Project Management Information System Introduction:

Challenges and Remedies in a Construction Context

A thesis submitted in accordance with the requirements of the University of Liverpool for the degree of Doctor of Business Administration

by

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Abstract

This thesis examined the implementation of a Project Management Information System (PMIS). The research subject was a temporary organisation called Group2, which was created to build eleven hospitals across the Kingdom of Saudi Arabia (KSA). The introduction of the PMIS experienced several setbacks before the start of this research.

The aim of the investigation was twofold. First, identifying and understanding the challenges that faced the PMIS implementation. Second, helping Group2 in improving the outcomes of the PMIS implementation. A hybrid research design was selected to enable the achievement of these objectives. Action research was the meta-methodology that orchestrated two overlapping research phases: A first phase that utilised a single case study design with multiple embedded units of analysis and a second phase that utilised a multi-site action research design. Within both phases, data was collected through a multitude of methods. These methods included: participant observations, semi-structured interviews, and review of official records.

The primary conceptual model that influenced this research was based on management information system theories that focusses on individuals' responses towards introduction of an information system. However, these models proved insufficient to provide a full understanding of the PMIS implementation phenomena. The analysis of the research data suggested that PMIS implementation in a context similar to this research context is a multi-level phenomenon. As such, it was necessary to broaden the conceptual frame to incorporate theories that dealt with the group and organisational levels, as well as the individual level.

The main challenges found included lack of perceived usefulness, unsatisfactory facilitating condition, fear of the PMIS, lack of sustained management support, politics, and high staff turnover. Some challenges were attributed to the temporary nature of Group2, such as the high turnover rate and the highly politicised landscape. Several actions were implemented during the three action research cycles carried out as part of this research. Some of these actions were training customisation, stakeholders' analysis, stakeholders' involvement, and realignment of PMIS objective to organisational objectives. Additionally, a prior analysis of the implementation landscape in terms of stakeholders' interests, existing implementation barriers, and enablers proved of paramount importance to implementation success.

The outcomes of the interventions showed a significant improvement in the PMIS implementation results. Therefore, this study suggests that to maximise the likelihood of a PMIS implementation success in a temporary organisation, the implementer has to employ a multi-level implementation strategy. This requires a thorough analysis of the implementation subject and context before its inception. The analysis should consider all the three levels identified in this research: the individual, the group, and the organisational level. Based on the analysis results, implementers should act on the implementation's barriers and enablers. Tailored communication and customised training were the most effective action instruments used in this study. Besides, sustained management support proved of critical importance to implementation success.

"To my family who shared the burden of this journey as much as I did."

Acknowledgement

I extend my sincere gratitude to Dr Victoria Hanna and Dr Jason MacVaugh for their continuous coaching and unlimited support, which were integral to making this journey possible. This journey would have never been completed without the knowledge and professional assistance I gained from them. On many occasions, they pointed me in the right direction when I was convinced of the imminent failure of this project.

I was also fortunate to have a unique and impressive mentor, Joe D'Arcy who also served as my manager during this journey. His support, patience, and emotional intelligence played a central role in overseeing the continuity of this journey at its darkest moment. On many occasions, he volunteered precious time to help in shaping this project.

I would have never had the time to see this work through to its end without the unwavering support of Sahar. Her unshaken faith in my abilities fuelled me with optimism and lifted my spirit at each of the downs I came through.

I extend my gratitude to my Mum, Dad, brothers, and sister for their encouragement throughout this project.

Lastly, special appreciation goes to my children, especially Arwa for the time they gave up, allowing me to finish this work.

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List of Abbreviations:

DBA: Doctor of Business Administration

GS: General Supervision

GM: General Manager

IT: Information Technology

IS: Information System

KSA: Kingdom of Saudi Arabia

MSAR: Multi-Site Action Research

MIS: Management Information System

PM: Project Management

PMIS: Project Management Information System

PMO: Project Management Office

TAM: Technology Acceptance Model

TRA: Theory of Reasoned Action

UTAUT: Unified Theory of Technology Acceptance and Use

1 Introduction

The purpose of this research project was to help a selected organisation implement a Project Management Information System (PMIS). The researched organisation operates in the construction industry in the Kingdom of Saudi Arabia. The implementation of the PMIS started before this research, but was not successful at this stage, according to official reports. I joined the implementation team in the middle of the implementation process. I was intrigued by the paradoxical situation, whereby the existing professional project management consultant had no guaranteed strategy to successfully implement the chosen PMIS. Therefore, I decided to study the PMIS implementation process because a successful implementation was of great importance to my organisation. Importantly, the literature I reviewed suggested that PMIS introduction in the construction sector was a relatively new area of investigation.

1.1 Background and Research Context

The Saudi Ministry of Health (MOH) created a "temporary organisation" (Bakker, 2010) called Group2, whose purpose is to build 11 hospitals. The overall structure of Group2 is delineated in Figure 1 below and includes several supervisory consultants, construction contractors, a project management office (PMO), and a Ministry of Health supervisory team.
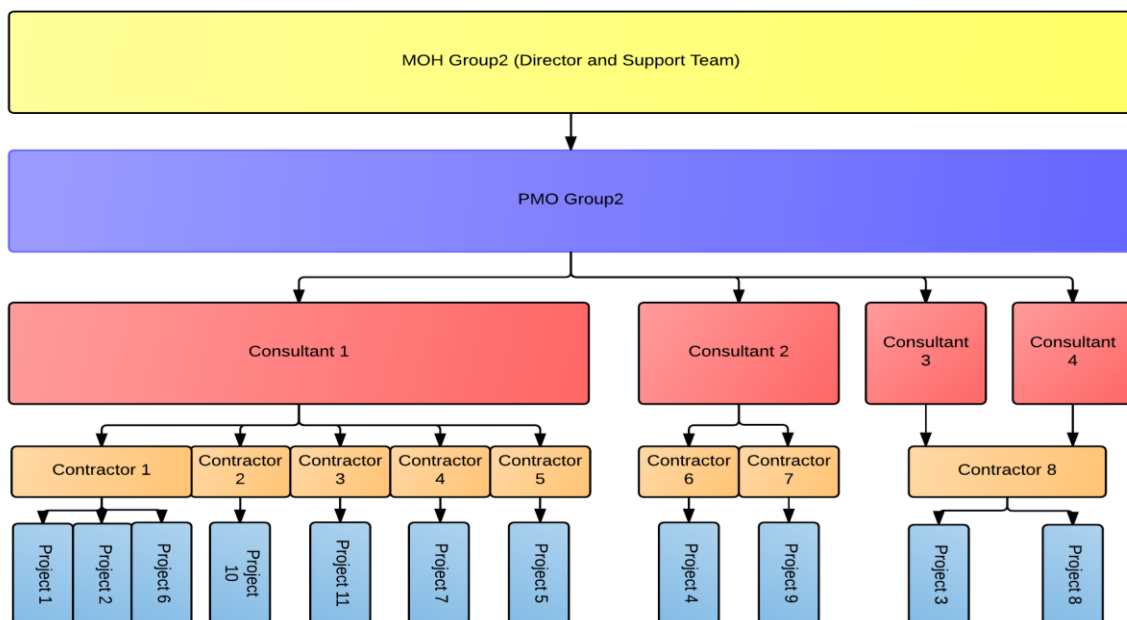
Figure 1: Researched Organisation: Group2

The eleven projects managed by Group2 were in different regions of the Kingdom. The consultants, contractors, and the PMO had teams at the construction sites and Group2's headquarters in Riyadh, the capital of the KSA.

