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TITLE: A FRAMEWORK FOR THE IMPLEMENTATION OF SCRUM METHODOLOGY TO MANAGE SOFTWARE DEVELOPMENT PROJECTS

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I **agree** to my dissertation and associated documentation being used as a sample for students on future cohorts

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ABSTRACT

Recently, the scrum methodology as part of agile project management has become a well-liked software development methodology in small/medium software development companies. However, it is remarkably different from the traditional waterfall methodology because it supports communication, flexibility, self-organised and creativity rather than expansive planning and systemised procedures. While its robust effectiveness assures to preferably support timely conveyance of quality software products, it adoption and utilising success relies on individuals willingness to accept the scrum methodology. Consequently, this research aimed at finding an effective way to implement Scrum methodology, and as well identify and address the potential challenges that may impact its adoption and utilisation.

This investigation was conducted to identify those factors that may impede the adoption of agile scrum methodology. To achieve this, relevant literatures were critically reviewed as well as conducting interviews with 5 employees of the company in Nigeria. The interview responses were then analysed utilising thematic analysis.

The study revealed several challenges that may impacts the transition and adoption of Scrum methodology, and ways on how to tackle/mitigate these challenges were recommended. A framework was developed with sets of recommendations for better understanding to lead the change in the organisation, and also to address the challenges that may impact the successful implementation of Scrum methodology in the organisation.

CHAPTER 1

INTRODUCTION

1.1 Overview

Software development project is a complex process with countless variables and obstacles, which are hard to keep track simultaneously for maximum efficiency. In order to overcome this hurdle project developers use systems development methodologies (SDMs) that are essentially a collection of processes and procedures that are designed with specific obstacles in mind (Tien Fabrianti Kusumasari et al., 2011). As such, these methodologies are limited in terms of their responsiveness to the changes that occur once the project has begun (Sundararajan and Mahalakshmi, 2013). Many methodologies have been developed along the way to afford flexibility along the life of the project. Such methodologies are known as agile methodologies.

Changing from the traditional waterfall methodology to agile project management requires lots of effort and change management, which may take quite some time (Javdani Gandomani and Ziaei Nafchi, 2015). The process of transition affects all aspects of the company's software development sector, and as well act as change in the development process. Indeed agile transition involves so many changes in the behaviour of the organisation, because of the broad area of change required. Most company sometimes basically experience many obstacles, challenges and issues related to management, people, and as well as technical and cultural problems during the process of change (Javdani Gandomani and Ziaei Nafchi, 2015).

1.1.1 Client Company Background and Statement of Problem

TODAY Digital News & Media Limited was established in 2009, as a digital media publishing and software development company. The company is registered and based in the South-South region of Nigeria, and currently publish two online media platform- Nigeria Newsdesk and TODAY.ng.

The company has 25 employees including its principal officers and technical project managers. TODAY.ng has within a short period had contracts and sponsorship deals with renowned companies in Nigeria, including Dangote group of companies, GTBank, Oando and many more.

Software development as part of the company's services, offers development of powerful software intended to meet customer's demand with all the specified requirements while staying within time and budget.

In the past years the company (TODAY.ng) has experienced constant changes in the sector of software development projects, and Customers have been experiencing products delays and in most cases delivery failures due to the fact that team communication and collaboration issues occurred through operating with the traditional (waterfall) project management methodology, and causing business loss. And these have offered an evidence of the durability of agile project management methodologies as a master plan that can accelerate the software projects.

1.2 Research Questions and Objectives

1. What is the most effective way to implement scrum methodology in the organisation?

2. How will project management transferable knowledge and skills of the project team leader affects the successful application and utilisation of agile scrum methodology?

3. What are the most pertinent challenges in relation to the implementation of scrum methodology?

Objectives: See TOR (Terms of Reference in Appendix 1) for the objectives.

1.3 Limitations

Ideally, any project or investigation is expected to finish within the assigned timeline. However certain limitations are likely to occur of which may obstruct the progress. Hence, it is important to identify those constraints to aid address them. The following constraints shown below were identified:

- Location of client, which is in Nigeria posed several difficulties of face-to-face meetings.

- Project duration, which was limited to 600hrs.

- Data collection at some point was a challenge because the selected participants, to secure their jobs withheld some sensitive information.

- The selected participants completely have no knowledge about the research and this made it more difficult to obtain reliable information that was needed to facilitate this research.

1.4 Dissertation Structure

This dissertation comprises of eight (8) chapters including the Introduction, Literature Review, Methodology, Data Analysis, Discussions, Framework and Recommendations, Evaluation and Conclusion.

The chapter one (1) which is the introduction presents the rational for this study, beginning with the world view, client company background, concentrating on the research questions and objectives in order to measure the success, limitations and then followed by the dissertation structure.

The chapter two (2) which is the Literature Review presents reviews of relevant academic journal articles on agile project management, Traditional software development method (Waterfall) vs. scrum methodology, teamwork, project management transferable knowledge and skills when project manager/leader adopt the agile project management method and also the cultural and organisational factors that may impact the scrum transition and adoption with critical discussion.

The chapter three (3) presents the methodology adopted for this research, emphasising on the objectives, designing of the interviews and how it was conducted, the sample size selected, method of data collection, methods of which the data was analysed, ethical consideration and the setbacks that was experienced.

The chapter four (4) shows the analysis of results, which includes the themes/groupings created through thematic process of results presentation in this study.

Chapter five (5) presents the discussions of all analysed results from data gathered during the investigation combined with the arguments from reviewed literatures.

The chapter six (6) presents the primary purpose of this research; to develop a framework with set of recommendations to address the rational of this research.

The chapter seven (7) offers the critical evaluation of the project, including how the objectives of the dissertation were achieved and also evaluate critically the requirements of the clients.

And finally Chapter eight (8) brings the whole project to conclusion by stating the outcome of this research and future work. Additionally, all relevant list of references and appendixes will be added as supportive evidence of this research.

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

The aim of this literature review is to look into the current literatures that indicate how scrum methodology can be effectively implemented and utilised to manage software development projects. Beginning with agile project management approach, as well as focusing particularly on the comparison between the traditional software development method (waterfall) and scrum methodology.

The literature will also review teamwork in agile project management and the transferable knowledge and skills required of the Project Manager that contributes to the success of the software development projects when adopting the agile project management technique to manage software development projects, and conclude by investigating the cultural and organisational factors that may affect the transition and adoption of the scrum methodology.

Bell and Bryman (2007), in their research specified that reviewing literature addresses related investigations, give setting and background of the study, offer hypothesis and comparable circumstances to take into consideration for greater understanding, and give other supporting information for the study. Remarkably, in-depth reviews of literature that could be associated with answering the question in the research are directed to give an observational and hypothetical base for the study.

2.2   Agile Project Management

The agile project management is gaining power and adoption in Nigeria IT sector, and though it is somewhat new, and the providers are discovering that adopting agile project management helps them to expand their awareness of project risk, increases customers value and cost reduction from failed and abandon projects (Consulting, 2012).

Additionally, there are challenges associated with sourcing of academic journals for this research that discusses agile project management and its adoption in Nigeria and Sub-Saharan Africa.

The changes in IT business environment recently have made tremendous weight on the delivery of Software development projects (Jayawardena and Ekanayake, 2010). Staying competitive in a rapidly changing business environment is the most challenging aspect that most organisations face in order to retain or expand their business dividends (Papadopoulos, 2015).

The traditional software project management methods for managing software projects are no longer in use and effective to manage software projects as these methods can't adapt to the rapid changes of the software businesses and organisation (Jayawardena and Ekanayake, 2010). Agile project management has gotten the consideration of numerous project managers as a method for confronting these challenges and to conquer the impediments of managing agile software projects (Molhanec, 2010).

According to Dybå and Dingsøyr, (2015), agile project management technique is about managing the effect of complexity and instability on a project, understanding the requirement for a significantly shorter duration in between the planning and implementation stage of the project, and that planning an activity does not give full details of the software implementation and also learning and innovating is important to comprehend the software development environment.

Contrary to the straight sequential exercises of the traditional project management methods, agile project management is portrayed by fixed length iterations and incremental software delivery and nonstop changes of code integration (Dybå and Dingsøyr, 2015). Agile project management initiates improvements in the role of management and practices that change the way the team coordinates, collaborates and communicates in software development projects (Dybå, Dingsøyr and Moe, 2014).

The nonphysical form is the fundamental property of software; its programming code is basically an expansive set of theoretical instructions having boundless complexity, flexibility and reversibility (Dybå and Dingsøyr, 2015). Dybå, Dingsøyr and Moe, (2014) in their research mentioned that one issue is that it is naturally hard to implement models of software that permits exact thinking of the framework's qualities. Therefore, agile project management confronts these essential properties of software and splits away from the traditional project management techniques. This method moves the project focus forward from planning to implementation, and by doing this, the agile technique shifts from the traditional method to shared self-management, decision making and learning within the project teams in order to confront any complex and unpredicted problems that occur during the projects.

The main aim of the agile project management introduction was to overcome various shortcomings associated with traditional plan-based project development approaches. The main emphasis of the agile methods was on communication and collaboration, team self-independence, continually functioning software and flexibility to new business realities (Erquicia, 2005).

2.3   Scrum Methodology versus Traditional Waterfall Methods

Scrum being an incremental and iterative agile project management for managing software projects was selected because of it well documented advantages over other agile project management methodologies, and its suitability for a small enterprise. This has seen its adoption to a point where it is a popular agile methodology in small and medium enterprises.

The most effective way to illuminate the superiority of agile project management methodologies and particularly scrum is through side-by-side comparison with traditional waterfall project management techniques. The review of existing literatures revealed that writers, in bringing out the strongholds of scrum, have naturally exploited this to a large extent.

Comparing the two project management approaches, agile project management techniques as Scrum establish key changes with software development project process. To demonstrate the subsequent implications for the software department, the significant differences between the

traditional waterfall project management and the Scrum technique will be discussed briefly. Rather than the traditional waterfall project management methods, Scrum is characterised as management process that reduces the complexity to concentrate on implementing software that addresses the business needs (Mahnic, 2012). It highlights flexibility, incremental development and practical applicability. The traditional waterfall project management methodologies rather concentrate on thorough process when managing software development projects. As an outcome, the agile project management methodologies are said to be repeatable, foreseeable, and permits processes to be enhanced (Overhage et al., 2011).

As mentioned earlier, the traditional software project management methods for managing software development projects are no longer in use to effectively manage software projects as these methods can't adapt to the rapid changes of software businesses and organisation. However, this investigation will specifically look through the difference between traditional waterfall project management and the selected Scrum methodology focusing on the investigation of teamwork, followed by the behaviour required of the Project manager, and narrowing down to the cultural factors that could impact the transition and adoption of agile project management methodology.

2.3.1 Differences between Traditional Project Management Methodologies and Scrum

2.3.1.1 Team Planning

Scrum methodology manages software development projects in an iterative way, and the planning is being carried out entirely on different levels of strategy. Assigning tasks to the team is clarified during the daily scrum meetings. However, in the traditional software development methodologies, the process is managed ahead of time, and the planning procedure is being carried out using a Work Breakdown Structure (WBS) and milestones. Project Manager allocates tasks to team ahead of time in Traditional methods.

The various methods of managing software development basically lead to various planning and controlling strategies of software development processes. The scrum method utilises a purported empirical process control, which depends on the belief that software development project analysis, design and execution is typically changeable and thus hard to planned in advance (Cervone, 2011). As an outcome, the scrum approach oversees the software development procedure from an iterative way and utilises distinctive levels of planning the project, such as, sprint planning, release planning and daily scrum meetings. Amid release planning, fundamental key factors to manage the entire software development process are decided. However, such factors just describe the general usefulness or the highest expenses of a release. The project operational points of interest are to be decided separately for every development process iteration (Overhage et al., 2011).

In scrum methodology, the iteration processes are labelled as sprints. Sprint planning gives the appropriate points of interest, such as the requirements' definition for the iterations and in addition, the subsequent tasks in the backlog of sprint. The ideal time for a meeting to arrange one-month sprint is recommended to proceed for 8 hours and must be balanced

relatively to the sprint period (Pino et al., 2010). Another scrum most comprehensive planning level is the 15-minutes daily meeting in which each team member clarifies what was accomplished subsequent to the last meeting and what the team member aims to accomplish before the following scrum meeting.

2.3.1.2 Team Collaboration

In scrum methodology, the team depends and organises selves and in close collaboration with the client from the start of the project to finish. Meanwhile, in the traditional software development methodologies; project manager generally leads the team, and collaboration with the client basically occurs during the project description of requirements (Overhage et al., 2011).

2.3.1.3 Project Control

During software development project management controlling; Burndown Charts which is part of the scrum mechanism which indicates the daily improvement review of the tasks remaining, and a functional software product being demonstrated at the end of every sprint meeting, however, in the traditional methodologies, the software development project team members usually render the project completion in percentage, using specific tools for reporting status or milestones (Overhage et al., 2011).

2.3.1.4 Requirements

From the requirements aspect, scrum offers a continual review of the software requirements, whereas, the traditional project management methodology offers a fixed agreement document for the project requirements (Overhage et al., 2011).

