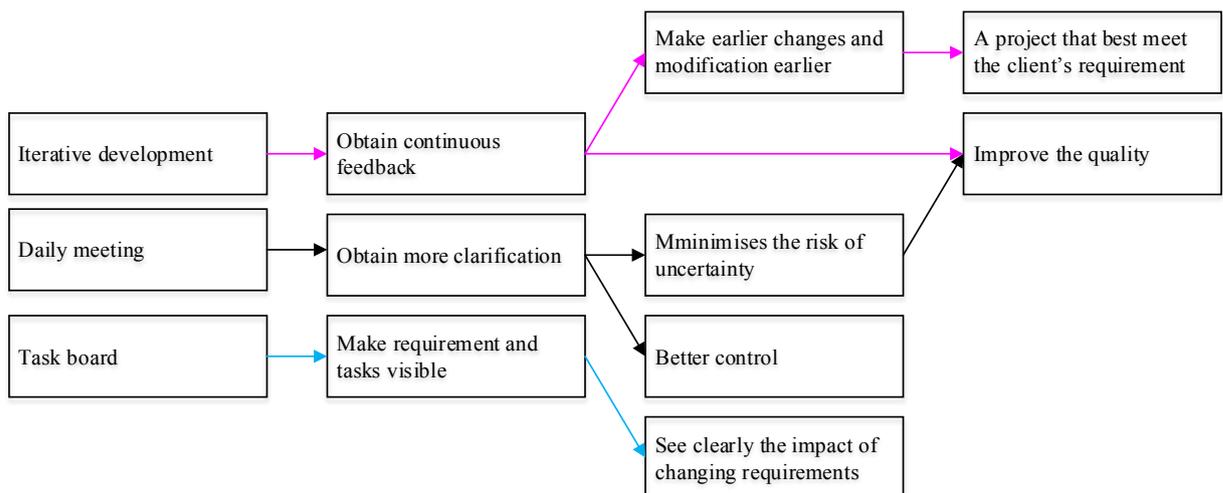


Figure 29: Identified impact of APPs on change requirement in Innov

The interview analysis shows that iterative development and daily meeting lead to increase the interaction with the client (innovation team), which enable and give them the opportunity to gain feedback. The analysis also shows that the most powerful practice is iterative development followed by the daily meetings. Interestingly, it is found that the task board allows the team to realise the risk of applying any changes to the project and have a clear picture of the risk of change. Since the client is from the organisation, then it is not surprising that the practice of daily meeting increases the interaction and involvement with the client. This indicates that if the client from the organisation and attend the daily meeting will lead to increase the interaction and involvement between the project team and the client, thus increase the feedback. Thus, it can be said that daily meeting improves change requirement, which can be further studied. The result also shows that the frequent interaction with the client supports and welcomes changes earlier than later, which saves the team's efforts and time through avoid doing things based on assumptions. The findings support the research outcomes of Boehm (2002), DeCarlo (2004), Boehm & Turner (2005) and Wysocki (2007), Collyer et al. (2010), Gustavsson (2011) and Moogk (2012) that the practice of iterative development support regular interaction with the client and deliver outcomes that best meet the clients' requirement.

#### 5.5.6 Impact on Pressure and Stress

The DEVELOPER claims that open space design has some negative aspects that impact the quality of the work done. Such factors include a lack of privacy and noise level due to communication and interaction among team members that results in high level of distraction

and gives them a stressful time to focus on accomplishing the tasks. He also says “*We sometimes need to stay separate from others for deep focus on our tasks and think about the project*”. However, with a lack of privacy, this is something hard to have, which impact their productivity a bit. These outcomes prove the findings of Pikkarainen et al. (2008) that open office layout increase pressure and stress on the project team. As a solution, the team use the worktable when not occupied to get away and stay more focus and that minimise the impact on productivity.

*“I usually use the worktable in the office to isolate myself from other and stay focus on the tasks” – Developer*

The APs require the project team to daily report on their project tasks during the daily meeting. This according to the DEVELOPER puts some members particularly the developers under pressure to provide updates even if there may be circumstances extend outside of their control such the lack of client presence at meetings due to their workload. As a result, the team sometime makes assumptions to commit to what they have agreed and show progress; as a result, the team make some modifications to what has been done based on assumptions at a later date. This issue occurs at earlier phases of the project and to overcome it, the IT team invites the innovation team to attend the daily meeting whenever there is a need for clarifications as stated previously. Thus, it can be said that daily meeting increase pressure on the project team, which is similar to the results obtained previously by (McHugh et al., 2012).

*“When we started the project, the innovation team rarely attended the daily meetings. So at that time, we had to do some works based on assumptions, which we had to re-do it as per the client’s feedback” – Developer*

Both ITMag and the DEVELOPER feel that a certain amount of pressure due to retrospective and daily meeting, and claim that it is stressful to the team always to show progress, which forces them sometimes to work overtime, especially when the pressure is very intense and the deadline is very close. This outcome proves the findings of McHugh et al. (2012) of daily meeting impact on pressure. Interestingly, the DEVELOPER highlights that although high visibility of the project is broadly considered as a positive impact and motivates the team to deliver on what they have promised, our team are not comfortable as it forces them to put more pressure and stress on themselves to accomplish what they have agreed. This is maybe perceived beneficial by the client or the management because tasks may be accomplished more quickly. Conversely, it imposes an undue burden and puts continuous stress and pressure on the project team especially when tasks are complicated.

*“It is true that task board increase the project visibility and that generally is seen as something positive, but in our case, it puts more stress and pressure on us to deliver what we have promised” – Developer*

The following figure shows the identified impact of APPs on pressure and stress.

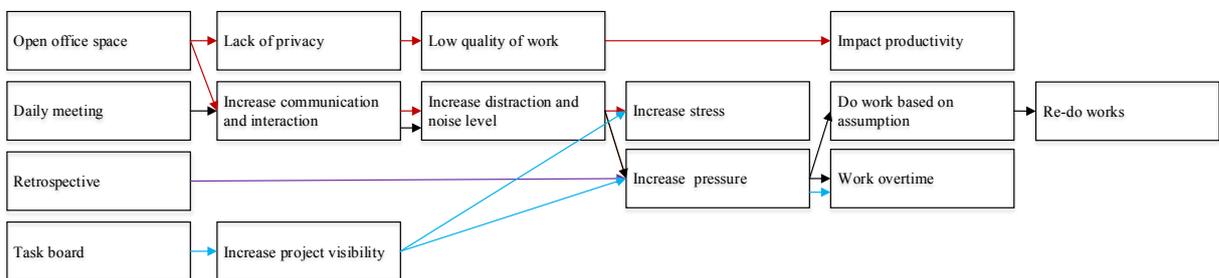


Figure 30: Identified impact of APPs on pressure and stress in Innov

Overall, it may be said that the used of APs such as daily meeting, open office layout, retrospective causes high pressure and stress on the project team especially at the beginning as the client was not involved in the daily meetings. At a later stage, the pressure and stress had been minimised as the team has taken specific actions and the primary causes were the practices of open space design and daily meeting. These findings can be linked with the LR. As per Aguanno (2004), Pikkarainen et al. (2008), McHugh et al. (2012) and Strode et al. (2012) APs lead to increasing pressure and stress. In addition, the re-work that done earlier proves that pressure and stress due to deadlines and must showing progress impact the outcomes of the of the project and this supported in the LR by the finding of Gustavsson (2011). Interestingly, it is found that the visibility of the project puts a certain level of stress and pressure on the project team and this can be considered in future studies. Moreover, the lack of privacy due to the open space layout also results in stress on the team, which also can be taken into consideration for future studies.