I joined Group2 as an employee of the PMO in May 2015. Initially, I was a member of the team responsible for implementing the Project Management Information System (PMIS). When I joined, the PMIS implementation had already started. During the early stages of the project, the PMO team struggled to succeed in delivering the PMIS. In my earliest months on the job, I came to know that although the PMO has been executing a plan to introduce the PMIS, the results were not satisfactory to the client "MOH". Since the client perceived the PMIS implementation as critical to the success of the entire construction program, I decided to study the challenges that were affecting its rollout and help my organisation to overcome them.

The introduction of the PMIS is the subject phenomena of this research. The PMIS is a web-based system that includes several modules. Each module acts as a specialised instrument to collect, store, and disseminate data. The PMIS includes cost, schedule, quality, and engineering-submittals management modules. For the PMIS to work properly in delivering precise reports about the status of construction, it is essential to provide timely and accurate inputs from several stakeholders' groups. Take for example, the process of inspecting and recording the quality of constructed work in Project-1 (figure 1 above). An engineer from Contractor-1 must sign into the PMIS to fill a form that contains all necessary technical data and send it through the system to Consultant-1 requesting for an inspection of the work that he deems as ready for inspection. The system notifies Consultant-1 of the new inspection request. He assigns an engineer from his team who physically inspects the work on-site and then enters the results into the PMIS. Contractor-1 will then be notified of the results and consequently act accordingly. This process is recorded, timed, and most importantly is visible to all relevant stakeholders as it happens.

Group2 was in a dire need for the advantages accrued from adopting a PMIS. Since the MOH team was based at Group2's HQ with no presence at the construction sites, the PMIS represented an integral instrument for monitoring and controlling construction progress. The value of PMIS in the construction industry is widely supported in literature. A PMIS can assist project managers and stakeholders through improved information coordination and delivery

(Lee et al., 2003; Chung et al., 2008; McCarty, 2012; Mselle, 2014). Despite the potential benefits that PIMS holds, the implementation of similar systems in the Saudi construction industry has often failed (Hadidi et al., 2017). This study explores the challenges a PMIS encountered its implementation and proposes solutions to overcome them.

1.2   Research Objective and Questions

The government of the KSA contracted a PM service provider to manage the construction and delivery of new health facilities. This provider was tasked with establishing a PMO and implementing a PMIS. Although the PMO was successfully created, many unexpected challenges delayed the full use of the PMIS. I joined the PMIS implementation team after the start of the PMIS implementation. One year later, I became the head of the implementation team. The failure of the PMIS introduction was a critical issue to the researched organisation and myself. However, to resolve this problem, it was vital to understand it first. Therefore, this research aimed to achieve two interconnected results. The first aim was to identify and understand the issues preventing the effective use of the PMIS in Group2. The second aim was to improve the researched organisation's ability to successfully introduce the PMIS. This would be achieved through the creation of actionable knowledge rooted in the understanding resulting from accomplishment of the first research objective. It is expected that the knowledge accumulated during this journey will inform both practitioners and scholars in the field.

In summary, the research aimed at the following:

Improving the PMIS implementation success in Group2's construction projects.
To achieve this research aim, the following research questions needed to be answered:

1. **What were the challenges to a successful PMIS implementation in Group2?**
2. **What next steps were required to overcome these challenges?**

The proposal theorised that identifying and understanding the implementation challenges would allow the formulation of a strategy to overcome them. Implementation results and delivery of construction projects would improve through the application of this actionable knowledge.

1.3   The Significance of This Research

Understanding the problems faced during a PMIS implementation in the construction environment is a crucial issue as, historically, this process has had a significant failure rate (Kuipers, 2016). Many experts in the field argue that a PMIS is a necessity for today's project management practices (Lee and Yu, 2012). A PMIS provide organisations with a level of transparency that ensures the optimal utilisation of enterprise resources (McCarty, 2012). According to Forrester's research, when a PMIS was efficiently utilised, corporations witnessed a decrease in their projects failure rate by about 15%. Forrester concluded that when an effective PMIS was in place, cost overrun occurrences decreased by 10%, while the completion time of projects was shortened by about 10% (Symons, 2009). Unfortunately, many of the new technological initiatives introduced into the construction industry fail. Henderson and Ruikar (2010), Mselle (2014), and Majrouhi Sardroud (2015) agree on the necessity of intensively studying the implementation of information systems in the construction industry.

Despite the pressing need for conducting a research examining issues faced in the introduction of new technological innovations in the construction industry, Nitithamyong and Skibniewski, (2003) pointed the scarcity of empirical studies concerning the adoption and success of a web-enabled PMIS. In a later study, Nitithamyong and Skibniewski (2006) postulated that the potential benefits of web-enabled PMISs in the construction industry were still not realised due to the inherent misunderstanding of the factors that influence the performance of these systems. Scholars to date have not done enough studies to assist the industry regarding this matter. Nitithamyong and Skibniewski (2006), Mselle (2014), and Sepasgozar et al. (2016) argued that research regarding the introduction of new technologies in the construction industry lagged far behind when compared to other industrial sectors. Moreover, Sivnert and Jöneros (2014) continued to draw this bleak picture as they asserted that most of the few studies carried out were irrelevant. They declared that most of the studies in the field employed a general perspective, which ignored the prominent importance of the context and culture in information system implementation. This study will help to bridge this gap as it involves an empirical study that is grounded in the context of the research.

From a practitioner's point of view, a better understanding of the difficulties facing the introduction of a PMIS in construction projects could introduce cost-savings in technology investment, such as in the construction project's budget, and the amount of time wasted. The context is of critical importance as Ejodame (2015, p.8) stated: "a one-size-fits-all strategy is unfeasible." Al-Saleh (2005) maintained that the scholarly literature fell short in addressing the implementation problems in developing countries. This oversight leaves managers in these regions vulnerable to repetitive failures in optimising the potential benefits of technology in the construction industry. This also explains why the Group2 management did not have a well-informed implementation strategy. This study is intended to help Group2 in obtaining the benefits of a successful PMIS implementation. An efficient PMIS will allow Group2 management to improve decision-making time. It will also help them avoid common versioning issues in the development and execution of construction design. More importantly, the transparency promised by an effective PMIS will improve Group2 management's visibility of the construction program, and thus overall program delivery. The results of this study will also provide practitioners with valuable insights into the best practices of introducing this technology in similar contexts.

1.4   Thesis structure

This thesis is composed of seven chapters. The first chapter provides readers with essential background information that facilitates the understanding of the research context, objectives, and the thesis structure.

The second chapter summarises the literature that informed the research. It also provides the conceptual background upon which I build the analysis of the research data.

The third chapter explains my choices concerning the methodology used in this research.

Chapter four outlines the story of the implementation on each of the cases studied and the action research cycle undertaken.

Chapter 5 presents a detailed account of the analysis carried out during this research and the finding of this study. It also outlines what I have learned during the research journey.

Chapter 6 summarises the research results and points out the potential benefits for both scholars' and practitioners' communities, which might be transferable to similar contexts.

Chapter 7 is an account of my reflections on the research process and the personal development attained during the action research journey.