2.3.1.5 Documentation

Scrum does not instruct an explicit writing or documentation of knowledge, but instead building and sharing knowledge during various meetings, while in the traditional software methodology, documentation is important, and it is considered to be an essential part of the software development procedure (Overhage et al., 2011).

2.3.1.6 Retrospectives

In scrum approach, retrospective meetings are being conducted after each and every sprint, but in traditional waterfall methods, the team tends to learn lessons basically when the project has ended (Overhage et al., 2011).

2.4   Teamwork in Agile Project Management

The development of software depends particularly on the performance of the project team, likewise any process that requires interaction with human. Traditional project management point of view on software projects is established in the rationalistic worldview that encourages a well-defined software product offering ways to deal with software development utilising a controllable, standardised, and software implementation process which is predictable (Tjørnehøj and Mathiassen, 2009).

In today's organisation, this traditional unthinking perspective is being challenged by the agile point of view that gives supremacy to uniqueness, complexity, ambiguity and change rather than forecast, certainty and control. Optimism goal is replaced by responsiveness and flexibility (Nerur and Balijepally, 2007). Team setup is typically motivated by advantages, such as, productivity increase, creativity and staff satisfaction. Many research carried out on software project teams found that performance in a team is connected with the teamwork collaboration effectiveness (Hoegl and Gemuenden, 2001; Strode et al., 2012).

In traditional waterfall methodology, coordination of work is usually a hierarchy that includes command and control management style in which the roles are clearly separated (Nerur and Balijepally, 2007; Moe, Dingsøyr and Dybå, 2010). In agile project management method, coordination of work is done by the self-organising team in which the project team determines how the implementation will be coordinated (Moe, Dingsøyr and Dybå, 2010).

A project team that adopts a heavyweight methodology frequently comprises of independently engaged self-organising experts, and one of the greatest challenges is the transition to self-organising teams when initiating the agile project management approach (Moe, Dingsøyr and Dybå, 2010). Either mind-sets or culture people can easily be changed, which instituted the transition to agile project management more considerable for most companies (Misra et al., 2007). Moreover, it is not adequate to assemble people in a gathering and label them self-organising, then assume that these people will naturally know how to organise and function suitably as a scrum team.

2.4.1   The self-organising team: Scrum team

The teamwork topic has drawn a greater interest of study from different disciplines (Moe, Dingsøyr and Dybå, 2010; Diefenbach, 2008). The idea of teamwork conveys a set of qualities that promotes listening and reacting productively to points communicated by other team members, assuming the best about others, giving assistance and acknowledging the achievements and interests of the other team members (Pattit and Wilemon, 2005). Values of such are important since they encourage the performance of an individual, and help the team carry out their tasks well.

Teamwork incorporates the initiation of experiments to recognise personality attributes of each team members, since it has regularly been contended that great teams require a specific mix of personalities, Such are Myers-Briggs and Belbin test indicator type (Batenburg, van Walbeek and in der Maur, 2013). There is likewise a lot of study on teamwork climate and level of the team. Rasulzada and Dackert (2009) recommended that task orientation; vision,

participative well-being and innovation support are the four climate factors that are crucial for team innovation to prevail.

Moreover, there are investigations of teamwork over the years, which show that project teams experience set stages. The studies, which are well known, are that of Moe, Dingsoyr and Dyba, (2010); they recognised the project team experience stages as forming, storming, norming and performing. Different investigations have concentrated on the connections between members of the team, and also argue that team cohesiveness is vital for the success of the team as mentioned in (Sapsed et al., 2002). Although, the utilisation of teams doesn't generally bring about accomplishment for the organisation (Moe, Dingsøyr and Dybå, 2010). The performance of the team is complex at some point, and the team performance actually relies not just on the ability of the team being competent to manage and execute its task, but moreover to the authoritative setting issued by the management.

More study has been committed to what is outlined as an autonomous, self-organising or teams' empowerment (Moe, Dingsøyr and Dybå, 2010; Dianzhi et al., 2013).

One reason that the use of teams that are self-managed gotten to be popular is that most study recommends that their utilisation encourage more employees' satisfaction, low turnover and low absenteeism (Driskell et al., 2006). Hoegl and Parboteeah, (2006) claimed that teams that are self-managed are essential for innovative projects to be successful. In spite of the fact that most studies revealed that utilising teams that are self-managed has beneficial outcomes, a few studies offer a more blended evaluation; a team of such can be hard to implement, and there is a possibility of failure if utilised inappropriately or with no adequate support and leadership (Moe, Dingsøyr and Dybå, 2010).

Furthermore, study on the performance of team shows that the outcome of using autonomous teams are exceptionally conditional subordinate, and that the results of an autonomous team operations rely on upon such aspects as the way the organisation and the way of the workforce (Driskell et al., 2006; Dianzhi et al., 2013). Additionally, the individual level of autonomy might conflict with the team level of autonomy. At some point when the whole team is given a lot of autonomy, it doesn't take back that individuals in the team are being given elevated amounts of autonomy. Lambe, Webb and Ishida, (2009), brought out example that self-managing teams might at the end control members of the team more inflexibly than they did when utilising traditional project management technique, whereas, Quinteiro, Passos and Curral, (2014) argued that incorporating autonomy of both individual and team in the same group might be difficult. For job, motivation and satisfaction of the team members, they need to be given authority on their own particular tasks and likewise planning and executing of individual work (Acuña, Gómez and Juristo, 2009; Moe, Dingsøyr and Dybå, 2010).

2.5 Project Management Transferable Knowledge and Skills of the Agile Project Manager

Presently, several organisations recommend the agile project management methodologies like Scrum (Sutling et al., 2014). The reason is because the agile project management techniques have demonstrated to reveal enhanced project timeline and saving costs compared to traditional project management methodologies (Sutling et al., 2014). However, the project managers have a vital part to play in guaranteeing the success of the project. This associates with the sort of knowledge and skills needed to achieve the project success. Great project management allows the manager to get the proper competencies, knowledge and attributes especially in connection to management of time, risk, cost and scope (Sutling et al., 2014).

2.5.1 Competencies and Knowledge

Methods of communication, concerning the perspective of conflicts and furthermore the criticisms is generally the style of leadership which includes behaviour in regards to the behavioural patterns of different types with respect to circumstances (Sutling et al., 2014; Trivellas and Drimoussis, 2013). There are number of competence factors recommended in PM practice (Trivellas and Drimoussis, 2013; Sutling et al., 2014), that are applicable to the project management profession and in agile context. However, some are chosen as the best characteristics for agile project manager, and these are; strategic, innovative, tactical, communication, excitement, delegation, consensual and production. However, Sutling et al., (2014) in their research analysed the conduct required of an agile project manager in order to successfully manage the software development project and to facilitate expansion on the software development implementation. Subsequently, they identified conducts of the agile project manager that determines the success of the project includes leadership, innovative, communication, ethical, honesty and strategic.

2.5.1.1 Leadership

The role of leadership includes giving pathway and additionally motivating others to meet the objectives of the project. The style of leadership adopted incorporates behavioural examples, conflict resolution, communication, criticism, delegation, teamwork and decision making (Sutling et al., 2014). Ordinary engaging leadership skill incorporates five measurements such as showing others how it's done, coaching, participating in decision making, sharing information and showing interest by cooperating alongside with staffs (Pinar et al., 2014). However, deciding the agile project manager's success in the skill of leadership, leader communication skills must be great. Primarily, the accomplishment of leadership is through communication (Pinar et al., 2014). Whereas, Li, Ying and Long, (2013) argued that leaders who communicate more with the staff enhances the staffs' efficiency in communication. In Agile project management, the most effective and efficient way for passing information within the project team is communicating face-to-face (Sutling et al., 2014).

2.5.1.2 Innovative

Agile project management reliant on those individuals who are ready to act and also be innovative, and to maintain the readiness and innovativeness to the full length of time of the Software development projects (Denning, 2015). Sutling et al., (2014) in their research, identified three innovative behaviours.

Firstly, the Project manager's communication skills must be creative because communication is a tremendous segment of project management. The project manager's communication could be enhanced through creativity and also improve the effectiveness of communication. Gemünden, Killen and Kock, (2013) asserted that one approach to be distinct with communication is by using effective colours, pictures and charts to visually communicate ideas. Moreover, to support innovation, be open when communicating within the team – solving problem, choices and tips ought to be freely shared between the team members. At the point when team members assign tasks, this encourages commitment and most significantly supports each other's endeavours to be more innovative (Sutling et al., 2014).

Secondly, the Project manager must guarantee that each member of the team is not discouraged in finishing the project. The Project manager should provide adequate training to the members of the team. According to Ibrahim Alzoubi, Qumer Gill and Al-Ani, (2015), it is important for a project manager to concentrate on coaching the team. Yi, (2011) concur that the primary aim of coaching the team is to help them become better in self-managing. Besides, the Project manager must increase contacts externally with the team, for example, travel encouragement and also encourage collaboration with external bodies. In Denning, (2015) report, stated that his organisation host's fun day involving relaxing and fun activities such as, a hot air balloon ride and shooting "skeet". Engaging in such, the Project manager minimises the team members' job pressure.

Third, during meetings, the Project manager must be creative. The use of too much and exhausting meetings within organisations are incredible. The Project manager can creatively conduct meetings offsite such as, walking meeting other than in a typical meeting room/space (Sutling et al., 2014).

2.5.1.3 Communication

Communication is an important factor to a project manager's skills (Sutling et al., 2014). According to Moe, Dingsøyr and Dybå, (2010), regularly, communication objectives is dependably to acknowledge or to clarify information reception, including information verification before acknowledging and restating information to make certain comprehension. According to Littlemore, (2003), if the skills of communication is being misunderstood, it could cause misinformation and distance.

Agile project management professional draws attention on communication involving the team and client and care for satisfactory documentation (Sutling et al., 2014). Numerous contextual investigations on agile project management reveals that active communication diminishes ambiguous and instability of many client and team by constantly gathering feedbacks and requirement on a functioning software product (Korkala and Abrahamsson, 2007).
The project manager's skills of effective communication must have a face-to-face feedback session and also communicate frequently among the software development team and between the teams and the clients (Turk, France.Robert and Rumpe, 2005; Hazzan and Hadar, 2008),

although, the second effective communication skills converses via video, telephone, an audio conference, email and voicemail (Sutling et al., 2014).

Another important communication skills, a project manager must have when managing software development project is osmotic communication. The osmotic communication process is part of the agile project management communications used between the agile smaller teams (Sutling et al., 2014). According to Mishra, Mishra and Ostrovska, (2012) in the osmotic communication process, information associated with the software development project streams not just between the sender and the receiver, but as well as by osmosis. The example of the osmotic communication process is when two members of the agile team are discussing about a particular point during the project; other members of the team overhear the idea discussed also. It is the osmotic communication process whereby listening to members of the team will most likely choose whether to take interest of the team discussion or not (Sutling et al., 2014). This concept of communication called "osmotic" helps members of the teams to gather related details of the agile project status. Hence, osmotic communication lowers the cost related to communication alongside maximises the feedback rate so that mistakes are redressed to a great degree effortlessly and in addition knowledge of the teams can be dispersed rapidly.

Finally, the communication skills in which the project manager should have are attentive listening. The listening skills in communication can be in different ways. Listening comprehensively, listening critically and evaluation are normally skills of communication with beneficial outcomes (Hazzan and Hadar, 2008). According to Sutling et al., (2014), the project manager must attend to the client's system requirements and as well understand the requirements to give an understandable feedback to the client regarding technical issues and how the issues can be resolved or cannot be.

2.5.1.4 Ethical

Ethics grasps a morally acknowledged accomplishment and additionally the behaviour of all software projects. Ethics ought to be regarded to enable the project manager to work without challenges, such as, conflict during the agile project implementation (Sutling et al., 2014). However, according to Lee, (2009) ethics explains how organisations and individuals desire to communicate with each other.

According to Sutling et al., (2014) when managing projects, the project manager should likewise keep in mind his commitment to be a decent ethical and responsible manager. Sutling et al., (2014) also added that, ethical behaviour gives a great advantage to a successful project.
The ethics in PMI values the use of phrases and words such as, fairness, responsibility, honesty, accuracy, credibility, secrecy, admiration and also professional standards. An ethical and effective project manager possesses the outlined qualities:

- Honesty is principal keeping in mind the end goal to be an effective and ethical project manager. An honest project manager provides legit facts and in addition a true and complete situation report of projects. Regarding the client, a great Project manager must respect the clients because contacts with the client will be minimal and can prompt an issue and notwithstanding contradictions now and again (Sutling et al., 2014).

2.5.1.5 Strategic

A project manager who possesses strategic leadership skills is great at creating and moreover strategy execution. However, a project manager with these skills is often in the right place to motivate and guide the members of the teams on how to think strategically on their individual roles and responsibilities (Sutling et al., 2014). According to Sutling et al., (2014) Project managers with strategic leadership skills, then again, tend to show interest about numerous things and then grab a more comprehensive worldview. Lacking effective strategic leadership skills, it is truly believed that the company's strategy don't work. Sutling et al., (2014) further mentioned that there are four (4) characteristics of a Project manager who possesses the strategic leadership skills, which are: Creativity, curiosity, courage and Agility strategy.