#### 5.5.7 Impact on Productivity

Based on the interview analysis, it is found that the implantation of APs has impacted the productivity of team members in positive and negative ways. Nevertheless, the positive impacts outweigh the adverse outcomes on the project team. Overall, the productivity in this project is found to be high, although some interviewees clearly brought up some challenges that influence their productivity a bit at some point, they have managed to overcome these challenges.

According to the results of the effective communication, the results show that implantation of APPs particularly daily meeting and open office space has supported considerably in enhancing the communication effectiveness among the project members and between the project team and the client. To elaborate, the open office space and daily meeting along with the supportive technological tools increase the interaction frequency between the project members and enhances the communication effectiveness although the team are distributed. It also enables the project team to conduct urgent meetings without the need to commute between the two offices. Based on the analysis outcomes, it can be said that effective communication improves the productivity and since both daily meeting and open office design increase communication and interaction between the team, then it can be concluded that these practices increase productivity as well. This finding can be linked with the research results of Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010), and Grapenthin et al. (2015) that open office design improve communication effectiveness which in turn increase the productivity. The findings also reveal that the daily meeting affects productivity positively due to effective communication; this may indicate that daily meeting improves productivity through enhancing communication effectiveness. This discovery can be further studied to prove it.

In addition, the team reports that the open office space causes some distractions and lack of privacy that affect their level of stress, thus their productivity a bit. This finding can be tied with the previous outcomes of Fathian et al. (2007) Pikkarainen et al. (2008) in the LR. However, to minimise the impact on the project and team members, specific actions have been taken successfully. Based on the interview data, there is no clear evidence or statement that the team missed deadlines, although it is reported that they re-did some of the works. During the interview, the ITMag states a couple of times that the project has been delivered

successfully on time. Accordingly, it can be said that communication effectiveness improves the project team productivity. Since the project team gives an example on how they overcame the issue of distraction and managed to deliver the project on time, thus it can be considered that the negative impact of open space design is low.

*“We delivered the project on time” – IT Manager*

*“We manage to deliver the project based on the innovation team requirement with no delays. Currently, we are working on its improvement and addition of the innovative ideas risk assessment” – IT Manager*

The interview analysis also shows evidence of coordination among the project team and between the project team and the client. This has been clearly stated by the InnovMag in the knowledge sharing section, where the project team coordinates to tackle the issues they face and the continuous interactions between the team results in establishing cohesion. According to the DEVELOPER, whenever there is a need for the client, the innovation team is invited to the daily meeting, which indicates that coordination exists between the project team and the client, who is part of the organisation. The practices of whole team is also found to enable the team to build on each other's experience, which reduce the tasks time, thus improves productivity. Thus, it can be said that better project progress is expected if the cross-functional team is competent and they become flexible to support when necessary and effective coordination due to the practice of whole team has impacted the productivity positively. This outcome is consistent with Lee and Xia (2010) and Strode et al. (2012) finding about the positive impact of whole team on productivity.

At the individual level, the outcomes of the impact on communication show that the communication effectiveness in this project is remarkably high, which reflected positively on the amount of documentation being produced for this project. Based on the interviewees, none of the interviewees complained about the less documentation. This is maybe because the client is part of the organisation team and things can be explained to the innovation team without the need for the official and proper documentation. Accordingly, the team has more time to focus on critical tasks. This finding proves the research result of Karelsky & Voord, (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015) about the positive impact of informal communication due to the open office design on the amount of documentation, thus teams productivity. The following figure shows the identified impact of APPs on productivity.

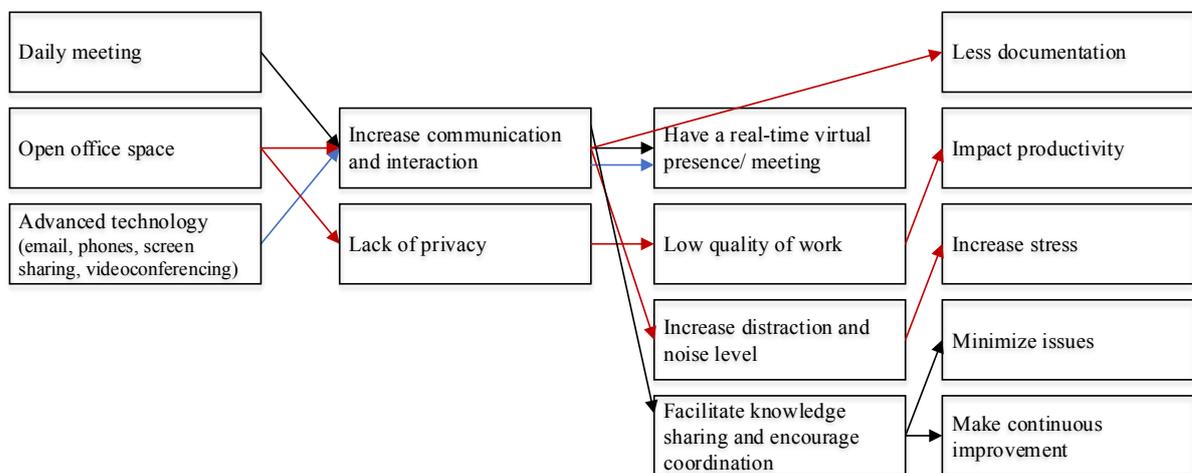


Figure 31: Identified impact of APPs on productivity in Innov

## **5.6 Summary**

In this Chapter, the profile of the group interviews' participants was highlighted, and a brief about each project and organisation was presented to understand the context of each project. Additionally, a separate analysis for each project on the impact of using APPs was described and explained through linking outcomes with the findings of the interview. The results of the separate analysis and discussions will be used for the cross-analysis in the next Chapter, spotting any similarities and differences in the three projects that may have contributed to the identified outcomes. Accordingly, a conclusion and recommendation will be made.

## 6. Chapter (6) – Cross-analysis and Discussions

### 6.1 Introduction

The framework drawn based on the findings of the LR has been used to examine the impact of APs in the three case studies conducted in three different government organisations. One of the selected projects is an event project management, whereas the other two projects software/system development that requires the heavy involvement of the IT team as the main contributors in developing these projects. In the previous section, each case study has been analysed separately; however, in this part, the cross analysis will be conducted to identify similarities and difference and compare the outcomes with the results of previous studies mentioned in the Chapter (2).

### 6.2 Impact on Communication Effectiveness

Table 5: Comparisons of the Used Agile Practices – Communication Effectiveness

No.	Agile Practice	Evventi	Osool	Innov
1	Daily Meeting	*	* (Ineffective)	*
2	Demo	*	*	
3	Whole Team	*		*
4	Iteration Planning	*	*	*
5	Iterative Development			
6	Open Office Space	*	• Only part of the team use it	*
7	Information Radiator		White board	
8	Others	• Advanced technology	• Bulletin board • Meeting minute • Project Status report • Role and communication channel sheet	• Advanced technology

The separate analysis of each case study shows that there is a variation between the three projects in term of communication effectiveness. Effective communication is meant in this research as the exchange of information about the project among the team members. Both Evventi and Innov have shown evidence of effective communication due to using different APPs effectively, particularly daily meeting and open office design. While, the result of Osool indicates a low level of communication effectiveness, and the demo is the most practice that improves communication effectiveness among all members and improves their understanding of the project requirement. Based on the analysis, the reasons for high results in both Evventi and Innov could be due to the daily meeting and open office design that contribute to constant interactions, frequent communication and facilitate rapid access to information and resolving issues. The finding is supported by researchers such as Pikkarainen et al. (2008), Li et al. (2011) and Grapenthin et al. (2015).