2 Literature Review

In this study, I aimed at improving the PMIS implementation results in Group2. Therefore, this literature review was conducted to identify a conceptual framework that informs the intended intervention to overcome any issues that were facing the implementation in Group2. To understand why the PMIS implementation was failing in Group2, it was necessary to review the existing relevant literature and propose a framework, or lens, which could explain the issues faced during the implementation. The literature reviewed suggested that the PMIS implementation in Group2 was challenged by several factors that operate at three different levels: the individual, the group, and the organisational level. As such, it was necessary to employ a multi-level lens.

Frambach and Schillewaert (2002) proposed a framework for studying the acceptance and use of innovation from a multi-level perspective. Their framework suggested that individuals' acceptance is directly affected by personal dispositions, attitudes towards innovation, and social usage. Individual acceptance is also affected indirectly by organisational facilitators such as training and organisational support. The authors suggested that factors from the individual, group, and organisational levels all play a role in the acceptance and use of technology. Frambach and Schillewaert (2002) call for multi-level research has been echoed by other IS researchers (Burton-Jones and Gallivan, 2007; Lapointe and Rivard, 2005; Lee and Mun, 2011; Sun and Bhattacherjee, 2011; Zhang and Bandara, 2012; Bélanger et al., 2014; Nguyen et al., 2016; Venkatesh et al., 2016)

Similarly, Burton-Jones and Gallivan (2007) argued that past research in IS usage is incomplete and biased. This because most of the research was concerned with studying IS usage at a single level. They proposed that the phenomenon should instead be observed and studied from a multi-level perspective. Multi-level perspective improves research quality by allowing researchers to avoid many of the single-level studies fallacies (Zhang and Bandara, 2012). Most of the single-level studies use constructs that are influenced by attributes at a different level (Burton-Jones and Gallivan, 2007). Take, for example, subjective norms; it is a construct that exists one way or another in most of the prominent technology acceptance models. These models are claimed as a single-level model that operates at the individual level. However, subjective norms are strongly affected by group perceptions, beliefs and attitude.

Another example is facilitating conditions construct in the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT measures the construct at the individual level. Lee and Mun (2011) study challenged the single level depiction of the facilitating condition and argued its multi-level nature. Sun and Bhattacherjee (2011) cited several authors who argued and studied the multi-level nature of IS usage and acceptance. They illustrated the critical influence of some organisational level factors such as training, top management support, and technical support on the acceptance and use of technology. They further criticised prominent technology acceptance models such as UTAUT and TAM for treating the acceptance and use of technology at a single level.

Almost all the existing studies employing multi-level perspective are either quantitative or conceptual as discussed in Sun and Bhattacherjee (2011) and echoed in Kim and Love (2014). Lapointe and Rivard (2005) who conducted a multi-level, longitudinal study based on three case studies of an IS implementation provides a rare example of the vital contribution a multi-level qualitative study could provide to IS research. The absence of qualitative studies in this area does not help to create a deep understanding of the possible cross-influence between the different organisational levels during IS implementation and use. Bélanger et al. (2014) argued that multi-level qualitative research could provide valuable insights into the interrelationships between different constructs at different levels.

Consequently, in thinking about the research questions, it was sensible to assume that a multitude of factors influences the unsatisfactory result of the PMIS implementation. The difference in individuals' acceptance of the PMIS is a result of a social reality that is co-created by the interaction between organisational, social, and individualistic elements. As such, I decided to employ a multi-level perspective when examining IS extant literature. The review of the literature has identified three main streams within the IS implementation and introduction research. To a large extent, each of these streams is concerned with studying the implementation phenomena at a different level (i.e. the individual, group, and organisation). This literature review will explore the main arguments of each of these streams to identify propositions that could help to answer the research questions: What were the challenges faced during PMIS implementation in Group2? Furthermore, how can the PIMS implementation be improved to guarantee its success? While attending to the multi-level nature of the implementation phenomenon.

This categorisation of the literature review is in line with the finding of Nguyen et al. (2016) who criticised the general lack of integration of these streams within the literature. Venkatesh et al. (2016) also suggested that going forward; information system research should focus on the multi-level nature of the technology introduction phenomenon. This view is also supported in the work of Lapointe and Rivard (2007) who argued the multi-level nature of the IS implementation process.

The literature review is divided into three distinctive parts that correspond to the level of analysis espoused in this research (individual, group, and the organisation). The first stream focuses on understanding the behaviour of IS users as individuals, which is portrayed as the cornerstone of the implementation success. The second stream concerns the resistance to an IS system introduction, which is conceived as a group phenomenon and a prominent reason for implementation failure. The third stream is focused on the identification and understanding of organisational critical success factors, which are central to the successful information systems' implementation.

2.1 Stream 1 - Individual Level

One of the most prominent manifestations of Group2's PMIS implementation failure in its early days was the reluctance by end-users to use the system. Therefore, the question this section tries to answer is, why do individuals use or not use an information system?

IS acceptance and use at the individual level enjoyed a great deal of scholars' attention (Venkatesh et al., 2003). This could be attributed to the diffusion of technology in virtually all facets of life in the past four decades. This is evidenced by the multitude of theoretical models that have attempted to predict and explain individuals' use and acceptance of the technology. The Theory of Reasoned Action (TRA) proposed by Ajzen and Fishbein (1975) is considered the classical base of this research stream. Building on TRA, several models and extensions were established: TAM suggested by Davis (1986), TAM2 proposed by Venkatesh and Davis (2000), TAM3 recommended by Venkatesh and Bala (2008), UTAUT proposed by Venkatesh et al. (2003), and UTAUT2 planned by Venkatesh et al. (2012). These and other authors have developed a research stream trying to improve the explanatory power of their models. This research line was born with TRA and was developed with the various models of TAM and crowned recently by the Venkatesh et al. (2016) UTAUT review.