Agility strategy is mostly crucial for knowledge in every part of the Project manager's conduct. This actual strategy is generally vital to attend to the direction of strategy that leads to a huge objective, and to accordingly make decisions. The leaders of the organisation can evaluate the level of Agility in strategy with assistance of Strategic agility (Doz and Kosonen, 2010). Beadle, (2016) in their research outlines how the agile project management methodologies are rising above agile development project teams and changing the most business environment. The author further clarifies how agility can bring about cheaper, better and speedy strategies in business, and also highlights that a flexible leadership model is crucial to the organisation's strategic agility. In order to maximise the strategic agility of the project manager, Sutling et al., (2014) in their research identified some tips, and what a project manager should do to raise the competency of leadership with regards to strategic agility. The following approaches required to maximise the project manager's strategic agility are:

2.5.1.5.1   Interaction strategies

When software development team practices agile project management methodologies, interaction among them becomes more important (Greer and Hamon, 2011). The significance of utilising a decent interaction with the client (product owner) during the software development project is because the procedure will be acknowledged. According to Akbar and Hassan, (2010), the product owner is literally part of the project team. The product owner requests to assist and at the end being comprehend and additionally being offered a principal priority between the project managers.

2.5.1.5.2   Transformational Strategy

Generally, the transformational strategy and leadership, particularly in recent years has been viewed as an important individual problem that influences innovation in organisations as well as workplace performances (Kissi, Dainty and Tuuli, 2013). The skill of leadership associated with portfolio managers is essential for encouraging and enhancing team performance and in addition, allowing the project managers to transform the teams and eventually impacts the performance of the project.

2.5.1.5.3   Coordination strategy

Typically, coordination is perceived as an essential part of software development project inside the little measure of abstract (Strode, 2015). The author further explained the Scrum method board, sprint backlog; product backlog and the daily Scrum meetings were the

practices are distinguished. According to Mak and Kruchten, (2006) during the process of coordinating tasks, it is the Project manager's duty to be competent in obtaining the project milestones, the state of software, the risks associated with each tasks and the team member's feedback. The amount of work to be done, ability and the territory of work of every member of the team are the benchmark of attention in the process of task allocation.

2.6 Cultural and Organisational Factors of Agile Transition and Adoption

2.6.1 Culture

Culture plays an important part in the adoption and acceptance of agile project management methodology in a company utilising the traditional waterfall project management method (Chan and Thong, 2009). It is important that organisations understand the existing differences between the agile project management approaches and traditional waterfall approaches.

In opposition to traditional waterfall project management approaches, agile project management methods are individuals aligned. Specifically, this approach demonstrates the huge part of people involvement in the techniques. Expanding commonness of agile project management techniques encourages most software development organisations to consider cultural related factors as important issues in agile project management adoption and transition (Gandomani et al., 2014).

Agile project management as a response to traditional waterfall techniques offer diverse qualities to the software development sectors. Truly, by characterising various software development methods, they have concentrated on various accomplishments, for example, greater quality products, faster products delivery, welcoming change and lightweight documentation (Laanti, Salo and Abrahamsson, 2011).

When moving from the traditional waterfall project management approach to agile approach, there is need to extensively change the mind-sets and behaviours of the people involved in the organisation (Laanti, Salo and Abrahamsson, 2011). This implies that individuals play an important part in agile project management transition and adoption, and these individuals can both act as hindrance and drivers of the process. Different research has been done in regards to the role of individuals during the transition and adoption of agile project management (Lalsing, 2012). A few of the research have described how individual's resistance to change impacts the adoption (Ghanam, Maurer and Abrahamsson, 2012).

The process of moving from Traditional project management approaches to agile techniques doesn't happen overnight and requires more endeavours and sufficient time. Truly, two tasks must simultaneously be done before the agile transitioning; disregarding the mind-sets and practices of traditional waterfall and embracing agile methods and practices. The two tasks are individual's driven which is hard. Gandomani et al., (2014) mentioned in their research that the transformation process of agile project management is not easy and quick.

There are several confrontations involved during the agile project management transition. Due to the individual focused of this sort of process, most challenges faced during the transformation are mainly the people involved (Gandomani, 2013). The Cultural factors of the agile project management transformation process are revealed as the crucial impediments

when adopting agile project management in the organisation (Tolfo et al., 2011). Cultural issues also affects the transformation process negatively (Iivari and Iivari, 2011; Summers, 2008).

The main hindrances of the agile project management transition process are traditional mind-set of the software development practitioners (Nerur, Mahapatra and Mangalaraj, 2005; Gandomani, 2013). The mind-set of commanding and controlling people causes resistance to the change (Nerur, Mahapatra and Mangalaraj, 2005). Regularly, people can't abandon their past roles at workplace thus adjusting to the new role becomes hard (Gandomani et al., 2014). Individuals' coordinated effort and commitment are additionally crucial requirements of change process, yet accomplishing these factors is difficult especially, when those individuals with the traditional project management mind-sets have no interest in collaborating with one another in a shared working environment (Sureshchandra and Shrinivasavadhani, 2008). The upper and middle management, likewise pose as obstacles during the process of transition and adoption of Agile project management, mainly because they still operate with the traditional mind-sets and also the absence of information about the values and standards of agile (Iivari and Iivari, 2011; Nerur, Mahapatra and Mangalaraj, 2005).

Regardless of the negative impacts, there are numerous reports on beneficial outcomes of individuals on agile project management transition and adoption process as well. The commitment of the upper management and individuals of the organisation are crucial factors of the change process (Pikkarainen et al., 2011). Moreover, the agile champions, by assisting during change difficulties and motivating the team members will make the change easier and simpler (Conboy et al., 2011). Additionally, the agile project management instructors play an important part in assisting the team members to adopt the transformation (Rico and Sayani, 2009).

According to a study carried out by Gandomani et al., (2014), the mind-sets and behaviours of individuals vigorously affected the transition and adoption of agile project management methodology.

2.6.1.1 Hindrance to Change

Gandomani et al., (2014), indicated that, resistance to change, cultural issues, lack of collaboration, wrong mind-set and lack of knowledge were the major hindrance of the agile project management transition and adoption.

Agile project management focuses attention on people and communication as one the values of agile (Gandomani et al., 2014). Compared to the traditional waterfall methodologies, agile project management methods reflect the crucial role of individuals. According to Conboy et al., (2011) the expanding acceptance of agile project management techniques and developing weight to adjust to these techniques prompt most organisations to concentrate on issues related to individuals entirely. Those organisations believe that at the initial step, every single potential challenges associated to people that might happen amid the process of adopting agile, ought to be examined.

In an early investigation carried out by Nerur, Mahapatra and Mangalaraj, (2005), sorted all difficulties of migrating to agile project management in four (4) different classifications in

which issues related to individuals was part of the research. The study likewise found that individuals could pose as a serious resistance to the transformation.

2.6.1.2 Change Resistance

Another obstacle during the agile project management transformation process was reported to be resistance to change. In previous investigations, this challenge was addressed (Nerur, Mahapatra and Mangalaraj, 2005). However, this challenge is not only identified in agile project management, but, because the nature of agile project management techniques is centred to people, it is a critical factor in these techniques (Conboy et al., 2011). Heeager, (2012) mentioned that modifying the mind-sets of individuals changing to new methodology isn't straightforward and quick. Moreover, in a few record of researches, individual's resistance to change was reported during the transformation process of agile (Hajjdiab and Taleb, 2011; Pikkarainen et al., 2011). Clearly, individuals are customary to the business as usual and this reality poses as a major boundary to the transformation. In their research, the participants specified that the significant issue that occurred during the agile transformation process was the challenges associated with human, and that some CEOs and teams resistance to change also posed a significant challenge during the process of change because they were acclimated their current roles and assignments and naturally refuse to change.

2.6.1.3 Cultural Issues

Gandomani et al., (2014) furthermore said that during the process of change, that individuals' culture posed a significant challenge due to lack of trust among the team, and that it was difficult for the team to accept collective ownership and collaboration. And moreover, in generally members of the team choose self-interests to the interests of the entire team.

Among the team members who participated in Gandomani et al., (2014) research, it appeared that issues of culture were indeed crucial than other issues because it was the most addressed area by the majority of the members. In a few researches, individual's culture and that of the organisation were argued (Iivari and Iivari, 2011; Nerur, Mahapatra and Mangalaraj, 2005). According to Lalsing, (2012), by outlining individuals' role in migrating to agile project management techniques revealed that individuals' culture influences the process of change strongly. Nerur, Mahapatra and Mangalaraj, (2005) in their research addressed cultural issues in organisation. Dorairaj, Noble and Malik, (2012) found that absence of understanding in distributed teams originates lack of trust and impacts the transition and adoption of agile project management in teams that are distributed. Chan and Thong, (2009) brought up organisational culture as one the factor that potentially affects the decision of agile project management acceptance. Tolfo et al., (2011) argued various organisational culture levels and discovered that there are various facilitators and drawbacks in the lower-level organisation. Issues of culture in the transition process of agile project management were also investigated in few other studies (Iivari and Iivari, 2011).

2.6.1.4 Lack of Team Collaboration

Another reason for hindrance to change during the transition process is lack of collaboration, because the nature of agile techniques is people oriented. Communication and collaboration plays an important part in the transition and adoption of agile project management. Moe, Aurum and Dybå, (2012) in their research argued that in a shared decision making process, lack of team collaboration is part of agile project management practices. Mishra, Mishra and Ostrovska, (2012) investigated the effects of physical atmosphere on communication, coordination and collaboration in agile development projects. The role of collaboration in agile project management techniques was emphasised in Tien Fabrianti Kusumasari et al., (2011), and furthermore explained a model for collaboration in agile methodologies.

2.6.1.5 Wrong Mind-set

Maintaining the wrong mind-set was another problem found in Gandomani et al., (2014) research that was one of the people negative factors in agile project management transition process. Nerur, Mahapatra and Mangalaraj, (2005) discussed that one of the most crucial obstructions to modifying the agile development method is the traditional mind-set of the people involved. When the people possess the wrong mind-set it makes them display negative and sudden attitude to change. For example, Sureshchandra and Shrinivasavadhani (2008) argued that few individuals such as, technical project managers, couldn't leave behind their traditional ways of carrying out tasks and this pose an obstacle in agile transition. Moreover, project managers can't give up their past authoritative attitude and this causes difficulty in the agile transition process. In this respect, the mind-set of commanding and controlling is a crucial threat (Nerur, Mahapatra and Mangalaraj, 2005).

2.6.1.6 Lack of knowledge

Gandomani et al., (2014) mentioned in their research that lack of knowledge about agile project management contributed to the negative role played by people during the change as addressed by the participants in their investigation. Landim, Albuquerque and Macedo, (2010) argued that lack of knowledge also contributed to agile failure and recommended ways to accomplishing satisfactory knowledge in the contexts of agile project management. Agile values and practices together ought to be comprehended by every single team to enable them carry out their assignments in the change process precisely. Mostly, lack of knowledge during the change process is caused by dysfunctional and insufficient training (Gandomani et al., 2014). Bergin and Grossman, (2006) asserted on acquiring knowledge of agile principles and values other than the practices to enhance practitioners knowledge. Asnawi, Gravell and Wills, (2012) in their research demonstrated that the agile practitioners with low awareness of agile methods is an obstacle of gathering every member of the team to be responsible for their individual assignments. Few more researches furthermore mentioned the importance of training and enhancing knowledge of the team members when adopting agile project management (Conboy et al., 2011; Gandomani et al., 2014; Lingard and Barkataki, 2011).

2.6.1.7 Change Acceleration

In spite of the negative factors mentioned above, Gandomani et al., (2014) in their research discovered positive factors as well. They further explained that these factors help accelerate the change process in team, and these positive factors were, management and people buy in, the agile supporters and champions of the change procedure; being the most critical factors used to encourage and accelerate the change process. In particularly, management and people buy in was the most important factor, as the authors identified in their analysis of data, that several supported those factors associated investigations. Conboy et al., (2011) described the role of people as important, emphasising that the interest of people is the most critical factor that makes the change processes successful. Tolfo et al., (2011) argued that concentrating on the aspects of people, addresses their commitment as an important element in the process of changing. Sureshchandra and Shrinivasavadhani, (2008) in their research identified that individuals that are unhappy obstructs the change process. Misra, Kumar and Kumar, (2009) in their research concentrated on how client commitment played an important role in the change process. Meanwhile, people motivation to change was emphasised by other several studies (Gandomani et al., 2014; Iivari and Iivari, 2011; Kautz, Johanson and Uldahl, 2014; Vallon et al., 2015), and commitment of management and buy in was highlighted by other investigations. Nerur, Mahapatra and Mangalaraj, (2005) further mentioned that lack of commitment in management is a high risk when migrating to agile project management. Gandomani et al., (2014) concentrated on how important the role of support from management on the team that is self-organising. Chow and Cao (2008) identified that one of the most important problems in agile development projects in management commitment. Additionally, few other researches argued the criticality of this particular factor (Gandomani et al., 2014; Laanti, Salo and Abrahamsson, 2011; Mahmood, 2012; Vijayasarathy and Turk, 2012).