Although Osool uses both practices; however, the study reveals that not all members attend the daily meeting, while open office design supports communication only among the members sitting next to each other; thus it can not be said that these two practices have contributed to improving communication effectiveness in this project. Another reason for the low level of communication effectiveness could be that the team gather almost once a month for the iteration planning in which daily meeting's topics are also discussed. Accordingly, information about the project is shared between the team almost once a month as the iteration planning is conducted in a three weeks interval, which is a very long period and the project team may forget the project information till the next meeting especially that the findings show that some members skim the MOM. This finding may signify that the gap between meetings or information sharing plays a significant role in improving communication effectiveness,

which justifies the reason for the low effectiveness in Osool. The discoveries can be further examined in the future studies. This discovery also proves the positive impact of both open office design and daily meeting as stated above.

The cross-analysis shows that the three teams agree that the practice of iteration planning improves team's awareness of the project requirement and identify the most prioritised requirement for the coming sprint as it was revealed in the LR Pikkarainen et al. (2008). However, as mentioned previously, Osool team uses this practice ineffectively and combines it with the daily meeting, which as explained could be one of the reasons for the low communication effectiveness in this team.

The practice of demos is found to be implemented in both Evventi and Osool project, and the separate analysis proves that this practice improves team's understanding and awareness about the project's elements or features. Accordingly, makes it easier to obtain feedback and inputs from different stakeholders, thus makes modification faster and saves the project teams' time and efforts. The result supports the findings of Pikkarainen et al. (2008) in the LR that demo leads to enhance the awareness and understanding of the project requirements.

The separate analysis proves that both open office design and the whole team impact the communication effectiveness negatively; however, none of the interviewed teams states that conflicts occur during the project development as they are cross-functional (whole team). This is maybe due to the reasons stated in the separate analysis, whereas in Osool, this is hard to be examined as the strategy team controls the project and assigns tasks to the teams and the developers are outsourced.

The negative impact of open office design will be discussed in details in the pressure and stress section. Accordingly, it can be said that both the whole team and open office design lead to negative impact on communication effectiveness, which proves the findings of Pikkarainen et al. (2008) and Lee & Xia (2010). However, the investigation shows that the impact can be eliminated in many ways as discussed in the separate analysis.

The findings also reveal that the project teams use other tools that facilitate the sharing of information among members such as a whiteboard, bulletin board, sticky note and advanced technology, which includes video conferencing, smartphone by using email, Whatsapp, and SMS as well as reports such as status report and MOM.

According to the examination, the use of advanced technology by Osool's members is rare and limited to a certain level at the organisation. While the other two teams rely heavily on advanced technology for effective communication. Therefore, this may denote that using other supportive tools such as advanced technology and information radiators support effective communication and fast sharing of information among the entire team members. These findings can be linked with the LR with the research outcomes of Mishra & Mishra (2008) and McHugh et al. (2012) tools could be used to improve communication effectiveness

### 6.3 Impact on Knowledge Sharing

Table 6: Comparisons of the Used Agile Practices – Knowledge Sharing

No.	Agile Practice	Evventi	Osool	Innov
1	Daily Meeting	*		*
2	Demo			
3	Whole Team	*	*	
4	Iteration Planning	*	*	*
5	Iterative Development			
6	Open Office Space	*	*	*
7	Information Radiator			<ul style="list-style-type: none"> <li>• Whiteboard</li> </ul>
8	Others			<ul style="list-style-type: none"> <li>• Retrospective</li> <li>• Meeting</li> </ul>

The initial proposition states that APPs particularly whole team facilitate knowledge sharing and according to the framework, effective communication facilitates knowledge sharing between the entire team. So in this study, the level of knowledge sharing is examined in term of the extent the team members support and offer to help each other to accomplish the project tasks and practices that has been proven to enhanced communication effectiveness will be examined to prove the positive relationship between effectiveness communication and knowledge sharing.

To be able to examine this, the researcher ensures to select projects that have members from different departments and based on the results, the three examined teams have supported and built on each other strength to improve the project's requirement further as members come from different department especially Evventi's members. They have given a clear example on how the use of APPs facilitates knowledge sharing when they are in shortage of resources to finalise critical tasks; they count on their competent members who have adequate knowledge to accomplish the tasks collaboratively. This indicates that the Evventi's members have done

works from other functional areas in this project and cross-functional practice facilitates knowledge sharing. This could also be because Evventi is considered as an event project management in which the project team particularly the project manager is required to have right competencies from other functional areas to quickly get together and understand the requirement of each task. The findings show that the some of the team members have worked together on similar projects, which enhance their understanding about other department responsibilities, which could be a reason for the high knowledge sharing and collaboration in this project. This outcome supports the finding of Strode et al. (2012) who report that the practice of the whole team facilitates knowledge sharing and makes members capable of performing each other's task, which confirms that the whole team results in a positive impact on knowledge sharing.

The cross-analysis shows that there is a difference between the projects in term of the APPs contribution to knowledge sharing. Based on the data, the result shows that iteration planning contributes to a greater extent to the knowledge sharing in the three projects, particularly Osool. This is maybe because it is the only practice used by Osool that gather all team members in one place and allows them to interact with each other and share knowledge about any issues and challenges; accordingly, teams feed the project with the inputs and share their experience to improve the project further. It is also found in both Evventi and Innov and leads to boost performance and reduce the development time. Thus, it can be said that iteration planning also facilitates knowledge sharing which is consistent with what McHugh et al. (2012) found about the positive impact of iteration planning on knowledge sharing.

The practice of open office design is found to facilitate knowledge sharing to a certain level among team members that sit in the same area. To elaborate, it highly facilitates knowledge sharing between IT team in Innov, and members sitting in the Event's office in Evventi. It also has shown positive impact in Osool project in term of performing each other's tasks, but among the GRdes, StraSpec and the developers when they test the system before showing it to the rest of the team. Therefore, it may signify the importance of constant and effective communication on facilitating knowledge sharing, which can be linked with the findings of Mishra & Mishra (2008) and Strode et al. (2012), which state that open office design encourages learning through effective communication and increase coordination effectiveness. Based on the cross-analysis, the continuous interaction and communication between the teams in Evventi and Innov projects establish cohesion and trust that facilitate knowledge sharing. This outcome can be linked with the findings of Fowler & Highsmith (2001) and Stray et al. (2012) and Strode et al. (2012) that trust is established due to the interaction between the team that allows them to count on each other's knowledge. The separate analysis reveals that a certain level of trust exist among members and leads to enhance coordination effectiveness which can be linked with the finings of Fowler & Highsmith (2001), Stray et al. (2012) and Strode et al. (2012 however, since the discussion of this is out of this research paper scope, it will not be further explained.

The practice of daily meeting is found to be used by the three projects, but the level of implementation varies. In Osool, the meeting found to be only attended by the strategy team, the developer and the GRdes and no evidence given to prove that it facilitates knowledge sharing, which may indicate the reason for the low knowledge sharing. On the other hand, the separate analysis reveals that this practice is used effectively in Innov and less effectively in

Evventi. However, both have shown evidence of the positive impact of the practice on facilitating knowledge sharing through identifying issues earlier in the project. Accordingly, both teams get together to tackle these issues, which result in minimising the risk on the project. Thus, it can be said that the practice of daily meeting facilitates knowledge sharing which is consistent with what McHugh et al. (2012) found.

Based on the findings, it can be said that effective communication facilitates knowledge sharing which proves the findings of (Pikkarainen et al., 2008). This is because the open office design, daily meeting and iteration planning, which previously have been proven to have positive impact on communication effectiveness have also led to facilitate knowledge sharing.