Figure 2 below considered the Delone and McLean (2003) IS success model and the Mardiana et al. (2015) integrated model in addition to the models reviewed by Taherdoost (2018). Apart from the diffusion of innovation theory, all the illustrated models are rooted at the individual level. An arrow in Figure 2 below indicates that a model at the end of the arrow builds on its antecedent at the start of the arrow. The selection of the reviewed models in the following section was based on the recognition of the model's explanatory power and its citations. Also, the clarity of the theory operational level was considered. Lastly, models that built on earlier theories and did improve their predecessors were preferred over earlier theories. The section below elaborates on selected models with an emphasis on some of the most recent and prominent work on this topic. They include: Delone and Mclean IS success model, TAM, and UTAUT as they are the most used models in the field.
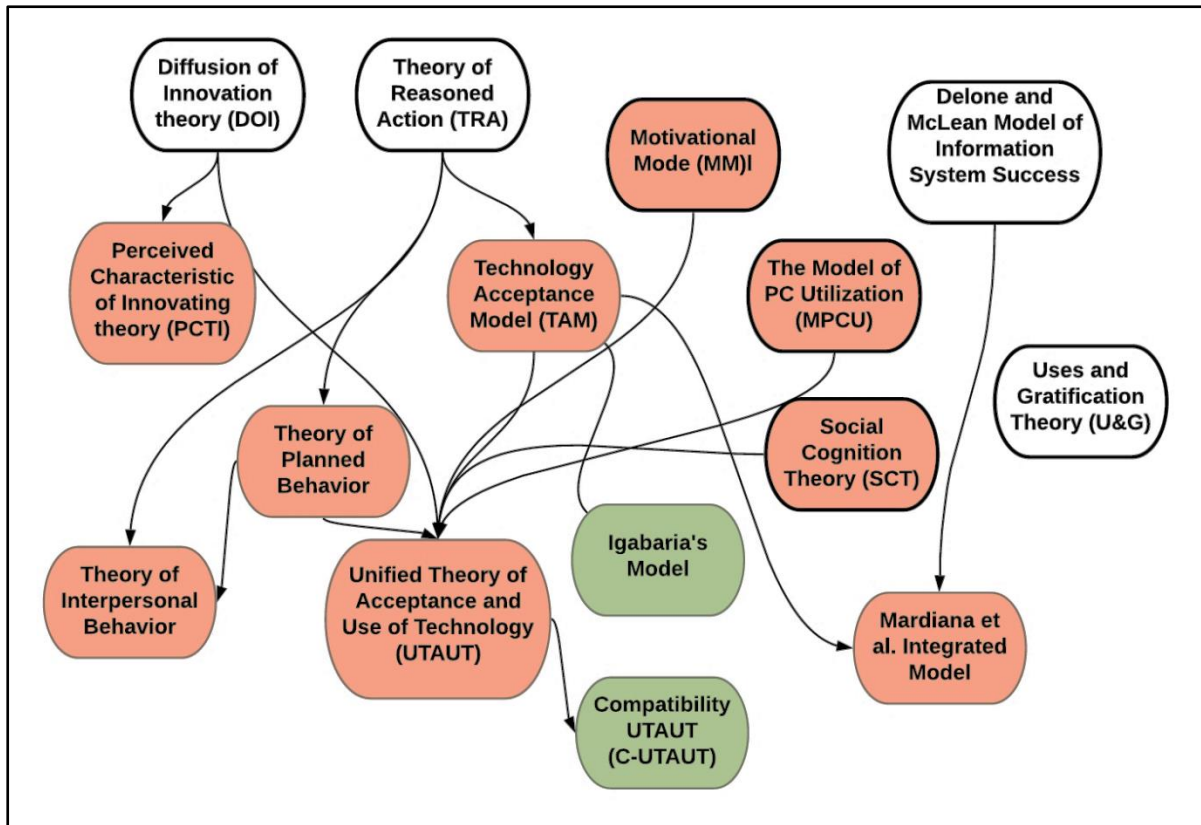
Figure 2: Theories and Models IS Success and Acceptance (Source: The author)

2.1.1   Information Systems Success Models

The DeLone and McLean Model of Information Systems Success

Over 100 articles citing the DeLone and McLean (1992) original IS success model (hereafter referred to as the "D&M model") were reviewed by Delone and McLean (2003). As a result, it was concluded that an update for the D&M model is necessary. The D&M model, introduced in a 1992 paper, was a response to the MIS quest for a dependent variable that legitimises the field. It was suggested that choosing IS success as a dependent variable ensures that MIS research remains relevant to practice by studying a problem that is of central importance to the real business. Figure 3 below illustrates the relationship between the model's constructs as envisaged in the original paper.
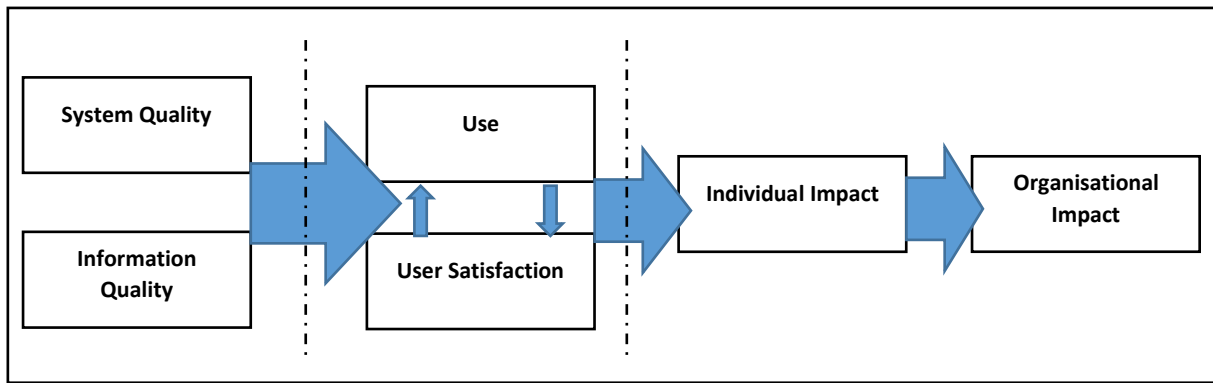
Figure 3: D&M original Model Delone and Mclean (1992)

The original article suggested that IS success is manifested as an organisational impact, which is driven by the IS impact on individual users. The impact on individual users is determined by both usage and user satisfaction, which are interdependent. Both determinants are functions of the system, and information quality as the review of many articles and discussions concluded (DeLone and McLean, 1992).

The updated model suggested in DeLone and McLean (2003), accepted the suggestions of many scholars who argued that service quality must be incorporated as part of the D&M model. The updated model (see Figure 4 below), also replaced individual and organisational impact by a single dependent variable that is "net benefit," which influences both the intention to use and user satisfaction. Interestingly, the updated model argued that the behavioural construct of intention to use has no direct impact on user satisfaction. Instead, the intention to use impact on both the user's satisfaction and the net benefit constructs is moderated through the use construct.
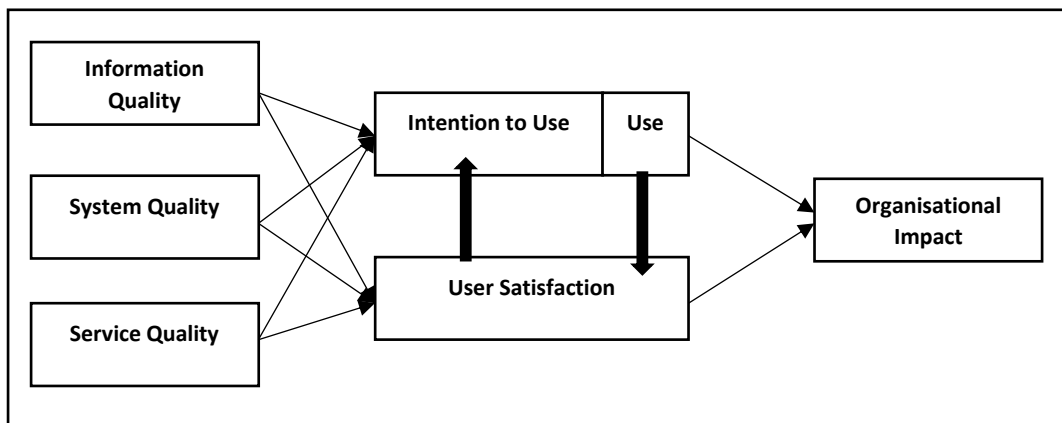
Figure 4: D&M IS Success (2003)

Many studies leveraged the D&M IS success model in order to suggest a PMIS success model. For example, Lee and Yu (2012) built on DeLone and McLean's (2003) IS success model to propose a model for PMIS in the construction industry. Another example of the influence of the D&M model on the PMIS research is the work of Shojaie et al. (2016) who also modified the original model for construction context. According to the D&M model and its proponents, PMIS implementation was challenged in Group2 by the lack of one of the above-discussed model determinants: system quality, information quality, or service quality. This is a proposition that could be examined further in the analysis and discussion sections.