2.6.1.8 Individual's perception

Gandomani et al., (2014) in their research discovered that individual's perception was an additional emerging characteristic in during their investigation. The research presented that the mind-sets and perceptions of individuals about the process of change were different. Whereas some individuals were enthusiastic about the transformation, and some were not. Additionally, a few of the individuals had an impractical expectation about the agile project management, its values and the process of transformation. Begel and Nagappan, (2007) presented at Microsoft that individuals, while having high interest in utilising agile project management to enhance team communication and maximise flexibility in design, were also concerned about scaling the agile project management in large projects, as well as attending lots of meetings and coordination of non-agile and agile teams. Conboy et al., (2011) as well argue individual's perceptions pose as an obstacle to agile project management adoption and utilisation. Patel et al., (2006) in their research investigated individual's perceptions of agile project management and discovered that most of their participants during the study perceived the values and principles of agile as a crucial aspect that can support the teams to adapt to the practices of agile project management. Lalsing, (2012) founded that team climate which was described as shared perceptions and aims to accomplish the goals of the organisation, impacts the performance of the team in agile development projects. O'Connor, (2011) further justified

that agile instructors (project manager) in some cases ought to make sure that the team members doubtful desires is corrected during the process of agile project management transformation.

2.6.1.9 Motivational factors and incentives

Gandomani et al., (2014) in their study discovered the incentive factors as an important role during the process of agile project management transformation. When appropriate incentives and motivations are provided, it provides a positive environment and encourages the team members during the process of change (De Azevedo Santos et al., 2011). Because the nature of the agile transformation process concentrates primarily on people, the factor of incentive impresses the process strongly. Conboy et al., (2011) revealed that the causes of most issues in the utilisation and adaptation of agile project management methodologies is lack of incentives and motivations. (Mahmood, 2012) highlighted that during the process of moving to agile project management, delivering measured motivation is essential to support the team members. Chan and Thong, (2009) described how factors related to motivation should be regarded for utilising agile methodologies. De O. Melo, Santana and Kon, (2012) in their research disclosed that, in agile teams that motivators are somewhat different from others. O'Connor, (2011) described that, in order to enhance the team productivity during the process of agile transformation, project managers should provide incentives correctly.

2.6.2 Organisational

2.6.2.1 Time Decision

According to Misra, Kumar and Kumar, (2009), agile development teams that are successful are basically left to manage self, as a result to enable them to make decisions on their own. Additionally, client cooperation, workplace atmosphere and collaboration of the team are supported by agile project management techniques, and critical decisions of the project are liable to be addressed in a short period of time. Agile project management techniques are believed to possibly achieve desire goals in working conditions where communication is rapidly enabled (Misra, Kumar and Kumar, 2009).

2.6.2.2 Corporate Culture

According to Misra, Kumar and Kumar, (2009), being an agile is a thing of culture. If the agile culture isn't right, subsequently the software development company can't become agile. Agile practitioners consistently perceive proper corporate culture to be a factor that is necessary in determining the agile project management methodology introduction (Bartsch, 2011). Because the implementation of agile project management techniques demands being in control of individual's self-future to the greatest conceivable degree, and the kind of organisations people carry out their task is essential. For instance, agile project management is not suitable in an organisation that is bureaucratic (Misra, Kumar and Kumar, 2009). Fast and dynamic changing companies will discover that agile project management techniques are exceptionally appropriate for them (Salo and Abrahamsson, 2008).

2.6.2.3 Project Planning and Control

One of the vital perspectives that portray the adoption and usage agile project management techniques are the way of organisation manages, plan and control agile development projects. For example, plans documentation combined with quantifiable measure of performances are regarded as success key to implementing agile (plan-driven) techniques (Misra, Kumar and Kumar, 2009). Despite what might be expected quality control and internal plans are believed to be the success of any organisation that adopts agile (Boehm and Turner, 2003).

2.7   Summary

This chapter offered a significant review of literature on agile project management. Focusing specifically on Scrum methodology. While putting more effort towards identifying the differences between the traditional waterfall methodologies and Scrum methodology. Several research recommended many ways of which agile project management methodologies can be adopted and utilised in software development projects such as, understanding the usefulness of teamwork in agile project management, behaviour required of the technical project managers and the cultural and organisational factors that could impact the transition and adoption of agile project management methodology. However, sourcing for literatures that addresses agile project management and its adoption in Nigeria and Sub-Saharan Africa was a huge challenge for this research.

CHAPTER 3

METHODOLOGY

3.1   Introduction

This dissertation chapter presents the approach that was employed for data collection covering the research question, selection of sample size, data collection methods, data analysis methods and the issues encountered during the event. Qualitative method of research was adopted for this research because of the size of samples involved. The research method employed in this dissertation involves a combination of first-hand information collected from interviews with the agile development team, technical project manager and the C.E.O.

3.2   Research Objectives

The following research objectives were developed to address the purpose of this project.

1. To produce a literature review with relevant academic journals on how agile can be implemented effectively in the organisation, looking mainly at agile project management, Traditional Waterfall methodology versus scrum methodology, teamwork, project team leader's transferable knowledge and skills required when adopting the agile project management method and the potential challenges that could affect the agile transition and adoption with critical discussion.

2. To collect data and analyse the responses of interviews gathered through interaction with the Director, Developers and the Project managers.

3. To produce a framework on how the company can implement and utilise scrum methodology to effectively manage its agile integrated projects.

In connection with the issues faced in the software development sector of the company, and also being a key player in the organisation, numerous gaps were spotted of which the research question and aim outlined in this chapter was composed.

3.3   Designing of Interview

In order to gather the relevant data that was required for the research, designing of the interview was built on the purpose of the research. The semi-structured interview was designed using open-ended format for the discussions to successfully collect more explicit information needed for the study from the participants while addressing the research aim and objectives as specified in the terms of reference. Most researchers describes the nature open-ended interviews questions as exploratory because it enables the interviewee to give the answer that they want to without driving them to choose from solid choices. However, Young, (2007) argued that open-ended interview questions are helpful for investigations that targets a small number of participants on the grounds that there is no requirement complex factual examination and the nature of qualitative interview questions will provide more

significant information from every respondent. Therefore, semi-structured interview was employed as shown in appendix 2.

3.4   Selection of Sample Size

In any research, sample size varies from another depending on how large is the organisation. Young, (2007) asserted that the sample size of a study is the main component of determining the accuracy of the project results. However, it can be troublesome to ascertain a legitimate sample size without understanding the principles about levels of confidence. The interviews in this research targeted five (5) selected key people involved in the company's agile development projects. Therefore, the agile project developers, technical project manager and the C.E.O were selected as participants in the interviews. The criteria of selection were established through method of reviewing the teams' previous and present development projects and also the effectiveness of teamwork, collaboration and communication.

3.5   Methods of Data Collection

Attempting to collect data, qualitative method of collecting data was adopted for this research because of the number of respondents involved. Semi-structured Interview questions were developed and the method used for data collection was mainly through telephone and video calling using Skype conducted with the three (3) agile project developers, two (2) technical project managers and the C.E.O. Before the interview sessions took place, messages were sent to all potential participants for notification via emails and SMS to provide them with the awareness of the research.

This qualitative research approach usually aim at addressing the 'WHY' and 'HOW' of a particular event utilising a non-structured techniques of collecting data to explore the research topic thoroughly (Ortiz, 2007). For example, this approach often examines people's knowledge and understanding of a particular problem, as well as their social and cultural experiences that impacts the event.

3.6   Methods of Analysing Data

The interview sessions were recorded in audio format, and the data collected were transcribed and coded to abstract themes for analysis utilising Thematic coding analysis method. A pre-defined analysis approach called 'thematic network approach' was used to examine the findings that reflect the interests and objectives of the research. Makic, (2014) mentioned that this data analysis approach enables the researcher to concentrate on a specific answer while focusing on key ideas and reducing unwanted data. Hsieh, (2005) in his research explained that this approach of data analysis is a generic method to analysing data that allows the sources of data to be explored in themes or principal concepts.

3.7   Ethics

At this research stage, ethical considerations were considered. The participants consent were obtained by giving them adequate information regarding the research purpose, sponsor, the researcher, how data will be utilise, what information will be required from them; for example the topics area to be likely emphasised and the amount of time required for each session of the interviews. Disclosure and confidentiality was also considered. Disclosure in the sense that the participant identity is not being disclosed to any external body and confidentiality in the sense that participants' direct and indirect comments are confidential, because indirect comments most especially requires specific protection. Kirk, (2007) in his research advised that labelling the data audio files or transcripts are not appropriate because it could compromise the information anonymity. Before the participants were asked to participate, the issues that the research addresses were given explicitly and understandable. Sensitive questions were asked directly and clearly so that the respondents were not worried or be confused about the questions they would want to keep away from. Finally, the ethical guidelines that aim at protecting the participants involved in the research were all considered to facilitate confidence and trust from the respondents and to maximise the study reliability.

3.8   Setbacks

The setbacks experienced during the data collection were the fact that most participants felt their identity confidentiality was possibly low, limiting their honest responses. It was also time consuming briefing the participants about the subject area of which this investigation is addressing.

3.9   Summary

The methodology chapter of this research focused attention on the procedure of investigating how software development projects can be managed to support high quality results in a cost effective, adaptable and fast way, using Scrum methodology. In reference to this, semi-structured interview was utilised which provided a quality means of gathering data from the participants in order to be analysed. Although, the interview sessions were time consuming and challenging due to lack of knowledge within the area of study. However, the challenges didn't pose as an obstacle to collect relevant data that was needed for this research. Ethics guidelines were considered in the study.

CHAPTER 4

DATA ANALYSIS

4.1   Introduction

This chapter presents the results of the data that were obtained and analysed from the investigation. The qualitative data were collected through interview sessions of which were recorded in audio format, and were later transcribed and coded to abstract themes for this analysis utilising thematic coding analysis method to examine the findings that reflects the interests and objectives of the research.

4.2   Interview Responses

The themes, as shown below were developed based on the literature review covering the areas of this study to ensure that all necessary information needed to address the research objectives have been looked at. However, some of the questions were discarded, but were still analysed.

Themes	Interview Questions
Software development projects	Q.1 and Q.8
Software development methodologies	Q.2, Q.3 and Q4
Teamwork	Q.9, Q.10 and Q.11
P.M Transferable knowledge and skills	Q.12
Cultural and Organisational factors	Q.15 and Q.16

Software development projects - Question. 1 and 8

Q1: How would you define effective project?

1. **Respondent 1 – "**An effective project is a project that has advantages and is delivered to improve and implement a current development.**"**

2. **Respondent 2 – "**A project that is being developed successfully.**"**

3. **Respondent 3 – "**An effective project is a project that achieves the initial set of objectives within the stipulated time.**"**

4. **Respondent 4** – **"**A project that meets its aims and objectives. It's also a project that aims to improve something that is already in place.**"**

5. **Respondent 5** – **"**Effective project is a project that has successfully achieved its objectives through effective planning and organising of resources.**"**

Summary

As generally agreed, "an effective project is all about, successfully achieving project objectives through organising and planning resources effectively". From the question and responses above, 4 participants agreed that an effective project is a project that successfully meets its objectives. Among the five interviewees, respondent 5 clearly mentioned planning and organising as the most considerable aspect that defines effective project. This is a huge concern because to gain appropriate outcome from a project, one needs to understand specifically what they want to achieve towards the end.

Q8: What drives a successful software development project?

1. **Respondent 1** – **"**The drive for a successful software development project relies on careful planning and understanding the need for the software development. It is also driven by financial gain and the need to fulfil purpose.**"**

2. **Respondent 2** – **"**Teamwork, clear guidance, communication and organisational support.**"**

3. **Respondent 3** – **"**Effective time management, teamwork and collaboration, appropriate allocation of resources and working together towards a common goal.**"**

4. **Respondent 4** – **"**I feel that people having a similar outcome of goals makes a successful software development projects. Also, having a Project Manager/Coach who can advise or support the team is very important in a successful and effective software development projects because everyone will be in the same.**"**

5. **Respondent 5** – **"**Clear goals, planning project execution carefully, customer involvement throughout the implementation phases, excellent plan for change management, risk analysis and management, skilled project team leader and finally, competent project team.**"**

Summary

In the process of investigating what steers a successful software development project, the question above was asked, and the participants responded with different point of views as shown above. However, there are more software engineering fundamentals that drive a successful software development project, including clear specification of system requirements, proper selection of package, adequate resources, realistic schedules and budgets, good project management methodology and the impact of change. But, none of the

participants considered clear specification of requirements as an important factor that drives a successful S.W project; which is the most important factor a software developer should consider before initiating any S.W project.

Software development methodologies – Question. 2, Q.3, and Q4

Q2: **What is your understanding of software development methodologies?**

1. **Respondent 1 – "**Software development methodology is a process that is used to analyse the efficiency and the possibility of result to implement new software.**"**

2. **Respondent 2 – "**It's a system development lifecycle to manage software projects.**"**

3. **Respondent 3 – "**The process by which software is developed.**"**

4. **Respondent 4 – "**It's a way of structuring and controlling a software development in systems.**"**

5. **Respondent 5 – "**Software development methodologies as known as systems development process is a process of dividing the software development activities into different stages for effective planning and managing of the projects.**"**

Summary

In order to identify the selected participants' level of understanding of different software development techniques, the question above was asked and most responses shows that they have very little understanding of software development methodologies. However, as software developers, I expected most of the participants to provide an explicit understanding of software development methodologies which is an important factor in any software development, but only respondent 5 was able to provide an accurate understanding of S.W development methodologies.