## 6.4 Impact on Project Visibility

Table 7: Comparisons of the Used Agile Practices – Project Visibility

No.	Agile Practice	Evventi	Osool	Innov
1	Daily Meeting			*
2	Demo		*	
3	Whole Team			
4	Iteration Planning		*	*
5	Iterative Development			*
6	Open Office Space	*	*	*
7	Information Radiator	<ul style="list-style-type: none"> <li>• White Board</li> <li>• Shared Folder</li> <li>Takamul System</li> </ul>	<ul style="list-style-type: none"> <li>• Whiteboard</li> </ul>	<ul style="list-style-type: none"> <li>• Task board</li> </ul>
8	Others	<ul style="list-style-type: none"> <li>• Advance technology such as:</li> <li>• Whatsapp</li> <li>• SMS</li> </ul>	<ul style="list-style-type: none"> <li>• MOM</li> <li>• Project Status Report</li> <li>• Email</li> </ul>	<ul style="list-style-type: none"> <li>• Retrospective</li> </ul>

Based on the interview analysis, the implementation of APPs increases the visibility level in all examined projects; however, the degree of impact varies as the level of implementing APPs differs. The findings show that the visibility level in Evventi and Innov is considerably high compared to Osool in which the team members do not consider themselves very aware about the project status and members' progress based on the findings of the separate analysis. The study shows that meetings among team members in Evventi and Innov are daily and members care about attending the meetings including the daily meetings and iteration planning sessions, while in Osool members are not committed to attending the daily meetings, and all members gather almost once a month during the iteration planning. An explanation for the findings is that the more frequent the project team gathers, the higher the visibility will be, which shows the importance of daily meeting and iteration planning in increasing project visibility as the case of Evventi and Innov. As a result, it can be said that both practices have contributed to the high positive impact, which proves the results of Chong (2005), (Pikkarainen et al. (2008), McHugh et al. (2012) Strode et al. (2012) and Stray et al. (2016) in

the LR. Whereas, the frequency of communication and interaction in Osool is found low due to ineffective use of daily meeting and iteration planning, so it is not surprising the low level of visibility among them. The findings in Osool contradict the results of the researchers mentioned above, which signifies that inefficient use of daily meeting and iteration planning leads to hinder the sharing of information and reduce the project visibility. In addition, this may also be because the shorter the sprint cycle is, the more frequent the team will gather in a month time, which will make it easier for teams to grasp and get a clear picture of the overall project status. This outcome may indicate that frequent interaction and communication increase the project visibility and this outcome ties well with previous researches of Pikkarainen et al. (2008), Li et al. (2011) and McHugh et al. (2012) that APPs increase communication frequency which improve the project visibility.

Although members of all projects found to be not located in the same office; however, members of both Evventi and Osool are located in the same building. Whereas in Innov, part of the IT team is based in Abu Dhabi office, while most project members in Dubai. The analysis shows that both Evventi and Innov overcome this issue. The separate analysis shows that other factors contribute to high project visibility such as the use of technology and information radiators. Team members of Innov are distributed, but the analysis reveals that their project visibility is high; thanks to the advanced technology such as video conferencing and sharing screens that make their meetings stress free and saves their travelling time. While Evventi teams found to rely heavily on smartphones for sharing information outside working hours or if members are onsite. By using advanced technology and dedicate a time out of their busy schedule to attend the daily meetings. Based on the findings, it can be concluded that APs impact project visibility positively, which supports the research outcomes of Pikkarainen

et al. (2008) and McHugh et al. (2012) of the positive impact of APs on project visibility. Although members of Osool use MOM and project status report to spread knowledge about the project among all members, the findings show that a number of members refer to the parts that related to their responsibilities and skim these documents without paying attention to other tasks. Other practices include the use of whiteboard and sticky notes for sharing information in both Evventi and Innov. These findings imply that project visibility could be improved through using supportive tools, which agrees with the previous findings of Mishra & Mishra (2008). However, the role of supportive tools and technology could be further explored in a new research.

Moreover, the results show that the practice of open space design has positively impacted the project visibility in all projects since it increases access to the team members and communication frequency. Thus, it considerably enhances the outcomes in all projects mostly in Evventi, followed by Innov and Osool respectively. Accordingly, it can be said that open office design enhance project visibility and this finding can be lined with previous research findings of Pikkarainen et al. (2008).

As proposed in the Chapter (2), effective communication (both formal and informal) creates many benefits to the project team and based on the framework it is hypothesised that effective communication leads to improved project visibility according to (Pikkarainen et al., 2008) and (McHugh et al., 2012). Based on the LR, many practices found to improve communication effectiveness such as daily meeting, open office design and iteration planning, which are also found to impact project visibility. Based on the cross-analysis of these practices, it is found that these practices as well as information radiator and advanced technology increase both

communication effectiveness and project visibility. Thus, it can be said that effective communication due to using these practices have increased the project visibility and this can be linked with the finding of Chong (2005), Pikkarainen et al. (2008), Petersen & Wohlin (2010), McHugh et al. (2012), Stray et al. (2012) and Grapenthin et al. (2015) Stray et al. (2016) in the LR.

## 6.5 Impact on Change Requirement

Table 8: Comparisons of the Used Agile Practices – Change Requirement

No.	Agile Practice	Evventi	Osool	Innov
1	Daily Meeting			*
2	Demo			
3	Whole Team			
4	Iteration Planning			
5	Iterative Development	*	*	*
6	Open Office Space			
7	Information Radiator			• Tasks board
8	Others			

The cross-analysis reveals that the use of the APPs increase the involvement of the client in the project and make the project team more flexible to accept changes in the requirement in all examined projects as perceived by the project team. This is because interviewing the client was hard and as the projects are delivered. Although changes in requirements occur in the three projects; however, the analysis shows that the level of change in Evventi is very high especially as the event date gets closer and consider long-term planning as a time consuming, and in Innov as well due to the changes in the client's priority. Whereas, a significant change is found to occur in Osool that results in suspending the project for a while as the organisation

changes amend its strategy. Interestingly, it is found that iterative development is a common and significant practice in the three projects when it comes to applying changes in requirement at any point in the project and this was hypothesised.

The cross-analysis also show that both Evventi and Innov have managed to deliver the project on time, unlike Osool. This is because Osool has suspended the project for a short time to amend its strategy, which leads to minor changes on the works that have been delivered; thus, it is ruled out that any of the APs is a reason for the delay in this project. The three teams as well clearly state that iterative development enables them to deliver the project in smaller chunks, thus gives them the opportunity to apply changes easily and at an earlier stage of the project development rather than later when the whole project is completed, or a big chunk of it is delivered. It also allows for constant feedback from the client, as deliverables are frequent. The findings may indicate that this practice is significant for enhancing change requirement, which supports study outcomes of Boehm (2002), DeCarlo (2004) Boehm & Turner (2005), Wysocki (2007) and Moogk (2012).

Unlike TPM, APM focuses on the client and driven by the client. Therefore, it is characterised by continuous and early involvement of the client for feedback and re-arranging priorities list. According to the theoretical findings, using APs particularly iteration development allows for early and constant feedback from the client which enhances the team's ability to accept and welcome changes at any point during the project development. Additionally, the earlier the feedback is obtained from the stakeholders, the less impact of incurring rework will be on time to make changes, allowing for early delivery of requirement and better outcomes which is found in the three projects, although Osool finished the project three months after the

proposed date, but the reason is due to the holding the project that have discussed previously. The discoveries of the study have supported by Boehm (2002), Wysocki (2007) and Collyer et al. (2010) in which earlier feedback minimise the risk of uncertainty and support faster delivery.

Moreover, it is difficult to distinguish which project has benefited more from using APP of iterative development; however, the previous findings show that Evventi has benefited from the advanced technology to obtain instant feedback through Whatsapp. Whereas, the daily meeting is found to enhance changing requirement in Innov, maybe because the client is one of the organisation’s departments that makes it easier for the IT team to keep in touch with them at any time. This finding may imply that practices such as daily meetings leads to enhance change requirement with the presence of the client and can be further examined.