2.1.2   Technology Acceptance Models

1-Technology Acceptance Model (TAM)

For technology to positively contribute to an organisation, it needs first to be used by the organisation (Lucas Jr. and Spider, 1999). Upon this basic, but intuitive argument rests more than thirty years of the research tradition in technology acceptance models. In 1986, Davis Jr. suggested a technology acceptance model abbreviated as TAM, which later provided the theoretical base for many studies in the field of MIS. The substantiality of TAM lies in its argued capability to improve the success of IS design and implementation by providing an in-depth understanding of the factors that motivate end-users to engage with an IS. Besides, TAM provides a theoretical basis that enables testing system prototypes to measure their acceptability in organisational settings (Davis Jr., 1986). By providing a parsimonious theoretical base, TAM has also helped focus scattered research in the IS acceptance field (Lee, Y. et al., 2003).

The Technology Acceptance Model (TAM) proposed by Davis Jr. (1986), acquired a foundational status in the MIS because it builds on an adamant theoretical base. TAM draws upon the behavioural Theory of Reasoned Action (TRA) introduced originally in Fishbein (1967) and refined in Ajzen and Fishbein (1975). TRA in Figure 5 below suggests that any actual behaviour reflects a behavioural intention. TRA argues that the behavioural intention could only be affected through influencing attitude or subjective norms. This implies that the impact of the environment on the behavioural intention is mediated by attitude and subjective norms (Rondan-Cataluña et al., 2015). However, TRA was criticised for neglecting the role of habits and morals (Taherdoost, 2018).
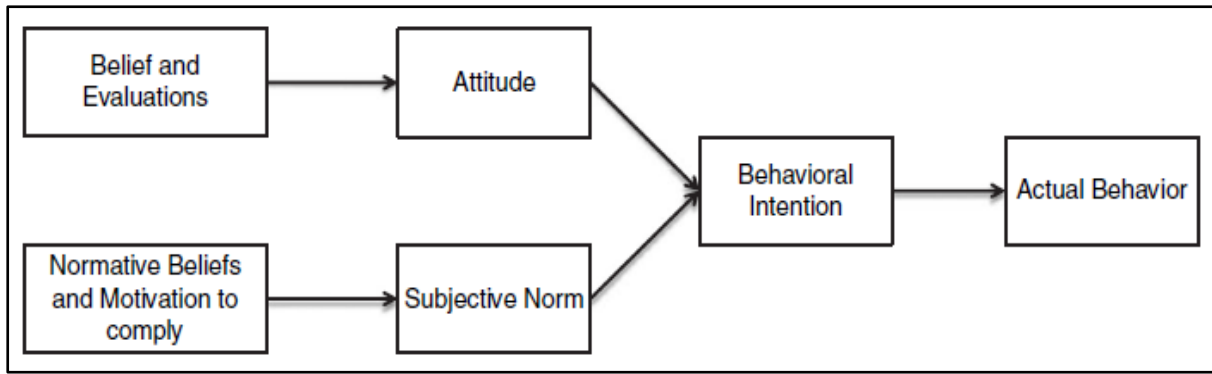
Figure 5: Theory of Reasoned Action Source: Ajzen and Fishbein (1975)

The TAM model presented in Figure 6 below, based upon the TRA, suggests that the most salient motive, which entices an end-user to use a system, is the user's attitudinal position towards the system. The user's attitude towards using a system is mainly determined by two cognitive factors: the user's perception of the ease of system use and the user's expectancy of the reward from the system use. TAM also posits that the Perceived Usefulness (PU) of the system is affected by its Perceived Ease of Use (PEOU), among other factors. Both the PU and PEOU are functions of a system's characteristics, among other external factors.
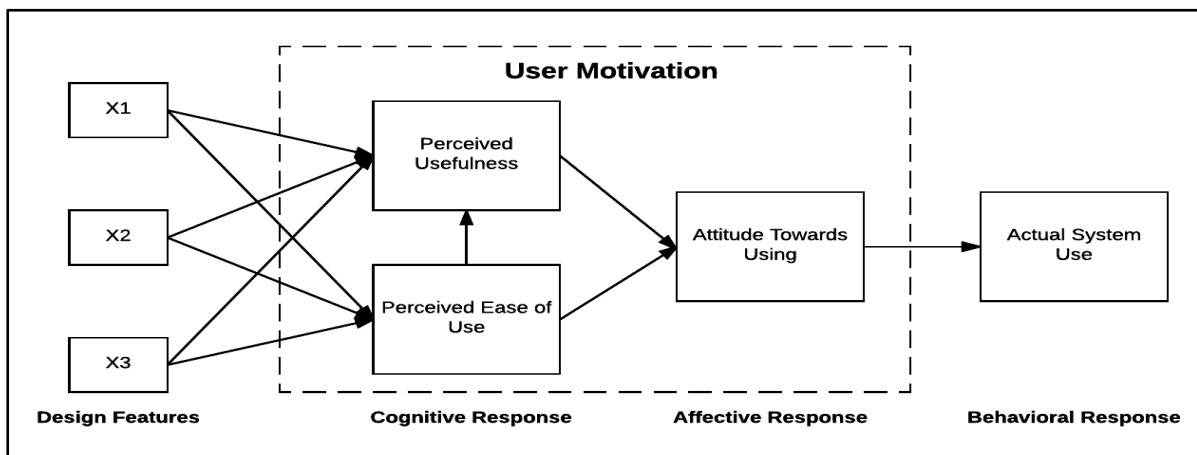
Figure 6: Technology Acceptance Model (TAM) as in Davis Jr (1986)

2-Technology Acceptance Model 2 (TAM2)

Fourteen years following the TAM original introduction, Venkatesh and Davis (2000) published a theoretical extension to TAM that was validated through a longitudinal study. The extended model (TAM2) in Figure 7 below, incorporated factors that affect the PU of the IS to the end-user. The longitudinal study confirmed that the output quality, the job relevance, the image, the results demonstrability, and the subjective norms significantly influence the end-users' PU of the system and consequently affect their intention to use the system.