Q3: **What software development methodology are you familiar with?**

1. **Respondent 1 – "**I am familiar with the traditional waterfall method of software development.**"**

2. **Respondent 2 – "**The Traditional Waterfall Methodology.**"**

3. **Respondent 3 – "**Waterfall Methodology.**"**

4. **Respondent 4 – "**I'm familiar with the traditional waterfall software development methodology, because that is the approach we are working with at the moment.**"**

5. **Respondent 5 – "**I am familiar with the conventional waterfall methodology, and as well as the agile methods.**"**

Summary

Software development methodologies play a vital role in software development projects. There are various methodologies used by software development companies today. The purpose of utilising these methodologies is to give customised software development according to requirements. To know if the participants are familiar with any, all five mentioned one particular methodology being practiced in the organisation. But, interestingly, respondent 5 mentioned two (2) methodologies that he is familiar with.

Q4: **Have you heard of a software development methodology called SCRUM? If no, as a software developer, how come you haven't come across agile/scrum?**

1. **Respondent 1 – "**I have not heard of SCRUM as I have not ventured into managing software development projects using this methodology.**"**

2. **Respondent 2 – "**No I haven't heard of Agile/SCRUM because it is new to me.**"**

3. **Respondent 3 – "**No, It's not a common methodology in Nigeria.**"**

4. **Respondent 4 – "**No, I have not come across SCRUM because we have been using a different methodology within my previous and current role. This is completely new to me.**"**

5. **Respondent 5 – "**Yes, I have heard of SCRUM, and this is one of the reason why I agreed to the adoption of SCRUM in the organization.**"**

Summary

To address the primary purpose of this research, and to facilitate the introduction of a new methodology in the organisation, the question above was asked to know if the participants have any knowledge of agile which is a popular methodology in the software development industries today. Surprisingly, only one (1) out of five (5) responded "YES" to having heard about the methodology, which can pose a huge challenge to its adoption.

Teamwork – Question. 9, 10 and 11

Q9: What do you think makes an effective project team when initiating a software development project?

1. **Respondent 1 – "**Good planning, communication, collaboration skills and testing skills. All these are skills the team should have in order to reach a successful delivery of software development.**"**

2. **Respondent 2 – "**Selecting the right people for the software development projects.**"**

3. **Respondent 3 – "**They should be open to learn new things, knowledge sharing, shared responsibility, participation and commitment.**"**

4. **Respondent 4** – **"**I think that collaborative working and good leadership skills are important factors that are needed when initiating software development projects. However, training and development is also required and having the right skill mix of workers.**"**

5. **Respondent 5** – **"**They have to be team players, self-beginners, influential and motivational.**"**

Summary

There are numerous building blocks placed to form an effective project team. All participants responded to the question with various characteristics that make an effective project team. But, only one respondent from all of them mentioned communication, which is one of the most important factors of an effective project team.

Q10: Do you feel collaborative teamwork is important in software development projects?

1. **Respondent 1** – **"**Collaborative teamwork is the most important factor, as collaboration brings about different ideas that will make the project fit for purpose.**"**

2. **Respondent 2** – **"**Yes, because knowledge can be shared as well as experience.**"**

3. **Respondent 3** – **"**Yes, It brings about development opportunities and innovation.**"**

4. **Respondent 4** – **"**Yes, we need people with different knowledge and experience who can offer something new or innovative to the team. This will build the team rapport.**"**

5. **Respondent 5** – **"**Collaborative teamwork increases responsiveness through scale of economies and gives more resources availability. It also reduces waste through decision making and understanding the picture of activities in a broader way.**"**

Summary

Collaborative teamwork is an important factor in software development project teams, because collaboration associates with a team, which offers a set of knowledge, and skills that are diverse. All participants perceived collaborative teamwork as an important factor in terms of software development projects.

Q11: Do you think the introduction of a particular collaboration and teamwork tool will improve project team performance?

1. **Respondent 1** – **"**Every experience and project brings about consideration or view and so adopting new challenges and new collaboration system bring about new lessons. Teamwork tools are always useful and I believe it will increase teamwork performance in future.**"**

2. **Respondent 2 – "**Yes, if this transformation increases teamwork efficiency and the ability to use it as a way of solving problems collaboratively.**"**

3. **Respondent 3 – "**Yes, it would make the team effective.**"**

4. **Respondent 4 – "**Yes, because this will enable the team to work towards the same aims and objectives. Collaboration can then be standardised. This could as well improve morale and incentive for the team to work together.**"**

5. **Respondent 5 – "**Yes, because it makes tracking of projects easier, and team members can work remotely at anywhere/anytime while they are still organized. It helps the team report the project progress easily and things are done quickly.**"**

Summary

All five (5) respondents agreed confidently to the introduction of the tool because it will change and improve the nature of which tasks will be carried out in the team.

P.M Transferable knowledge and skills - Question. 12

Q12: What project management transferable knowledge and skills do you think the project team leader needs to effectively manage the software development projects?

1. **Respondent 1 – "**The team leader should first of all have people management skills, motivational skills, communication skills and most importantly have knowledge in managing software development projects.**"**

2. **Respondent 2 – "**Leadership skills, communication skills and knowledge of software development techniques relevant to the project.**"**

3. **Respondent 3 – "**Leadership skills, good communication skills and motivational skills.**"**

4. **Respondent 4 – "**I feel that the Project Team Leader will need to have previous/new experience of management of software development projects to be able to mentor or support the team. The team leader will also need a clear understanding of the proposed methodology to be able to communicate and lead the team. Leadership skills, communication skills, collaborative working skills and critical analysis skills are also required to manage the team.**"**

5. **Respondent 5 – "**Good communication skills, problem solving skills, working to meet deadlines, leadership and management skills, negotiating skills, motivating individuals involved in the project, making decisions and research skills.**"**

Summary
A project team leader has a vital part to play in guaranteeing the success of the project. Several P.M knowledge and skills is required as the team leader to effectively manage projects. All five respondents highlighted that communication skills is required. Whereas four (4) of five (5) respondents perceived leadership skills as one of the most important skills that is required of the project team leader to be able to manage S.W projects.

Cultural and Organisational factors - Question. 15 and 16

Q15: What challenges do you think could emerge if the organisation is changing it ways of managing software development projects?

1. **Respondent 1 – "**Adopting new ways of doing things will affect the efficiency and quality as they learn new ways of doing things.**"**

2. **Respondent 2 – "**There can be confusion if there is no clear awareness of the new approach and also individual perception of the change. Also there can be challenges in the terms of trust.**"**

3. **Respondent 3 – "**Resisting to change, individual perception and issues of trust.**"**

4. **Respondent 4 – "**People not wanting to learn, being afraid of something. Also individuals not wanting to challenge themselves and lack of awareness of self or new project. If management is unaware of the changes and how to implement, this then could pose a challenge to the team and in relation to adopting a new way of working.**"**

5. **Respondent 5 – "**Interruptions and distractions will increase, barriers of culture to change in behaviour, individual perception, staff resistance to change and adaptation issues.**"**

Summary

In an attempt to identify what challenges could surface when the change is being implemented, three (3) respondents were able to identify individual perception as an impact. But, surprisingly, only respondent 5 considered culture as one of the most critical factor that could hinder process of change, because if the culture of the people and organisation does not fit with the new way of managing projects, the adoption will be unachievable.

Q16: What do you think should be done to mitigate these challenges?

1. **Respondent 1 – "**A slow ways of introducing the change should be implemented and thorough assessment should do before introducing the changes.**"**

2. **Respondent 2 – "**Clear planning of the transformation procedures, training and development and as well as proper restructuring of organization.**"**

3. **Respondent 3 – "**Proper education of team members as to why the change is necessary.**"**

4. **Respondent 4 – "**Ensuring that fears and perception are dealt with, explaining what is about to happen, knowing individuals strengths and weaknesses, explicit aims and objectives and giving incentives to adoption of new methodology.**"**

5. **Respondent 5 – "**The organizational structure and relationships needs to be changed by adopting lean thinking and principles to enhance the efficiency of the company internal processes. Management perspective must be new – staffs must no longer be managed to follow the orders and rules, but they should be committed to the goals of the organisation. And the change must be continuous.**"**

Summary

In order to gather best ways on how the challenges can be tackled, all respondent suggested different ways on how the change can be implemented effectively to avoid these challenges. But the most interesting response was that of Respondent 4 – Giving a guide that will as well help the organisation achieve the change.

Abbreviations
Software Development (S.W)
Project Management (P.M)

4.3   Summary of Results Analysis

In summarising this results analysis chapter, the themes of the results as shown above were analysed and summarised using the titles from each category. From the above analysed results, numerous facts were discovered, for example, the participants' level of understanding about what drives a successful software development project was investigated, and the results revealed that most of them lacks basic understanding about the whole picture of a successful software project. Additionally, the results also revealed that the participants have no clue about agile scrum methodology, and this means that lack of knowledge within the project team about the proposed transformation could act as impediment to the introduction of the new approach. As a software development company, this is a serious fact that must be considered in order to stay in the competitive business environment. The study revealed that the participants, most especially those with no knowledge of agile scrum techniques and values, needs to be encouraged and motivated for adopting the methodology. Culture and organisational factors were also seen as a challenge due to the work environment and geographic location. Moreover, all the participants agreed to welcoming any change proposed and willing to corporate with organisation during the change. Furthermore, they also suggested ways on how to mitigate any challenges that may emerge during the transformation process in the organisation.

CHAPTER 5

DISCUSSIONS

5.1   Introduction

The aims of this discussions chapter are to discuss the findings gathered from the analysed data collected from the investigation. By doing this, the research questions developed for this research will be addressed base on the literature reviewed. Additionally, from the results gathered, software development projects and methodologies focusing on agile will be discussed in detail to offer ways on how agile methodology can implemented effectively in the organisation, followed with the project management transferable knowledge and skills of the project leader that facilitates the successful adoption and utilisation of scrum methodology, as well as the identified challenges that could impact the success of adopting scrum methodology in the organisation.

5.2   Research question 1. What is the most effective way to implement agile methodology in the organisation?

In reference to past literatures, it is important for the team involved in the project to know what agile project management is all about and its benefits in order to effectively implement the agile methodology.

5.2.1   Software development methodologies

Several past literatures emphasized that software developers use software development methodologies (SDMs), which are essentially a collection of processes, and procedures that are designed with specific obstacles in mind in order to overcome the hurdles in software development projects. Many methodologies have been developed along the way to afford flexibility along the life of the project. Such methodologies are known as agile methodologies. Agile methodologies employ an iteration-based model where the product is evaluated on each iteration before it is passed along. Miller et al., (2011) in their research reported an investigation carried out recently in the software industry in Europe and Northern America with participants of about 2252 and it was revealed that 26% of the software companies already adopted and utilised agile scrum methodology, and that additional 46% already had awareness of this methodology

In the literature, Bergin and Grossman, (2006) asserted on acquiring knowledge of agile principles and values other than the practices to enhance the practitioner's knowledge. The results found from interviewing the selected participants' to assess level of understanding of different software development techniques and which of them they are familiar with, only one respondent provided an accurate understanding of software development methodologies and as well mentioned two (2) of which he is familiar with, while most of the responses indicated that the team had very little understanding of software development methodologies and one (1) which they are familiar with. Furthermore, when the project teams where asked if they have heard of agile/scrum, four indicated extreme lack of knowledge about agile/scrum,

while only one indicated having knowledge about it. This may be due to the fact that working environment and location of the project team basically utilises traditional method of managing software projects.

5.2.1.1 Summary

Though the team have not heard of the above-mentioned agile/scrum, this is because of the knowledge gaps and work culture challenge that exists in the software development sector of the organisation and its geographic location. In the literature review Gandomani et al., (2014) mentioned that lack of knowledge about agile project management contributed to the negative role played by people during the change as addressed by the participants in their investigation. Landim, Albuquerque and Macedo, (2010) further argued that lack of knowledge also contributed to agile failure and recommended ways to accomplishing satisfactory knowledge in the contexts of agile project management. Agile values and practices together ought to be comprehended by every single team to enable them carry out their assignments in the change process precisely. Mostly, lack of knowledge during the change process is caused by dysfunctional and insufficient training (Gandomani et al., 2014). Bergin and Grossman, (2006) furthermore asserted on acquiring knowledge of agile principles and values other than the practices to enhance the practitioners knowledge. Asnawi, Gravell and Wills, (2012) in their research demonstrated that the agile practitioners with low awareness of agile methods is an obstacle of gathering every member in the teams to be responsible for their individual assignments. Few more researches furthermore mentioned the importance of training and enhancing knowledge of the team members when adopting agile project management.

5.2.2   Software development projects

Software development project is a complex process with countless variables and obstacles, which are hard to keep track of simultaneously for maximum efficiency (Dybå and Dingsøyr, 2015). To successfully achieve the objectives of software development projects the resources requires effective planning and organising. However, a clear specification of requirements is required to drive the implementation. Several literatures have mentioned that before any project is initiated, the requirements have to be precise about what task has to be carried out.