## 6.6 Impact on Pressure and Stress

Table 9: Comparisons of the Used Agile Practices – Pressure and Stress

No.	Agile Practice	Evventi	Osool	Innov
1	Daily Meeting	*	* (Ineffective)	*
2	Demo	*	*	
3	Whole Team			
4	Iteration Planning	*		
5	Iterative Development	*		
6	Open Office Space	*		*
7	Information Radiator			• Tasks board
8	Others			• Retrospective

Based on the intensive LR, the previous studies of Fathian et al. (2007), Pikkarainen et al. (2008), Moe et al. (2010), Gustavsson (2011), McHugh et al. (2012) Stray et al. (2012) and Strode et al. (2012) have shown evidence that a number of APPs, namely open office layout, daily meetings, iterative development and demos increase the pressure and stress on the project team. The separate analysis has proven this and here the outcomes of the cross-analysis. The overall level of pressure and stress caused by using APPs in the three projects is moderate to high.

The practice of daily meeting is found to cause continuous pressure and stress on all teams to a large extent. This is because it is considered as a place where they have to show progress since the last meeting; however, the level of stress among the team members varies in Osool and Evtvnti as the daily meeting is not attended by all team members leading to missing some tasks deadlines in Osool that affect the progress of interrelated tasks. Whereas, in Innov some tasks are done based on assumption, resulting in re-doing the tasks and this issue is reported to occur at earlier stages of the project development. On the other hand, the EvtMag's tolerance leads to reduce the pressure on the team and distribute it to other members. These outcomes may indicate that the level of pressure and stress is something personal. The findings also prove that daily meeting increase pressure and stress on the project team, which can be tied with the previous outcomes of (McHugh et al., 2012).

In addition, demo causes a high level of negative stress and pressure on both Evtvnti and Osool, whereas Innov has not used this practice. Both teams have reported that the firm schedule and the number of works to be done to finalise the demos have contributed to stress and pressure to a large degree, which may indicate that a correlation exists between pressure

or stress and time or workloads. In other words, the less time and more workload lead to high pressure and stress, and this can be investigated further in the future. However, the findings show that only a few members of both teams are affected as reported and discussed in the separate analysis. Based on the results, it can be said that demo increases pressure and stress on the project team, which support the findings of both (Moe et al., 2010) and (Strode et al., 2012).

Moreover, the open space layout found to cause a high level of distraction in both Evventi and Innov that leads to an inability to focus on performing tasks as expected. However, both teams have managed to overcome this issue in different ways that allow them to stay in the most productive mental mood as mentioned before. Surprisingly, this issue does not occur in Osool although they use open office design, which may be because the team workstation is away from other's workstation. Therefore, the cause of distraction in Evventi and Innov could be because the workstations are not enough away or no partitions are used to absorb or block the noise. The discoveries support Pikkarainen et al. (2008) findings of the negative impact of open office design. It also proves the statement of Mishra & Mishra (2008) that says separating individual desks with a partition or by distance minimise the risk of the high noise level in open office layout. Interestingly, high visibility of the project requirement is reported by Innov to cause pressure and stress on the project team as it puts an undue burden and continuous stress especially when tasks are complex and the team have committed to deliver it. This finding may suggest that a relationship exists between high visibility and high stress and pressure, which also can be examined in future studies. Furthermore, the analysis shows that some members in Osool have worked overtime sometimes to meet deadlines, which

causes negative pressure and stress on the team. However, the discussion of this is out of this research paper scope and it will be disregarded.

## 6.7 Impact on Productivity

Table 10: Comparisons of the Used Agile Practices – Productivity

No.	Agile Practice	Evventi	Osool	Innov
1	Daily Meeting	*	* (Ineffective)	*
2	Demo			
3	Whole Team	*		
4	Iteration Planning		*	
5	Iterative Development	*	*	
6	Open Office Space	*	*	*
7	Information Radiator			
8	Others			• Advanced technology

The study of the productivity in the three projects has shown both positive and negative impacts due to using APPs. Although some challenges occur in the three projects, the productivity level in both Evventi and Innov is found high comparing to Osool in which some of the practices found to be ineffectively implemented that have a considerable impact on communication effectiveness based on the LR findings such as daily meeting and iteration planning. This indicates the importance of these two practices in enhancing communication effectiveness at the project level. Interestingly, it is found that a long time is spent on planning “iteration planning meeting” in Osool. The results also reveal that the three questions of the daily meeting are asked during the iteration planning. Therefore, it is not surprising to hear the team complaining about it. While in the other two projects, the outcomes show that time is

spent as well on daily meetings and iteration planning sessions. However, the results show that these practices lead to many benefits and positive impacts such as increasing project visibility, facilitating knowledge sharing and allowing for re-prioritising the project requirement as well as identifying obstacles and issues earlier. Thus, it can be said that effective implantation of these two practices lead to enhance communication effectiveness; thus influence productivity positively. The outcomes prove the findings of Pikkarainen et al. (2008), Li et al. (2011) and McHugh et al. (2012) about the positive impact of communication effectiveness on productivity.

In all projects, open office space practice makes access and interaction among the project members more frequent and easy, leading to enhance the communication effectiveness, which leads to many benefits as mentioned above, thus improve the productivity. However, the level of communication effectiveness found to be different in the three projects as the level of implanting the practices varies. In Osool, the visibility among the group sitting next to each other found to be high. Whereas in Evventi it is found to be very high among members sitting in the Event's office and overall, it is high at the team level. Similarly, at Innov, the visibility is very high among the IT team, and interestingly, the client found to be aware and attends the daily meeting if necessary as the client (innovation team) works at the same organisation. This outcome indicates that being in the same room and sitting next to each other increase communication and interaction, thus the productivity. Moreover, high involvement of the client leads to enhance the productivity. According to the cross-analysis, the results of APPs impact on pressure and stress show that open office design causes some issues related to lack of privacy, noise and distraction, which impacts the teams' performance a bit in both Evventi and Innov. This finding proves the research outcomes of Fathian et al. (2007) Pikkarainen et

al. (2008) about the negative impact of this practice. However, actions have been taken to minimise the side effects, and no task has missed its deadline in these two projects. Whereas in Osool, the team has not reported any issue related to this practice. This finding signifies that the open office layout causes some issues; however, based on the results this can be eliminated or minimised through taken supportive actions. So, it can be concluded that open office design improves productivity through improving communication effectiveness. This finding can be linked with Karelsky & Voord (2008), Pikkarainen et al. (2008), Petersen & Wohlin (2010) and Grapenthin et al. (2015); thus open office design improves productivity.

The findings of the cross-analysis indicate that a certain level of coordination occurs in the three projects to tackle issues, accelerate the progress and cover the shortage in the resources, which proves the findings of Lee and Xia (2010) Strode et al. (2012) that using Aps facilitate knowledge sharing as stated previously, thus improve the productivity. However, in Osool the coordination is limited to the group of people sitting in the same area. Thus, it can be said that effective coordination at the team level due to whole team practice has a positive impact on productivity, which proves the findings of both (Lee and Xia, 2010) and (Strode et al., 2012).