Besides, the study found that subjective norms have a direct impact on the intention to use the system when the use is perceived as voluntary. These results suggest that system introducers should first focus on the constructs that are under their control, such as the voluntariness perception, the image, and results demonstrability. Secondly, system implementers must work towards convincing users that system use is obligatory since this will reduce the direct effect of experience and subjective norms on the users' intention to use the system. This is important because it is not likely that the IS introducer would influence either the previous experience or the subjective norms; as such, they may jeopardise the system implementation efforts.
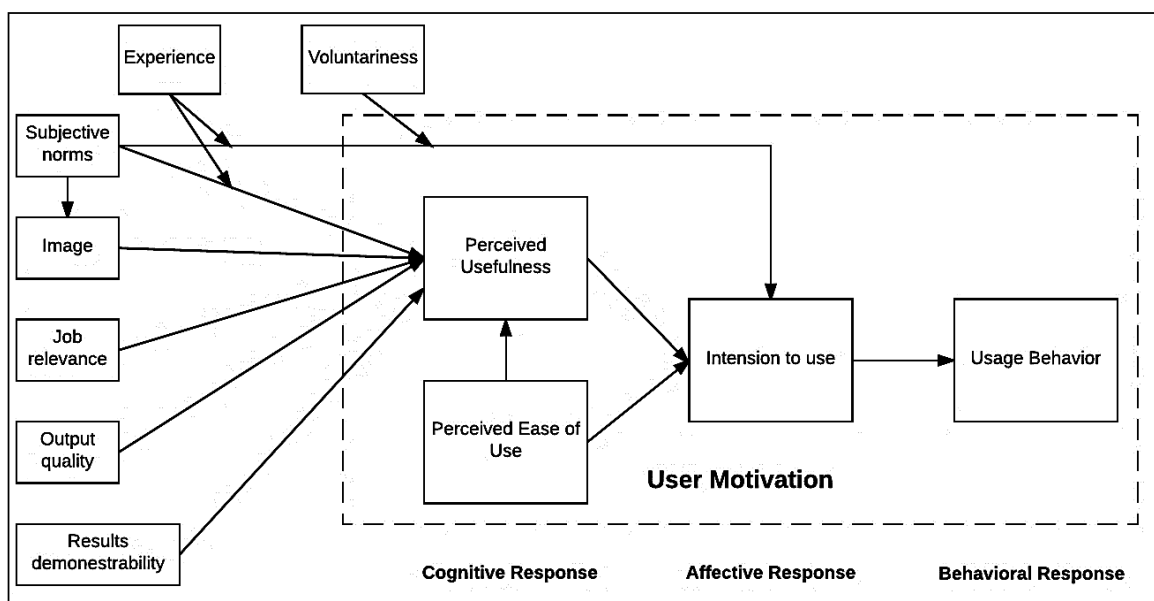
Figure 7: Technology Acceptance Model 2 TAM2 adopted from Venkatesh and Davis, (2000)

In the same year, Venkatesh (2000) published the results of a separate study that focused on the determinants of the PEOU (see Figure 8 below). The author suggested that two main categories of factors determine user perceptions concerning the ease of system use. Anchors and adjustment factors influence perception. It was found that computer self-efficacy, the perception of external control, computer anxiety, and computer playfulness are anchoring factors. On the other hand, the authors found that perceived enjoyment and objective usability are adjustment factors. The Venkatesh (2000) model rests on the argument that users' perception of a system's ease of use is anchored on their previous experiences with computers/technology in general. However, after interacting with the system adjustment factors which are more objective, the model was expected to amend the anchored

perception. Although it is not expected that hands-on experience will entirely displace anchored perceptions, it will certainly significantly influence past perceptions of the system's ease of use. This may explain why a significant group of IS practitioners wrongly believe that with time technology acceptance will improve.
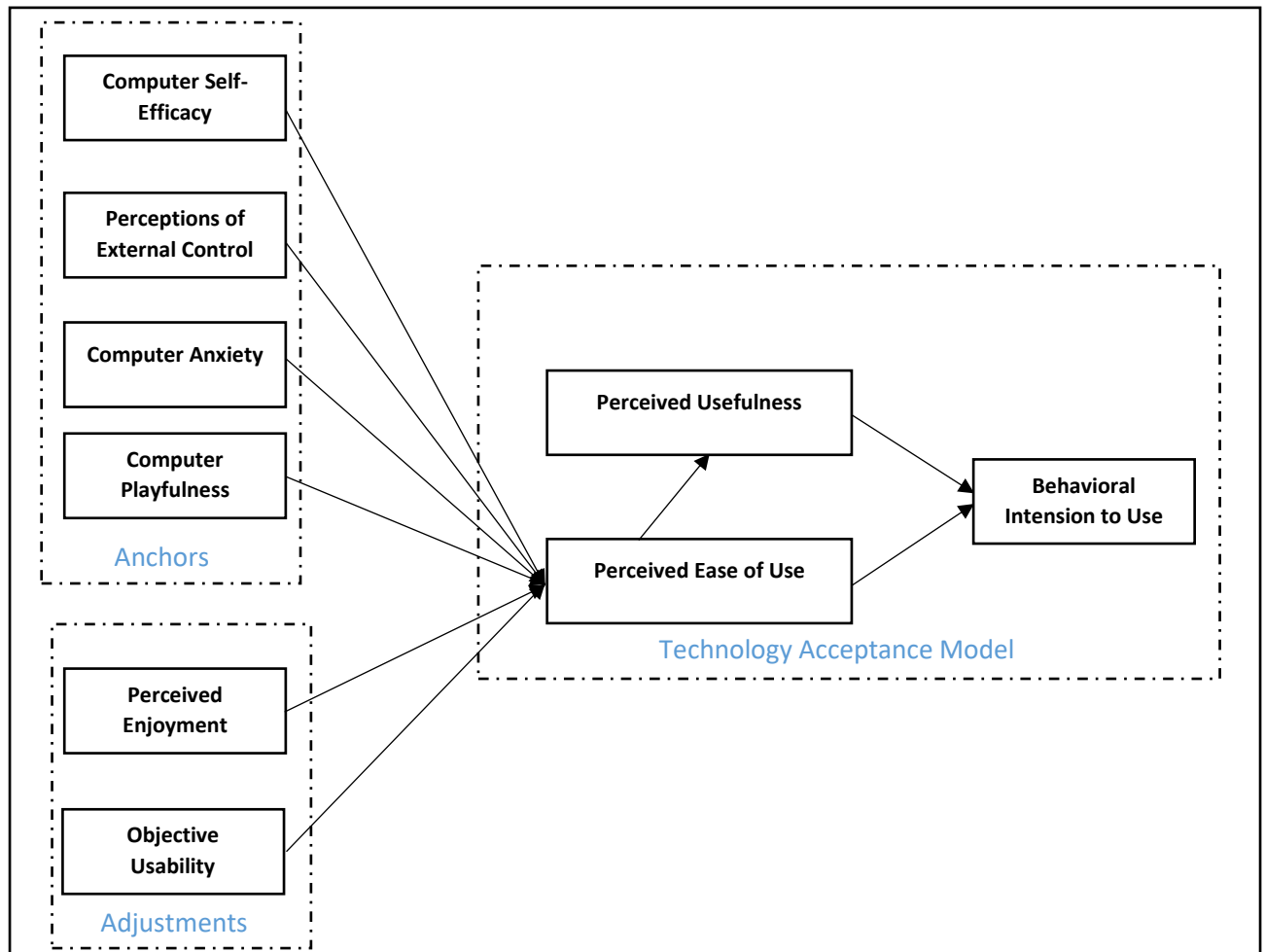
Figure 8: Determinants of PEOU Source: Venkatesh (2000)

TAM and its extensions have been criticised for varied reasons. First, TAM may have focused IS researchers into a very limited scope. Secondly, TAM is over-researched and still attracts efforts because of its simplicity. Also, TAM does not lend itself well to practitioners. As pointed out by one participant (Alan Dennis): "*Imagine talking to a manager and saying that to be adopted, technology must be useful and easy to use. I imagine the reaction would be 'Duh!' The more important questions are what makes technology useful and easy to use*" (Lee et al., 2003, p. 766).