The changes in IT business environment recently have made tremendous weight on the delivery of Software development projects (Jayawardena and Ekanayake, 2010). In a bid to determine the targeted participants understanding of an effective project and to what drives a successful software development project, the analysis of results gathered through the interviews indicated that all respondents agreed that an effective project is a project that achieves its aimed objectives. Furthermore, when they were asked about what drives a successful software development project, most of the respondents indicated teamwork as one of the factors that drives a successful software development project. Whereas, none of the participants considered clear specification of requirements as an important factor that drives a successful Software development project, which is the most important factor a software developer should consider before initiating any Software development project. This also may be due to knowledge gaps within their work environment.

5.2.2.1 Summary

All the team members understands what effect project is all about, but were unable to identify the important fundamental that drives any software development project due to knowledge gaps and experience. If a clear software specification is not providing during software development initiation, it is likely that the project will drastically fail. Dybå and Dingsøyr, (2015) indicated in a study conducted in a Norwegian software company that a successful software development project requires clear specification of requirements to know what tasks has to be carried out, and not how task should be done.

5.2.3   Teamwork

The development of software depends particularly on the performance of project team, likewise any process that requires interaction with human (Pattit and Wilemon, 2005). A team generally is define as a small group of individuals with harmonious skills focused on a typical reason, set of execution objectives and methodology for which they consider themselves commonly responsible (Tjørnehøj and Mathiassen, 2009). Several literatures have also argued that the traditional project management ways of managing software development project teams is based on controllable and standardised implementation process, which is predictable. However, as discussed previously, it was indicated that team performance determines the project success in software development.

The teamwork topic has drawn a greater interest of study from different disciplines (Moe, Dingsøyr and Dybå, 2010; Diefenbach, 2008). Although there are numerous building blocks placed to form an effective project team, all staffs interviewed expressed interesting factors that make an effective project team. But, only one Respondent from all of them mentioned communication that is one of the most important factors of an effective project team. Further questions were asked about how the project team perceives the importance of collaborative teamwork and if they think that introducing a particular tool will improve their performance, and all five (5) respondents indicated that collaborative teamwork is an important factor in terms of software development and also all of the five (5) respondents further agreed that the introduction of a particular tool in this aspect will improve the nature of their work.

5.2.3.1 Summary

In the research literature, (Pattit and Wilemon, 2005) highlighted that the idea of teamwork conveys a set of qualities that promotes listening and reacting productively to points communicated by other team members, assuming the best about others, giving assistance and acknowledging the achievements and interests of the other team members, and that values of such are important since they encourage the performance of individual, and helps the team carry out their tasks well. From the interview conducted, it shows that there is a huge gap of understanding what importantly makes an effective project team. And this is one the reason why this research is being carried out to identify these gaps and how to mitigate them. Despite that, all the five (5) interviewees agreed that collaborative teamwork is important and that introducing a tool to support teamwork will be a welcoming change/transformation.

5.3 Research question 2. How will project management transferable knowledge and skills of the project team leader affect the successful application and utilisation of scrum methodology?

The project managers have a vital part to play in guaranteeing the success of the project. This associates with the sort of knowledge and skills needed to achieve the project success.

5.3.1 Transferable Knowledge and Skills

In the previously reviewed literature Sutling et al., (2014) highlighted in their study that project managers have a vital part to play in guaranteeing the success of the project. This associates with the sort of knowledge and skills needed to achieve the project success and the adoption of scrum methodology. Great project management allows the manager to get the proper competencies, knowledge and attributes especially in connection to management of time, risk, cost and scope.
The literatures identified the following project team leader behavioural competences:

- Leadership behaviour
- Innovative behaviour
- Communication behaviour
- Ethical behaviour
- Result orientation behaviour
- Strategic behaviour

Sutling et al., (2014) also highlighted communication as an important factor to a project manager's behaviour and that agile project management professionals draws attention on communication involving the project team and client and care for satisfactory documentation. Additionally, Hazzan and Hadar (2008) argued that the Project manager's behaviour in effective communication must have a face-to-face feedback session and also communicate frequently among the software development team and between the teams and the clients. All selected participants when asked about what they project management transferable knowledge and skills is required of the project team leader to effectively manage the software development projects, all five (5) of them highlighted that communication skills is required. Meanwhile, four (4) respondents among them further perceived leadership skills as one of the most important skills that are required of the project team leader.

5.3.2 Summary

Pinar et al., (2014) highlighted that engaging leadership behaviour in a team incorporates five measurements such as showing others how things are being done, coaching, participating in decision making, sharing information and showing interest by cooperating alongside with others. From the interview carried out, it indicated that most of this behaviours and skills were indicated to be the competences required of the project team leader to be able to manage the software development projects and to communicate the change in the organisation and with all the behavioural competences identified, it will enable the organisation and the project team to carefully select the change champions during the transformation process.

5.4 Research question 3. What are the most pertinent challenges in relation to the implementation of scrum methodology?

Culture plays an important part in the adoption and acceptance of agile project management methodology in a company utilising the traditional waterfall project management method. It is important that organisation understand the existing challenges in relation to the adoption of scrum methodology.

5.4.1 Cultural and Organisational Impacts

In reference to the past reviewed literatures, Chan and Thong, (2009) conducted a study with a Bulgarian software company with total number 200+ size, which highlighted that Culture plays an important part in the adoption and acceptance of agile project management methodology in a company utilising the traditional waterfall project management method and it's important for the organisation wanting to adopt or change it way of managing software development projects to understand the existing challenges related to the implementation of scrum methodology and how to mitigate the challenges before adoption. Different researches have been done in regards to the role of individuals during the transition and adoption of agile project management (Ghanam, Maurer and Abrahamsson, 2012).

Iivari and Iivari, 2011; Summers, (2008) mentioned in their research that Cultural issues also affects the transformation process negatively. All the interviewed team members when asked what challenges they think could surface if the organisation is changing ways of managing software development projects, three (3) of the results indicated that individual perception could pose a huge challenge to the adoption of scrum methodology. And in addition, three (3) also indicated that team resistance to change is another critical factor that shouldn't be overlooked due to the fact that most of them are accustomed to the current traditional culture of managing software projects in the organisation. Additionally, individual opinions were seek from all participated team members during the interview about what should be done/put in place to minimise the possibility of the challenges, one (1) indicated that awareness and clear explanation of why the change is being proposed is important for the team readiness. And also another one (1) highlighted the structure of organisation and power distance needs transformation to bring adaptation during the change.

5.4.2 Summary

In the literature Laanti, Salo and Abrahamsson, (2011) highlighted in their study that, when moving from the traditional waterfall project management approach to agile approach, there is need to extensively change the mind-sets and behaviours of the people involved in the organisation and this implies that individuals play an important part in agile project management transition and adoption, and these individuals can both act as hindrance and drivers of the process. From all the interviews, it shows that people can be an obstacle to the adoption of scrum methodology because of their mind-sets and perceptions towards the change, which can cause them to resist change. Gandomani et al., (2014) further highlighted

an important consideration that there are several confrontations involved during agile project management transition.

Due to the individual focused of this sort of process, most challenges faced during the transformation are mainly the people involved in the process. Regardless of these challenges, Pikkarainen et al., (2011) highlighted that the commitment of the upper management and individuals of the organisation are crucial factors of the change process. Moreover, the agile champions, by leading, engaging and motivating team members during change difficulties will make the change easier and simpler. Another research conducted by Gandomani et al., (2014) highlighted that among the team members who participated in the research, it appeared that issues of culture were indeed crucial than other issues because it was the most addressed area by the majority of the members. Furthermore, Misra, Kumar and Kumar, (2009), added that being an agile is a thing of culture. If the agile culture isn't right, subsequently the software development company can't become agile.

5.5   Summary of the Discussions

In summary of all the discussions drawn from literature reviews and the investigation carried out through interviews with the project team members, it shows that all the highlighted factors in these discussions should be considered to effectively implement scrum methodology in the organisation. And when selecting a project team leader to facilitate the process of change and to manage the project, proper assessment of project management transferable knowledge and skills need to done. Furthermore, by understanding the challenges that could emerge during the transition and adoption are crucial.

CHAPTER 6

FRAMEWORK AND RECOMMENDATIONS

6.1   Introduction

The purpose of this chapter is to present the primary objective of this dissertation, which is developing a project management framework that is suitable for TODAY Digital News and Media, to facilitate a successful implementation of Scrum methodology to manage agile projects, followed with recommendations to guide the successful implementation of the developed framework.

6.2   Development of the Framework

Technologies are not easily adopted and utilise even when their robust effectiveness have been evidence. Against the initial literature reviewed and data gathered through interviews with important people involved in the organisation software development projects revealed several challenges that can hinder the implementation of Scrum methodology, a framework for understanding and leading change in the organisation was developed to address the challenges that could impact the successful implementation of Scrum methodology in the organisation. From the study carried out, several challenges that impacts the transition and adoption of Scrum methodology were identified, and ways on how to tackle/mitigate these challenges were recommended by several literatures. However, a framework of this kind has been proven to be suitable in a case like this, and if implemented properly during the process of change in the organisation, the adoption of Scrum methodology will be easy and successful.

6.2.1   Framework and Plan explanation

This framework begins with six (6) elements of work-streams identified as common factors to successful change management, and optimises the scope and approach of which the activities will be organised. As shown (highlighted in orange filled shapes) in the sketched framework below, these factors include: Project team and stakeholders' (Internal & external) engagement, Culture impact and organisational impact of the transition, readiness of the organisation and sustainability, in-house training and development, effective communication and culture. When organisation is changing it ways of working/managing projects, all of these factors must be considered to enable the change. These factors will be integrated with different activity stages, starting from initiation stage, planning, leading, and engagement to sustainability of the change. The idea behind this is trying to link all the activities and deliverables into each work-streams and place them according to where they'll take place in the stages of the change.

Furthermore, this framework provides the technical side of change management when thinking about configuration management and how to technically change to a new approach of managing software development projects and also influence the project team. Integrating change management process with the software development project process will increase the

change success probability and also manage change resistance within the project team. Change management drives the success of project by helping individual changes required by company initiatives through knowing their current state, transition state and future state. This is more than just a training, and for this to be successful, sets of activities and measurements needs to be included to ensure that individuals understands what the organisation will expect from them when the new approach has been implemented.
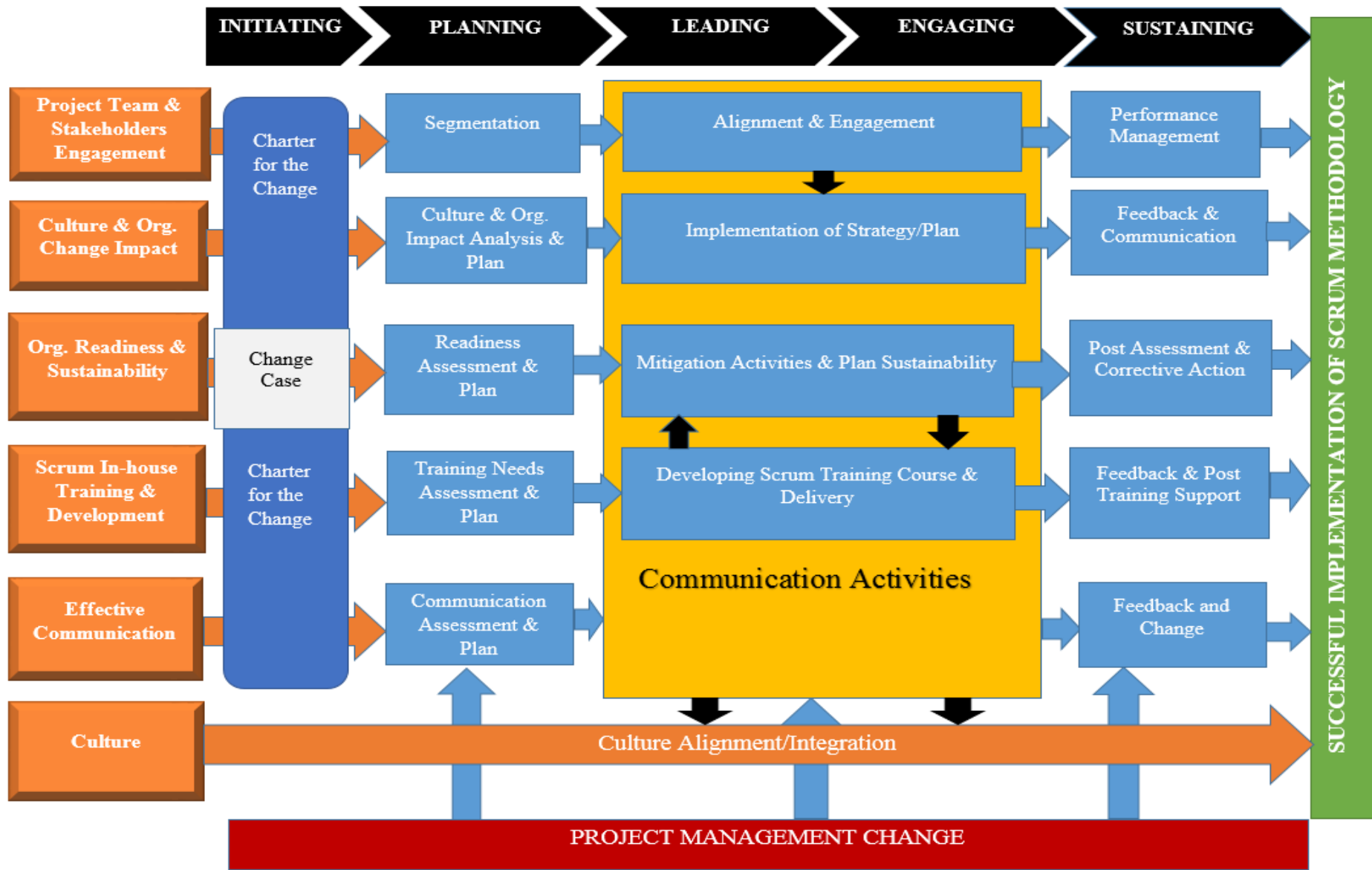
Figure.1 Source: Author

The framework shown in figure.1 above presents an approach for implementing the change plans with significant dimensions for leading the change, intended to support process of scrum adoption. This actionable framework is developed based on the "theory of strategic and organisational change". If it is effectively implemented, it will take both the organisation and project team from where they are now to where they want to be in future. It also identifies the kind of change the organisation and project team needs, and what activities are needed to be carried out to migrate through stages in the process of change, and the process of which the change outcomes will be assessed. At the initiation stage, the charter for the change will be outlined in order to define the change rational and purpose for the scrum methodology adoption (change), including the guiding principles, goals and objectives and also the critical success factors.