The theoretical background presented in the Chapter (2) shows evidence that effective communication leads to less amount of documentation (Pikkarainen et al., 2008 and Petersen & Wohlin, 2010). Accordingly, it is hypothesised that teams with effective communication will have less emphasis on internal documentation. The examination shows that the perceived amount of documentation in the three projects differs; Evventi, just sufficient, Osool is low, Innov, a bit too much. An explanation for this could be due to the nature of the projects, which means that event projects may not require too much documentation as the

software/system development project. Moreover, changing requests in IT project usually arise upon delivery or seeing outcomes, while in the event context changing request may result due to external factors such as force majeure or changes in activities/ plan. The use of advanced technology could not be said contribute to the less amount of documentation as Innov uses advanced technology, but the amount of documentation is a bit high compared to the other two projects. By comparing this result with the outcomes of communication effectiveness of the three projects, it can be said that the results contrast with the outcomes of (Karelsky & Voord, 2008), (Pikkarainen et al., 2008), (Petersen & Wohlin, 2010) and (Grapenthin et al., 2015); thus using APPs not necessary lead to reduce the amount of documentation.

To summarise, the productivity level in the three projects varies and this is due to the variation in the adoption and implementation of the APPs. Therefore, teams with a high level of communication effectiveness and effective use of practices such as iterative development, whole team and open office design have high productivity. Accordingly, it can be concluded that these practices improve productivity as found by (Karelsky & Voord, 2008), (Pikkarainen et al., 2008), (Misra et al., 2009), (Lee and Xia, 2010), (Petersen & Wohlin, 2010), (Li et al., 2011), (Moogk, 2012), (Strode et al., 2012) and (Grapenthin et al., 2015).

## **6.8 Summary**

In summary, the cross-analysis of the three projects validate the previously identified impact of APP and results in the discoveries regarding impacts such as lack of privacy due to the open office design and misunderstanding due to using jargon that related to the specific field and not known by other members from other departments. In addition, it is found that the studied practices contribute to other impacts such as daily meeting supports in getting feedback earlier especially if the client is involved in which lead to making earlier adjustment and changes.

## **7. Chapter (7) – Conclusion and Recommendations**

### **7.1 Introduction**

In this Chapter, a conclusion will be presented highlighting the main findings of the impact of applying APPs in the selected project for this study and a brief description on the limitation to this study will be brought up to be addressed in the future studies. Having mentioning future studies, a number of recommendations will be listed to further expand the research on this topic.

### **7.2 Conclusion**

This research paper evaluates the influence of the implementation of APP in three different projects in different areas; communication effectiveness, knowledge sharing and project visibility, involvement and change requirement, pressure and stress and finally the productivity that has been investigated at two levels; the project team level and individual level. The nature of the selected projects varies with different team experience, composition and knowledge about APM. Although, differences have been identified in the selected projects, the benefits of the APPs on productivity overweight the negative impacts as discussed. The analysis also shows that APs when partially used or ineffectively has a weak positive effect and may requires other tools to enhance it; however, when APPs are used effectively lead to more significant outcomes. Overall, based on the cross-analysis it can be concluded that using APs has a number of positive impacts:

- **Agile project practices enhance communication effectiveness**

The analysis shows clear evidence that APP leads to enhance the communication effectiveness, which contributes to many positive outcomes such as improve knowledge sharing that leads to increasing project visibility, minimise the need for documentation, thus the team has more time to concentrate on critical tasks. However, it is also found that documentation in the three projects is important and can not be fully replaced with informal communication (face to face communication). This is because new members keep adding to the project (Evventi project) or some members missed the meetings in which important points discussed, thus ways to communicate these things to the team are needed in this case (MOM and status report found to be heavily used in Osool).

- **APPs facilitate knowledge sharing**

It is also found that a certain level of coordination and trust among team members has been established, which positively reflected on the team's performance as they offer to help each other and tackles issues together. This is highly occurred in both Evventi and Innov, while in Osool knowledge sharing and supporting each other was mostly among the developers, the GRdes and StraSpec as they sit next to each other. In addition, the effective communication due to using practices such as open office

design and iteration planning facilitate knowledge sharing through increasing interaction and communication frequency among members that leads to building trust. While the whole team practice supports the teams in counting on each other's strength and enables members as well to perform tasks of others if necessary which result in minimising the workload and accomplish tasks on time.

- **APPs increase project visibility**

In addition to communication effectiveness that leads to increasing the interaction and involvement between the project team, it is also found that other APPs contribute to the enhancement of the project visibility. Both teams of Evventi and Innov have perceived a significantly high level of project visibility compared to Osool project. It has been found that some practices such as daily meeting and open office design contribute heavily to increasing team's awareness of the project and each member progress thus results in higher visibility. Furthermore, it is found that the more frequent team members gather, the level of project visibility increased which indicates the importance of regular meeting and interaction during the project development.

- **APPs improve change requirement**

The use of APPs facilitates and welcomes the changes in the project requirements at any stage of the project and this is significantly supported by the practice of iterative development in all examined projects. This practice allows the team to deliver the

project in small chunks and results more often throughout the development phases, allowing them to obtain feedback sooner rather than later. Thus, enable them to apply changes quickly rather than waiting until the end of the project to get feedback and then make major changes that are costly and time-consuming. Moreover, the results reveal that Evventi benefited from advanced technology by getting quick and instant feedback that leads to making changes and adjustment faster. Interestingly, daily meeting found to improve changes in Innov, and this is maybe because the client is one of the organisation's departments and attends the daily meeting and this finding may indicate that this practice enhances changes. However, further studies are recommended to prove it.

- **APPs increase pressure and stress**

With regard to the perceived level of pressure and stress in the selected projects, it is found to be moderate to high in the three projects, and some practices found to put continuous pressure and stress on the teams to accomplish the tasks, mostly daily meetings and open office design followed by the practice of demo. However, it is noticed that the level of pressure and stress is related to other factors such as the time as it is increased before deadlines. Based on the cross-analysis it is found that the open office design in Osool does not cause issues for the team as the team sit away from others teams, which indicates that supportive actions can be taken to minimise the negative impacts of the APs. An interesting conclusion is that the visibility of the projects found to contribute to an increase in the pressure and stress. In addition, a

possible correlation may exist between pressures or stresses the level of workload on the project. These discoveries can be further studies to verify them.

- **APPs improve productivity**

The study shows evidence of the positive effects of APPs on productivity in all examined projects, although some practices have contributed to negative impacts on productivity mostly the open office design since it causes distraction and loss of concentration on the tasks in both Evventi and Innov, but ways to minimise its impacts have been reported. This practice also contributes heavily to increasing iteration and communication frequency among team members leading to more face to face communication that reduces the need for formal documentation. Accordingly, giving the project team more time to concentration on critical tasks. Moreover, a certain level of trust and effective coordination exist that facilitate knowledge sharing in which allow members to perform tasks of others and share their experience to enhance the outcomes of the project. Based on the cross-analysis both daily meeting and open office design have contributed significantly in improving productivity, followed by iteration planning and whole and not to forget the role the of advanced technology in this regard.

In summary, APPs like many other things has both negative and positive impact on the project team and their productivity. However, their positive effects based on the analysis outcomes of the studied projects outweigh its negative impacts. It is also found that the use of

the practices in other industries; event project management, is useful and leads to many benefits and this research provides evidence in this regard, which can be further studied. However, managers are recommended to be more careful when using APs and take into consideration the possible drawback on the team and the project overall. In addition, the agile approach is suitable for a certain type of projects that are characterised by constant changes in requirement and difficulty in defining the scope and requirement of the project.

### **7.3 Revised APPs Framework**

Based on the cross analysis findings and the conclusion, the following figure presents the revised APPs framework in term of what impacts and outcomes, and the APPs cause the influence. In comparison to the earlier proposed APPs framework, using APPs in the three projects supports the previous theoretical findings as discussed in the Chapter (6) and leads to discoveries as shown in blue. It is found that both information radiator and advanced technology support communication effectiveness which in turn increase productivity. It is also concluded that practices increase project visibility as found in the previous studies and discover that advanced technology as well leads to enhance the visibility among members. It is also discovered that high visibility is perceived as stressful and increased the pressure as stated by Innov. The use of advanced technology also found to provide earlier and continuous feedback that results in making modification earlier.