3-Technology Acceptance Model 3 (TAM3)

Eight years after the TAM2 introduction, Venkatesh and Bala (2008) proposed the latest version of TAM, the Technology Acceptance Model 3 (see Figure 9 below). This model leveraged on the rich repertoire of the general and contextual research that extended, criticised, and modified TAM. In their paper, the authors addressed both the integration of Venkatesh (2000) and Venkatesh and Davis, (2000), and they also suggested research agendas for IS implementation interventions. TAM3, presented in Figure 9 below, demonstrates the result of the integration of the previous studies while taking into consideration the possible crossover effects between PEOU and PU determinants. The criticism offered by practitioners was one of the main motives behind the introduction of TAM3. Venkatesh and Bala (2008) argued that defining the determinants of PEOU and PU would allow practising managers to a better design intervention that could improve individual user's acceptance of IT
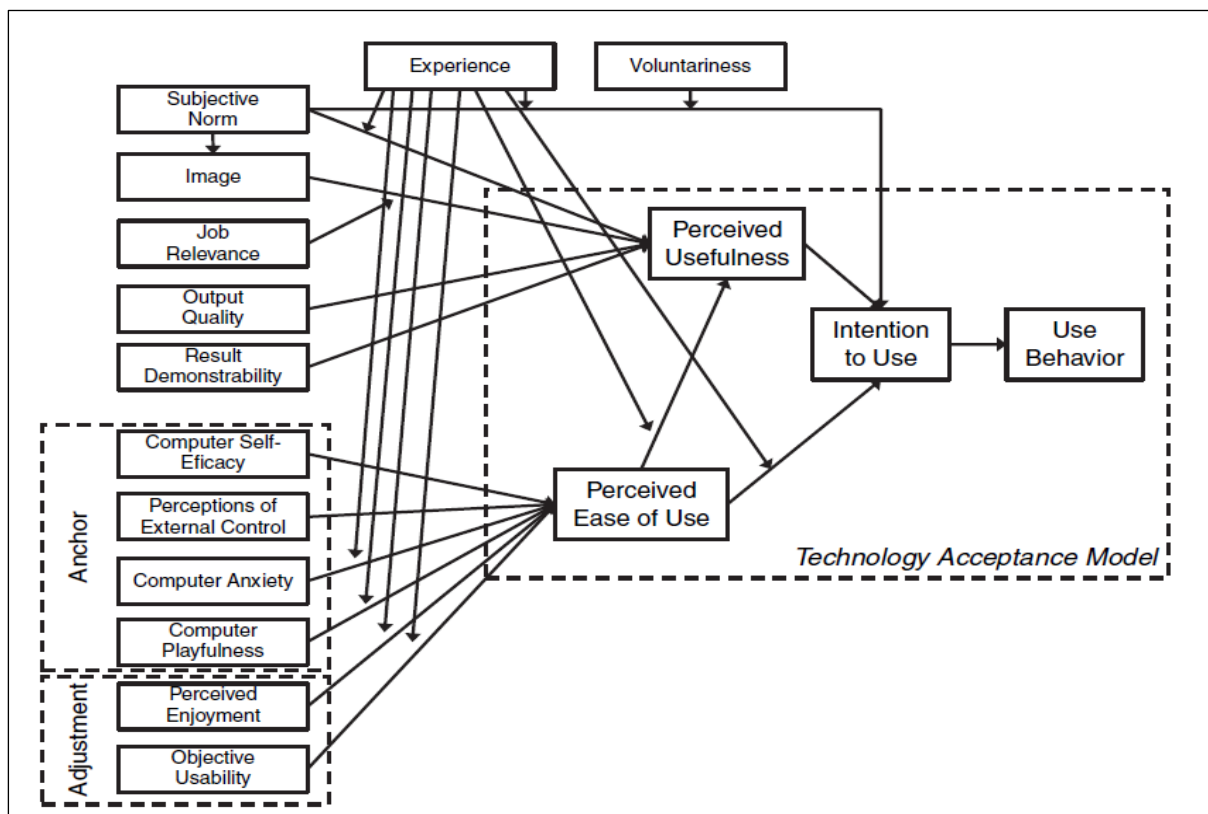
Figure 9: Technology Acceptance Model 3 Source: Venkatesh and Bala (2008)

Venkatesh and Bala, (2008) citing (Cohen, 2005; Jasperson and Carter and Zmud, 2005) pointed out that both trade and academic literature suggest that managers need to develop and implement interventions to maximise IS benefits. It is suggested that identifying the

determinants of "PEOU" and "PU" drawn from TAM3 is foundational to the underpinning of the most effective interventions. Therefore, the authors attempted to identify and propose several possible interventions based on the PEOU and PU determinants, which they argued may help practising managers to improve IS implementation results. Interventions discussed in this paper are of critical importance to an IS implementation practitioner. Unfortunately, according to Rondan-Cataluña et al. (2015), the extensions and improvements brought by the several TAM models discussed in this section did not improve the explanatory power of the original TAM. Therefore, since the objective of this literature review is to uncover a theory that could help explain the challenges facing the PMIS implementation in Group2, TAM extensions would only be considered for complementary explanations, rather than a mainframe of analysis.

According to TAM3, the PMIS implementation in Group2 is challenged by the lack of one of the model determinants: PEOU, PU and subjective norms. Each of these main constructs is affected or moderated by one or more of the 12 factors suggested in TAM3 (see Figure 9 above). This proposition will be examined further in the analysis section.

2.1.3   Unified Theory of Acceptance and Use of Technology (UTAUT)

The research on technology acceptance and use has reached a high maturity level. A multitude of models and theories were in competition when Venkatesh et al. (2003) proposed their unified theory of acceptance and use of technology (UTAUT) in Figure 10 below.
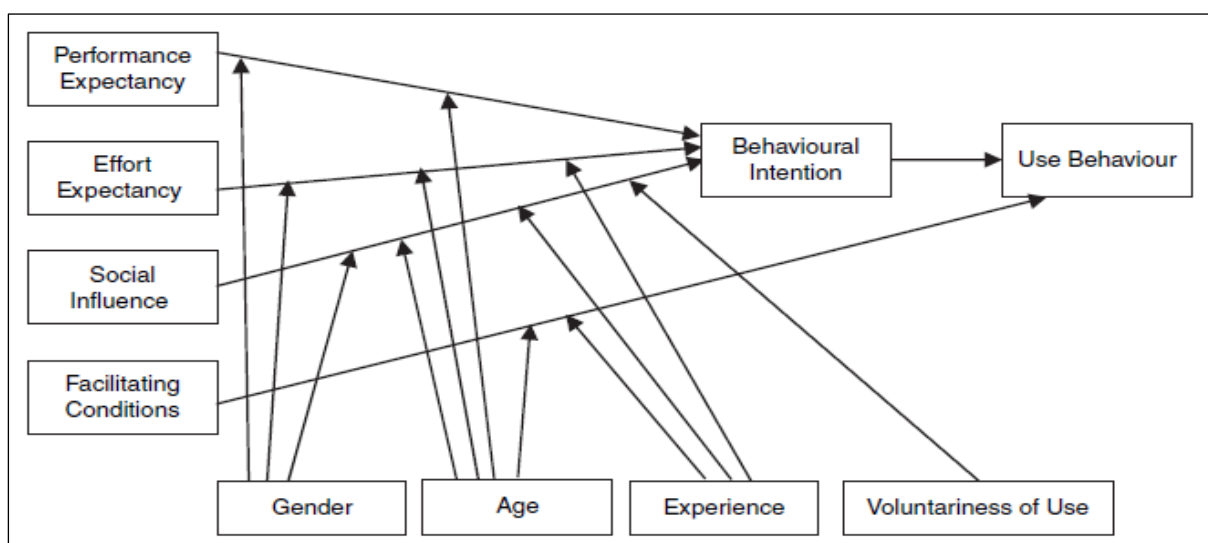
Figure 10: UTAUT Source: Venkatesh et al (2003)

The new model aimed at eliminating the theoretical confusion by suggesting a model with a stronger explanatory power building on the strengths of its antecedents. Before UTAUT, researchers were forced to select constructs across a wide variety of models that were established in various contexts and tested with different technologies (Williams et al., 2015).