Business case for change is extremely important because it connects to the organisational and project success and cannot be disentangled. It captures the rational for project initiation to convince the person who makes decision to act. For example, the situation assessment and statement of problem, project description, solution illustration, cost and benefit analysis, timeline for the implementation, assumptions, risk assessment and recommendations. If the change team don't talk about results achievement, then the conversation is wrong. The bottom line is the change team have to make case for the change to enable them convince numerous audiences including the project leaders and stakeholders about the benefit of scrum methodology, and should be linked to the area of managing individual side of change.

6.2.2   Factors to Successful Change

6.2.2.1 Project Team and Stakeholders Engagement

First and foremost, both the project team, internal and external stakeholders must be prepared for the changes in their work environment. All parties involve must be aware of the proposed changes and how this changes will affect them. Although this changes focuses on technology, this will likely be guided with new policies, data, procedures and work processes. Engaging the project team and all stakeholders is an important activity the change team needs to consider because the proposed change can be impeding if there are areas in the organisation with poor engagement of both the project team and all stakeholders. The effect of these changes will differ by segments of all key players involved and these groups could be classified by type of job, roles and responsibilities, team or a particular sector. Some groups could be affected more than other groups when the old traditional system is being changed. Therefore, it is more important to implement an effective strategy to support this aspect for sustainability of the change.

6.2.2.2 Cultural and Organisational Change Impact

The goal of culture and organisational change impact assessment is to identify and plan ways on how to mitigate the possible risks and issues related with the introduction of scrum methodology and process of managing projects in the organisation. In the process of adopting scrum methodology to manage software development projects in the organisation, number of change management events requires implementation so that the teams involved will be appropriately trained and changes are effectively communicated to them. This is where the

change team/scrum masters will take a look at the process "To be" against the process "As is". Making sure that those gaps are identified, and if any, it will require some type of adaptation management. Why this impact analysis tools is so significant is that all the possible risks and challenges are right in front of the change team, and they will understand specifically which risks/problems they are going to approach with effective communication, training or possibly the combination of two, and which needs special plan or requirements for sustainability.

6.2.2.3 Organisation Readiness and Sustainability

The aim of the organisational readiness is to gather an overall awareness and understanding of potential challenges the organisation faces during the change process. Organisational readiness is known to be an important factor to successful change in organisation because members of the organisation try to sustain the circumstances that give them perception of identity, control and psychological safety. When the readiness level of the organisational change is high, the members become more devoted in effort of change; the effort also become greater in the process of change, and they will demonstrate substantial determination when confronted with setbacks or challenges – which also contributes to successful implementation and sustainability of the change. Assessing the organisation readiness for the change, the change agents and project team leaders/managers can identify the gaps that may occur between the team's expectations regarding the effort of change of other team members. However, if significantly any gaps are identified and the change team takes no action to cover the identified gaps, resistance will occur and the implementation of change would be jeopardised. On that note, the organisational readiness for change acts as a guide/strategy for successful implementation of the change and must be continuous to encourage sustainability.

6.2.2.4 Scrum In-house Training and Development

A well-implemented in-house training of Scrum programs educates the project team on both the usefulness of the methodology and it processes. And it will also provide the team opportunity to realise some of the new improvements of the aim why the organisation is making the changes. Principally, in the case whereby the project team lacks basic knowledge of the proposed change, in-house training and development program is both critical and instrumental to change. In-house training and development will help to facilitate the project teams' buy-in and also support the team overcomes the change resistance.

6.2.2.5 Effective Communication

Effective communication is significantly a major contributor to a successful change because it communicates the vision, mission and objectives of the change. Most unsuccessful change is due to lack of effective communication. This is because effective communication prepares the employees for the change, and will also help them understand the impact of which the changes will have on them individually. Hence, an effective communication strategy is very important to encourage a successful adoption of Scrum methodology in the organisation.

6.2.2.6 Culture Alignment

Cultural alignment or integration is such a significant asset in the company because in the context of change or growth, staffs who work together to a desire goal tends to carry out tasks more better and contribute more effectively to achieving of company's business goals. Similarities between team member's individual preferences and values including the culture of the organisation plays an important part in engaging members and guaranteeing fun in their jobs, providing sense of belonging and retaining their jobs. It is essential to recognise that all members of the project team have the basic beliefs as regard to anything they must do in order to achieve desire goal and these beliefs defines the culture of the company. The culture of the organisation determines the processes and practices utilised to perform the project plans, and this drives the important practices, which can be relevant to the success of the projects. Therefore, cultural alignment or integration is very important in the process of change to effectively implement the Scrum methodology in the organisation.

6.3   Summary

In summarising this chapter, the framework above was developed to give TODAY.ng a clear understanding on how to lead and engage change in the organisation to address the impacts that could impede change and to effectively implement Scrum methodology in the organisation. Common factors to successful change were also explained to give the client further understanding of the work-stream elements and their purposes to support the organisation when implementing the framework. However, for sustainability, the change process requires continuous improvement (as shown below in Fig.2) using PDCA (Plan, Do, Check, Act) until the organisation adapts to the change.
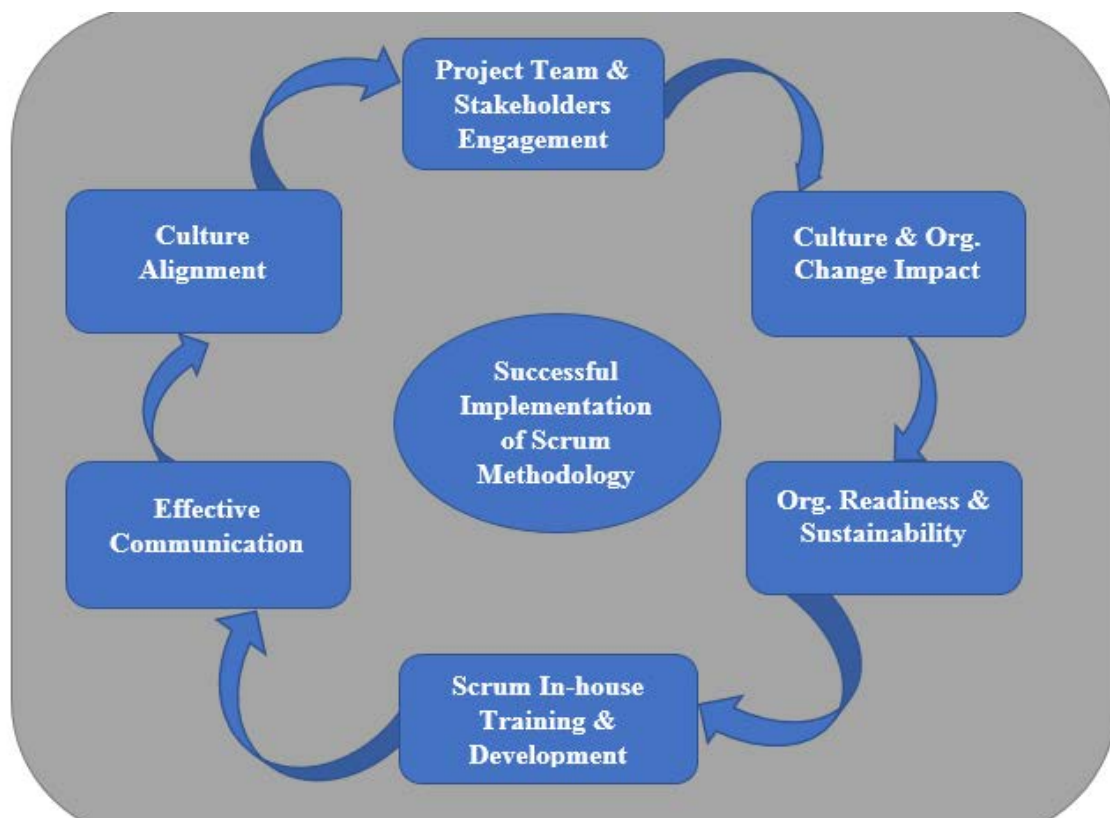

Figure.2: Source: Author

6.4 Recommendations

As mentioned earlier, this chapter also presents number of recommendations designed based on the findings from the client's company and the evidence from literature reviews. To ensure best change management practices, it is advisable that the client utilises the listed recommendations below in order to address the impacts of culture and organisational change and to guarantee a successful outcome when implementing Scrum methodology.

6.4.1 Project Team and Stakeholders Engagement

Who: Team Leaders and Change Consultants

What?
The team leader and change agents should engage individuals that may possibly be affected by the changes, or may be influenced by the implementation of Scrum methodology. Engaging the project team and stakeholders is a crucial factor of social responsibility in organisation, and to also achieve the triple bottom line.

Why?
Engaging the team and stakeholders (Internal and External) would embed positive working environment culture and advances in the direction of sustainability through the awareness of their beliefs and attitudes, acknowledgement of needs and making sure their acceptance to the change objectives becomes the company main activities and features for the organisational professional sustainability.

How?
The project team and stakeholders engagement should be considered critical like any planning process of a project, with sufficient review, arrangement, execution, documenting, evaluating and monitoring, and the process should be iteration to allow satisfaction through thorough planning, documenting and learning exercise as an outcome of proper evaluation and follow-ups. Preferably, this process should be developed on common vision and values, such as, targeting individuals that are more likely to be influenced in the company and furthermore, utilising of best practices in implementing the engagement through using appropriate cultural techniques, communicating relevant information in advance, using appropriate technology, acquiring a feedback/follow up system if any issues arises in the process of consulting and finally, having an explicit scope and roles regarding the activities and objectives of the change.

6.4.2 Cultural and Organisational Change Impact Assessment

Who: Change Consultants

What?
When the organisation is planning change it is important to thoroughly know both the negative and positive impacts and implications the change may possess.

Why?

Conducting cultural and organisational impact assessment in this context is critical to measure the possible impact of either negative or positive that the change might have on the individuals or organisation cultural values and interests of TODAY.ng, and then analyse the gaps identified to further explain specifically what to communicate in order to mitigate the risk.

How?

This process requires examination of individual's skills, knowledge, capacity and cultural gaps with the change impact separately on these parts and the whole project, with the key processes focusing on the company "As is" (current state), "To be" (Future state) and the group impacted. Utilising these key processes, the targeted challenges will be identified and analysed to reveal the impacts that might obstruct the successful implementation and utilisation of the Scrum methodology, and then implement the strategy that was put in place.

6.4.3   Organisational Readiness Assessment and Sustainability Plan

Who: Team Leader and Change Consultants

What?

The team leader and change consultants should utilise this assessment process to allow them discover possible acceptance and commitment in regards to the success effect of the planned change, and furthermore, to reveal the expectations, anxieties and concerns regarding the change.

How?

This process requires examination of individual's skills, knowledge, capacity and cultural gaps with the change impact separately on these parts and the whole project, with the key processes focusing on the company "As is" (current state), "To be" (Future state) and the group impacted. Utilising these key processes, the targeted challenges will be identified and analysed to reveal the impacts that might obstruct the successful implementation and utilisation of the Scrum methodology, and then implement the strategy that was put in place.

Why?

To know what leadership style is required to manage the change effectively.
To know the potential change resistance the people involve may experience.
To know the potential obstacle that may affect the Scrum methodology implementation.
To know what methods or strategy of change that could be utilised during the process.
Finally, to examine the initial original assessment to understand its situation, and also it often take prior to in-house training, so that the change agents/team can understand if everyone involved are ready for the in-house training, and in fact to understand how much the people know about the Scrum methodology.

How?

This process requires examination of individual's skills, knowledge, capacity and cultural gaps with the change impact separately on these parts and the whole project, with the key processes focusing on the company "As is" (current state), "To be" (Future state) and the group impacted. Utilising these key processes, the targeted challenges will be identified and analysed to reveal the impacts that might obstruct the successful implementation and utilisation of the Scrum methodology, and then implement the strategy that was put in place.