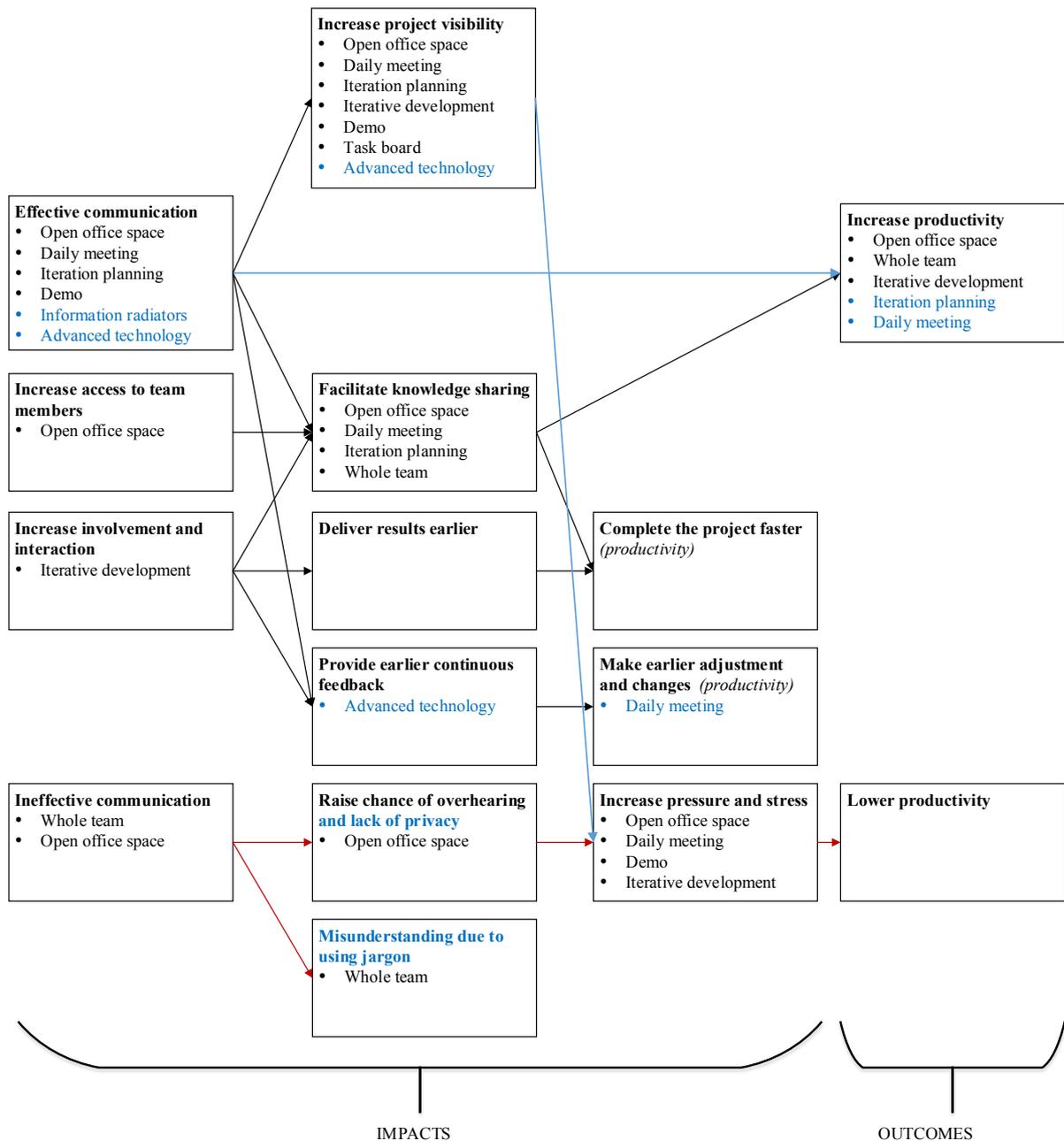


Figure 32: Revised APPs Framework

Additionally, the practice of daily meeting is found to contribute making earlier adjustment and modification. Interestingly, the open office space is proved to increase noise level and at the same time causes lack of privacy that increases pressure and stress on the project team. While the practice of the whole team found no support to cause conflict among members but found to result in

misunderstanding. In addition to the APPs that proposed to improve productivity, it is found that both daily meeting and iteration planning as well improves productivity.

#### **7.4 Limitations**

This study is affected by several limitations and challenges that somehow influence its outcomes. The following is a highlight of the main limitations.

- Only three projects were examined due to the limitation set for this research. The researcher believes that more projects would give more valuable and accurate results on the impact of APPs being used in the projects and would make the discussion more thorough and enhance the validity of this study
- The late response from some organisation due to the unavailability of the person-in-charge or not responding to phone calls made after the initial contact to request an appointment for an informational interview. As a result, the researcher has no choice but to contact other organisations
- Each organisation decided who would be participating in the interview of this study after obtaining a brief about the dissertation topic, objectives and research questions, thus, data may subject to many respond biases such as demand characteristics by attempting to be good and giving perfect answers to the research questions, or hypothesis guessing, which means telling the researcher what he/she wants to hear. All of these may have a significant influence on the validity of the results. To avoid this, the researcher rephrased and repeated the questions that she felt uncertain about and managed to get some of the negative impacts of using the practices

- Some participants do not have a clear idea about the agility concept as they are not from the IT field or have not attended any training or workshops on APM. Although the concept was explained to all participants at the beginning of the interviews, some ask the researcher insistently to give examples for some questions, which the researcher tried not to provide examples to eliminate the chance of getting yes-saying or stating that the given example is also embraced by his/her team. When this happened, the researcher asked the participant to elaborate more by providing examples
- The study examined government organisations and excluded others. However, other government entities in different sectors can be taken into consideration in future research. In addition, between four to five employees were interviewed in each project due to the time limitation set for this research and more respondents would enrich the outcomes and give more insight on how practices were used, their impacts and importance
- The data collected was limited to three organisations and three projects, mainly in Sharjah and Dubai; hence, the outcomes may not be generalised to other government organisation within the U.A.E. However, new comprehensive research can be done in the future covering government entities across the U.A.E.

## **7.5 Future Research Recommendation**

For future research, the findings in this dissertation can be considered as a basis to build upon future researches. An example of potential future research could be the identification of the agile levels needed and the organisation business type or industry, thus exploring the relations between required agile level and industry. Furthermore, identifying the practices and

approaches embraced by different organisations in different sectors; accordingly, studying the relationships between selected practices and industries, if any.

Moreover, it would be beneficial to quantitatively research the influence of agile enablers or providers on project/program or portfolio performance. Other potential future research may include:

- Examining more projects and obtaining insight from more respondents to enrich the outcomes of the results and give more validity and accurate results
- Examining the main practices and tools that agile projects have in common in government and non-government organisations. The research focus can be across sectors or one sector, but in the different country/region or on small, medium and large organisations
- The reasons that allow some agile projects to outperform other similar projects. Various factors can be identified and discussed such as the role of advanced technology and supportive tools, and the relationship between these factors or between them and agile projects can be examined
- APPs, challenges and opportunities. A comparison between highly agile projects and low agile projects in same or different industries/sectors
- Identifying the value and influence of APPs on the project success and its three main constraints. The study may also examine the importance and influence at the different stages of the project
- This study can be repeated using a quantitative research method or a combination of the quantitative and qualitative methods and including more projects and sample size or employees from different levels and departments

- Studying gap in time between meetings and information sharing and its impact on communication effectiveness and project visibility
- Investigating the role of trust in facilitating knowledge sharing among the project team
- Examining the relationship between high project visibility and high pressure and stress

## **7.6 Research Contribution**

This research paper can contribute to both academics and PM practitioners not just in the UAE, but also at world level as follow:

### **7.6.1 Academic Perspective**

In general, the initial findings indicate that research on APM in IT industry is well established; however, there is a need for more research in other industries and areas. Furthermore, most studies have been done on the methodologies and approaches of transforming to agility, whereas, only limited number of researches has been done about the impact of APPs, which provide valuable insight into the impact of APPs on project and team's productivity. Thus, this research paper contributes to existing knowledge and add value about the impact of using APPs on team's performance through presenting empirical data and evidence of both positive and negative impacts on three selected projects, of which one is not related to IT industry.

In addition, it gives strong evidence that effective implementation of APPs leads to positive impacts that benefits both the project team and the client. This study as well leads to a new conclusion about some practices and the discoveries open the door for future studies in the area of APPs as mentioned in the Chapter (6), the cross-analysis and discussion.

#### 7.6.2 Practitioners Perspective

The main findings of this research present for the PM practitioners in general and APM in particular that using APPs has many benefits that enhance the performance of the project team, thus their productivity. It also gives them the opportunity to take advantage of other project teams' experience and have an overview of the main challenges that occur in the examined projects to carefully plan their approach when planning to implement any of the practices or agile methods in their projects. Moreover, it will broaden their knowledge about both negative and positive impacts of applying APPs and the outcomes these impacts trigger as well as benefit from project team experience in minimising or eliminating the negative impacts of the practices.

## **7.7 Summary**

In conclusion, this study was able to achieve its ultimate aim and objectives mentioned in the Chapter (1). It was also able to answer the main research question, which is about the impact of implanting APPs on project productivity and the initiation theoretical proposition proposed in the Chapter (3) were all examined separately in each project then cross-analysis was conducted to identify the similarities and difference that across the selected project that may contribute the end findings. Based on the study results, effective implantation of APs plays a significant role in getting positive impacts on team's productivity and the negative impacts of using some practices can be minimises through using other tools and practices. At the end, a number of limitations to this study have been described and recommendations for future researches have been presented based on the study findings.

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## 9. Appendices

### Appendix (A) – Agile Manifesto

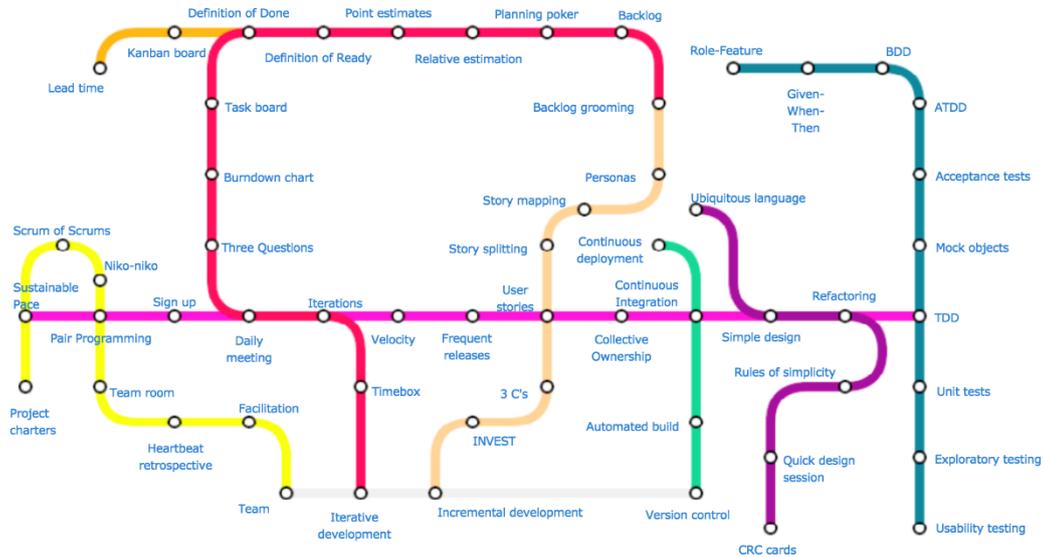
Agile manifesto depend on four critical values supplementing the twelve principle as follow:

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

The principles

1. Highest priority is to satisfy customers through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, with a preference to the shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Providing the environment and support they need and trust them to get the job done.
6. Face-to-face conversation is the most efficient and effective method of conveying information to and within a development team.
7. Working software is the primary measure of progress.
8. Sustainable development is promoted , facilitating indefinite development
9. Continuous attention to technical excellence and good design which enhances agility.
10. Simplicity is essential.
11. The best artifacts (i.e. architectures, requirements, and designs) emerge from self-organising teams.
12. The team regularly reflects on how to become more productive and efficient.

## Appendix (B) – 60 Agile Practices as Listed on Agile Manifesto



Lines represent practices from the various Agile "tribes" or areas of concern:



## Appendix (C) – Agile Methods XP and Scrum

The following is brief description of XP and scrum as most commonly used methods based on the LR findings.

### The Extreme Programming (XP)

The XP method, which is created Beck (1999) one of the original signer of the Agile Manifesto, is well known and is implanted by many companies since it support in developing and enhancing software project in four main ways: feedback, courage, communication and simplicity (Beck, 2000). The author says that XP suggests short iteration and aim on putting as many practices into action as possible. It has five core values, fifteen principles and thirteen key practices which can be easily adapted and should provide instant results, and eleven corollary practices which are more complex and needs more experience to implement them in a project See appendix D for more information about the values, principles and practices of XP. It present twelve best practices as follow:

<b>1. Planning Game</b>	<b>2. Small Releases</b>	<b>3. Customer Acceptance Tests</b>
4. Simple Design	5. Pair Programming	6. Test-Driven Development
7. Refactoring	8. Continuous Integration	9. Collective Code Ownership
10. Coding Standards	11. Metaphor	12. Sustainable Pace

### Scrum

In Scrum on the other hand is an iterative framework specifically developed for handling project in an agile way. Through scrum, changes in requirement and design is expected and accepted through the entire course of the project. It aims on planning requirement but not for long term and work only on the most prioritised tasks. Although it had been developed in 1995, it is only gained popularity after 2001 when Agile Alliance is established. Scrum is designed around a set of activities according to Griffiths, (2012) which are daily meeting, sprint planning, review and retrospective. Each event is time limited and facilitates fast development and continuous flow of information across all including external stakeholders. The length of a sprint is usually between 2-4 weeks where the project team carries out an agreed upon set of tasks. In addition, it has three roles, which are product owner who dictates the product backlog and identify requirements, scrum mater who makes sure that scrum process is follow and keep the team away from distraction, and team member is any one working on the project. The most important artifacts are product backlog which is a list of requirements that needs to be accomplish, sprint backlog a list of items taken from products backlog to be accomplished, and product increment

## **Appendix (D) – Selected APPs to Be Examined**

The following is the definition of studied agile practices in this dissertation according to the Agile Alliance' website.

1. Daily meeting – is one of most widely used practices and it is a short meeting conducted to keep everyone updated about the current status of the project and what each member is doing
2. Demo – a demonstration of work to give an insight about the expected outcome/product as it is difficult to visualised it
3. Whole team (Cross-functional team) – is when the project team made up of people with variety of skill (cross-functional) and experience that required
4. Iteration planning – a repeated time limited practice done to identify what should be done in coming iteration
5. Iterative development – is when the project development is divided into small chunks of work known as sprint
6. Open office space – is when the project team are located or sit together in an open work environment that encourage face to face communication
7. Information radiators – a term for any physical displays that show the project information for the team at a glance and usually placed in a highly visible location. An example task board