6.4.4   Scrum in-house Training and Development

Who: Scrum Coach/ Change Consultants

What?

For the scrum coach/change consultants to address the challenges of knowledge gaps regarding the proposed adoption of the Scrum methodology. Especially, in the case whereby the project team lacks basic knowledge of agile methodology, in-house training and development program is both critical and instrumental to change.

Why?

It will train them on both the new methodology (Scrum methodology) and it processes, and will also give them opportunity to visualise the new improvements of the reason why the company is making the changes. The training and development aids to facilitate individual's buy-in and as well encourage them overcome change resistance.

How?

Scrum in-house training should include teachings between the previous way and the new way, and also, manuals for procedures, in-house lectures, videos, web-based learning, mentoring formally/shadowing jobs and peer-to-peer informal learning. Furthermore, the in-house training also should be attached to individual positions and roles in the company, and then proficiency levels will then be utilised later to test their competency to lead or mentor others.

6.4.5   Effective Communication

Who: Team Leader and Change Consultants

What?

It is against the nature of human to favourably react to transformation (change) because they are used to their comfort zone. This is significantly a major contributor to the success of change, which requires a sophisticated and detailed plan. Effective communication plan is a superset of the overall change plan. This because it promotes the culture and awareness of the change.

Why?

Effective communication is a paramount thing because it raises level of understanding and transparency during the change in the company.

How?

The change agents/team leader should effectively communicate frequently, consistently, with honesty and through multiple channels. And should also effectively communicate everything that associates with the changes quickly as soon as the information is available to avoid rumour mill issues. The change agents/team leader must effectively communicate what is going to change, benefits of the change and how the change will be accomplished because most individuals will be interested in knowing how the change will affect their jobs or life. And more face-to-face means of communicating is required.

6.4.6   Culture Alignment

Who: The Organisation

What?

The culture of the organisation determines the processes and practices utilised to perform the project plans, and this drives the important practices, which can be relevant to the success of the projects. If the culture is not aligned, the proposed change will be unsuccessful.

Why?

This recommendation is essential to recognise that all members of the project team/company have the basic beliefs as regard to anything they must do in order to achieve desire goal and these beliefs defines the culture of the company.

How?

This can be achieved through conducting surveys and assessments of cultural alignment to help the change agents/leaders identify quickly the misalignment areas, and once the gaps are clearly understood, the team can design a strategy to mitigate those gaps for sustainability.

6.5   Summary of Recommendations

In summarising this chapter, a framework that is suitable for TODAY.ng was developed with the primary purpose of addressing issues that were identified in the initial phases of this study. Furthermore, it is advisable that the client/organisation consider all these recommendations as relevant guidelines on how the framework can be utilised for effective implementation of Scrum methodology in the company.

CHAPTER 7

CRITICAL EVALUATION

7.1   Introduction

As mentioned earlier in this dissertation terms of reference (TOR) attached in Appendix 1, the outcome of this dissertation was to deliver a complete report that comprises of the following items listed below:

- A framework for a successful implementation of Scrum methodology in the company to effectively manage agile projects.

- A well-structured dissertation report that contains set of recommendations to address the findings.

The research outcomes mentioned above were captured through achieving the five (5) initial research objectives as documented in the planning review TOR (Terms of Reference. See Appendix. 1), which will eventually be evaluated in this chapter, accompanied by the sponsor's prerequisites. Meanwhile, all the five (5) proposed objectives were met.

7.2   Project Objectives Evaluation

The table below illustrates the assessment of how the research outcomes were met against the dissertation objectives.

Dissertation Objectives	Success Evaluation
To research and review existing literatures on agile project management with special focus on scrum methodology in contrast to the traditional waterfall methodology. Followed with teamwork, behaviour required when the project manager proposes agile adoption, and as well as identifying the cultural factors that may impact the adoption.	The study was carried out utilising relevant conference papers, academic journals, documents and reports gathered from the sponsor. In order to support the literature, data were also gathered through interviews. Although several limitations surfaced during the study, such as, sourcing for literatures that addresses agile project management and its adoption in Nigeria and Sub-Saharan Africa. This was a huge challenge for this research and also the University library (St. Peters Campus) access hours being limited to 12hrs, but that notwithstanding, this research objective was met successfully. However, in spite of the challenges, the available literatures were sufficient to reveal

	effective way of how agile scrum methodology can be effectively implemented, through the awareness of potential implications that demands requirements in accordance with individuals discipline and potential change resistance that might constitute major obstacle to the success of change. Additionally, it was also highlighted that culture and organisation acts as an impediment to the adoption, while suggesting ways on how to tackle the challenges. **Evidence: Chapter 2: Literature Review**
To gather data and analyse the responses through interviews with the company director, software development team and project managers.	In addressing this objective, qualitative method was adopted, using means of interviews to gather data that was required for this study, and the results were later analysed. The decision of choosing this method was because several scholars have argued that qualitative research method offers information that are valuable and used in a product design, such as, the needs of user, use cases and behavioural patterns. However, at the initial stage of this objective, it was a bit problematic as per deciding what research method is suitable for this study. Though few limitations were experienced during the investigation because of the selected participants withholding sensitive information required for the study in order to secure their jobs and also major knowledge gaps about the area of investigation due to culture/work location, they still demonstrated and contributed with the little knowledge they had, and also willing to learn and embrace the change/implementation of Scrum methodology. In this case, the mentioned objective was achieved successfully. **Evidence: Chapter 4: Data Analysis**
To develop a framework that will aid the company implement and use Scrum methodology to manage their agile projects effectively.	In regards to this primary objective, all the initial objectives that was attend in this study gave a pathway to developing the proposed framework for implementing scrum methodology in the organisation. However, the framework was successfully created based on the study findings, through review of various literatures and analysed data collected from the client's organisation.

	Several considerable influencing factors that contributed to the result were identified, which resulted in determining the work-stream elements that will facilitate a successful implementation of the framework to enable the company effectively change/adopt scrum methodology.
	Furthermore, it was somewhat challenging to determine the relationships/connection between each activities in the framework, however, with the use of a mind map to visually organise the idea behind the framework, and reading around the PDCA (plan, do, check, act) four (4) step method of management for continuous process improvement, made this objective a successful one.
	Evidence: Chapter 6: Framework and Recommendations
To present a critical evaluation of the entire dissertation to which the research outcomes have been achieved and as well discuss the issues, limitations and lessons learned.	As shown in the **Chapter 7** of this dissertation.
To produce a full report of the dissertation that contains all the significant chapters.	Having carried out all the investigations utilising relevant academics journals and gathering data which was later transcribed and analysed using thematic coding approach, a framework suitable for TODAY.ng was developed with set of recommendations to guide the client's organisation implement change/scrum methodology effectively, a complete report containing all the significant chapters was produced successfully as proposed and signed in the planning review TOR (Terms of Reference. See Appendix 1).
	Although the delivery timeline of the project was quite limited, this objective was successfully achieved.

Regardless of the few limitations and specifically the aspect of sourcing literatures that addresses the subject in the geographic location of the study, and also participants' knowledge gap about the study, the objectives that were set out as agreed initially in the TOR (Terms of Reference in Appendix. 1) were achieved and the dissertation was completed within the assign period of time.

7.3   Client's Requirement Evaluation

The table shown below presents the research outcomes in relation to the client's requirements in order to evaluate the research level of performance.

Client's Requirements	Evaluation of Client's Requirements
To identify the challenges software implementers encounter when moving from traditional waterfall to agile scrum methodology.	Through the review of relevant literatures and interviews conducted in the client's company, numerous facts were identified, such as, lack of knowledge, individual perceptions about the change, resistance to change due to their customary work settings, wrong mind-sets, cultural and organisational factors. Interestingly, all the participants agreed to welcome/accept the proposed change if the benefit is clearly made known to them during the process of transformation. However, the key company executives' proclamation agreed with the revelations by the literature authors. Regardless, there are more other considerable factors that were mentioned in literature, but were not highlighted by the interview participants, and these may be also considered.
To produce a suitable framework to help the company implement scrum methodology, considering the context of Sub-Saharan Africa	As client required, a suitable framework to aid the organisation effectively implement scrum methodology was developed alongside with sets of recommendations to guide a successful implementation. This framework and set of recommendation was then sent to the client in a form of report.

7.3.1   Client's Feedback

As mentioned earlier, a complete report of the work was delivered, and the sponsor successfully access the report with thorough review and later approved certainly the framework for the implementation of scrum methodology to manage the company's agile projects.

The Sponsor further made a comment on the work, stating that, despite the world view of agile scrum, that it strongly requires project management discipline, and also suggested that it will be best to apply the framework in the company to measure the success in it environment to be fully sure if it is suitable to the organisation and its culture, or if it requires further studies for reassurance. Nevertheless, the sponsor rated overall satisfaction very good for meeting the project requirements in the Terms of Reference, with the delivered product, and

impressed with the level of professionalism, effort, knowledge presented, enthusiasm, and conduct during the investigation. (See Appendix. 4 for Sponsor's Evaluation Form).

7.4   Overall Project Outcome Evaluation

The research has presented numerous important factors that should be consider in order to address the challenges that may impede the transition and adoption of agile scrum methodology in the organisation. This study emphasised more on the management of change as being the most important aspect of addressing the challenges that may emerge during the transformation process. The project management change processes as mentioned earlier in the research requires effectively considering such factors by taking into action the processes to initiating, planning, leading, engaging and sustaining as well as managing the change performances for continuous improvement till adaptation. This research offers the sponsor's organisation an opportunity to address the challenges that may emerge, as they want to change and sustain it ways of managing agile/software development projects by implementing scrum methodology in the company.

7.4.1   Achieving the Research Objectives

The research was carried out through sourcing relevant literatures in regards to agile scrum methodology and it adoption in Nigeria or Sub-Saharan Africa. However, it was quite a huge challenge to source academic journals that addresses agile scrum methodology and it adoption. In spite of this challenge, the available literatures sufficiently revealed all the important informations that were needed to address the research objectives. Another method was applied in order to obtain more perspective information concerning the implementation and utilisation of agile scrum methodology, through interviews conducted in sponsor's company on the software developers, technical project managers and the director. The interview disclosed various penetrative information in regards to the organisation's proposed change, stressing on, lack of knowledge, individual perceptions, cultural and organisational impacts and as well as transferable knowledge and skills a project manager/leader should have to successfully coach and mentor the affected individuals when implementing the change. The structuring of the above mentioned methodologies were done in order to achieve the objectives the research.

CHAPTER 8

CONCLUSION

8.1   Overall Project Conclusion

This research was aimed at producing a framework on how the organisation can successfully implement and use scrum methodology to manage its software development projects. In order to propose the framework, key research questions were developed to understand and address the problems of the organisation. Relevant literatures highlighted that it is important to consider cultural related factors as an important issues when an organisation is changing it ways of organising and managing software development projects. Qualitative research method was adopted to collect data from the selected participants in the organisation, which were later analysed utilising thematic analysis method. Numerous facts were discovered, for example, the participants' level of understanding about what drives a successful software development project was investigated, and the results revealed that most of them lacks basic understanding about the whole picture of a successful software project. Additionally, the results also revealed that the participants have no clue about agile scrum methodology, and this means that lack of knowledge within the project team about the proposed transformation could act as impediment to the introduction of the new approach.

Having carried out a study on the project topic through reviewing relevant literatures and conducting interviews with the company employees, assisted to propose a framework for the implementation of scrum methodology. The research revealed number of influencing factors that measures the organisation and other affected individual's readiness of scrum methodology acceptance in visible settings. As a result of that, the framework with set of recommendations is accompanied with the PDCA (Plan, Do, Check, Act) approach to perform selection of practice, assessment, adapting and adjustment through iterative cycle for change sustainability. Furthermore, the study revealed that moving from traditional way of organising and managing software development projects to agile scrum method needs reorientation, and not only for the project team but also the company management. Establishing such changes in organisation takes much time and more resources, besides it is a necessity for the success of any change.

Furthermore, based on the findings from the client's company and evidence from literature reviews, to ensure best change management practices, it is recommended that the sponsoring organisation consider the factors to successful change that comprises the work-stream of the framework in Figure.1

8.2   Future Work

Although the research have addressed the challenges of implementing scrum methodology in the company by recommending effective ways of how to adopt and utilise the agile scrum methodology with less implications, however, results have pointed out number of routes for further investigations. First, this research highlights various challenges that should achieved when introducing agile scrum methodology in the organisation some of which were not

emphasised during this study due to time limitation. Therefore, future study should concentrate on identifying other challenges that may emerge during the implementation of scrum methodology, and also ways on how to address them. Secondly, collaborative teamwork was one of the important factors that was address in the study but was not included in the framework as one of its work-stream, because of time constraints to evaluate the contributing factor of collaborative teamwork in the change process. In this case, an extended model for collaborative teamwork is required to study the development team maturity to understand the challenges better.

Additionally, reflecting on the client's feedback comment, the framework may require further studies after it application and discovering the existing impacts through feedbacks in order to evaluate its suitability in the context of its business environment/geographical location.

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