Venkatesh et al. (2003) reviewed many of the existing models: Technology Acceptance Model, Theory of Reasoned Action, combined TAM and TPB, Theory of Planned Behaviour (TPB) , Model of PC Utilisation, Diffusion of Innovation, Motivational Model, and Social Cognitive Theory to generate a better unified theory. As a result, it was suggested that Effort Expectancy (EE), Performance Expectancy (PE), Social influence (SI), and Facilitating Conditions (FC) were the primary constructs that determine changes in behavioural intention to use an IS and ultimately the use behaviour itself. Also, the authors proposed gender, experience, age, and voluntariness of use as moderating factors. Figure 10 above shows the relationship between individuals' use of technology, the constructs, and moderators suggested. UTAUT is similar to TRA and TAM3 in suggesting that the actual use behaviour is a dependent of the behavioural intention. However, UTAUT does not exclusively limit the dependency of use behaviour to behavioural intention as it suggests that facilitating conditions also have a direct influence on system use behaviour (Rondan-Cataluña et al., 2015).

In addition to its strong explanatory power, UTAUT is praised for its potential practical use in determining the effectiveness of interventions to improve the use of technology such as training and marketing. The original empirical test of UTAUT proved its superiority in terms of explanatory power. This was further evident in Venkatesh et al. (2016) and Williams et al. (2015) review of UTAUT status. In many empirical tests, in several contexts, UTAUT was able to explain up to 77% of the changes in behavioural intention to use technology and 52% of the variations in technology use. In the original research, Venkatesh et al. (2003) found that UTAUT outperforms its antecedents individually, as their explanatory power ranges between 17% and 53%. However, the Venkatesh et al. (2016) review showed that most UTAUT empirical testing focused on the main constructs while ignoring the effects of moderating factors.

According to the UTAUT model and its proponents, PMIS implementation is challenged in Group2 by the deficiency of one of the above discussed models' determinants, namely PE, EE, SI, and FC. This proposition will be examined further in the analysis section.

2.1.4   TAM, Delone and McLean, and UTAUT Criticism and Integration

TAM and UTAUT and IS success model share a prominent feature which is their simplicity. Arguably, this made them the first choice for researchers examining the acceptance and success of technology introduction in very diverse situations and with different kinds of technology. However, as pointed out in Bagozzi (2007), this simplicity could also be the "Achilles' heel". In principle, the three models try to examine human decision-making mechanisms in the context of deciding to use or not use technology. Decision-making is a very complex phenomenon that is affected by a complex set of contextual factors. The three models suggest that this complex decision-making process could be depicted in a straightforward deterministic function (except UTAUT, which includes facilitating conditions, other models assume a direct relationship between the intension and the action). This relation has an embedded assumption that if someone intends to do something, they will do it. However, on many occasions, people intend to act, but they fail to do so, or they change their minds. Reducing the complicated relationship between intention and action to a one-way deterministic function is a significant issue in technology acceptance and use models that are dominating the field currently.

Another shortcoming of these models is the reduction or neglecting of group, social, and cultural aspects of decision-making. The intention of an individual to use or not use technology should not be studied in isolation from the decision social context. Shachak et al. (2019) pointed out that TAM and UTAUT alike tend to simplify the complexity of information systems implementation by ignoring many facets of the implementation context. Except for social influence and its equivalent subjective norms, TAM and UTAUT did not account for the group, social, and cultural aspects of decision making in the technology acceptance and use process. The models' representation of group, social, and cultural factors as influencers of the intention to use are very limited. They suggested that individuals are motivated by the perception of others who are important to them. This is limited in the sense that it excludes group norms and cultural identities from this social process. In a context like this research context, systems are used by a group of people. The process of performing an inspection or reviewing a drawing is collaborative by its nature. Therefore, it is reasonable to expect that engineers working in a team will collectively decide whether they will use the system or not.

Further, the cultural differences may influence individuals' decision to use the system. For example, people from cultures that promote and celebrate independent identity may exhibit decision-making behaviour that is different to people from interdependent cultures who are generally more inclined to be affected by groupthink. These possible shortages in the models discussed above are in line with Ajibade's (2018) and Bagozzi's (2007) view of the technology acceptance models.

The criticism offered to UTAUT suggests that research using it in empirical settings following its original introduction in Venkatesh et al. (2003) should experience inconsistency in the theory performance. This is inevitable considering the implied assumption in the intention-action relationship discussed above. Dwivedi et al. (2011) performed a meta-analysis to find whether UTAUT was consistent across several studies. The finding suggests it was not consistent, but this may be because all the examined studies did not take into consideration the moderating factors examined in UTAUT original study. Another interesting finding is that the effect of the facilitating conditions consistently proved more significant than in the original study.

Similarly, Holden and Karsh (2010) reviewed the application of TAM in the healthcare industry. Their findings suggest that the inconsistency found may be attributed to the unique context of health care. This also applies to the construction industry as both industries share the defining feature of being reliant on highly educated professional individuals. Most recently, Ajibade (2018) argued that TAM is not designed for organisational settings; instead, it is designed for explaining the end-user decision as an individual for personal technologies such as mobile technology.

Another critical issue in these models is the absence of a self-regulation mechanism (Bagozzi, 2007). Between the three models, only IS success model includes a self-regulation mechanism. The relationship between user satisfaction and use represent this mechanism, which depicts the influence of time and system functionality and performance on the future use of it. However, this is somewhat limited. Shachak et al. (2019) supported this view as he pointed that implementation could not be depicted as a one-time event, it is instead a continuum that manifests in a context of a system of people, processes, and technology.

Mardiana et al. (2015) suggested the integration of the three models: IS success, UTAUT and TAM3 to help offset some of the shortcomings identified above. These models together account for a very significant portion of the MIS literature in the field of technology acceptance and use. Most studies examining the acceptance and use of IS in this century has built on the models discussed above. These models received some criticism, but they remain at the top of their domain. DeLone-McLean model is accused of oversimplifying the relationship between the system use and the quality of information, quality of service, and the quality of the system. This because the DeLone-McLean model suggested that these three factors have a direct impact on the system use. Besides, the model lacks an underpinning theory for behavioural intention, which is questioned (Mardiana et al., 2015).

The intention to use is a prerequisite for use as per the theory of reasoned action (Ajzen and Fishbein, 1975). The intention to use is a behavioural intention that is affected by all three variables and many other factors. Mardiana et al. (2015) examined several meta-analyses, and one of their main findings was the lack of significance in the relationship between some of the Delone and McLean constructs. Therefore, they proposed to integrate TAM and UTAUT into the Delone and McLean model. The shared theoretical underpinning of those three leading technology acceptance models (TAM, UTAUT, and Delone and McLean) suggested that it is plausible to integrate all of them. The validated predictive power of the behavioural intention of system use which is embedded in the TAM and UTAUT models is expected to improve the Delone and McLean extended model below.
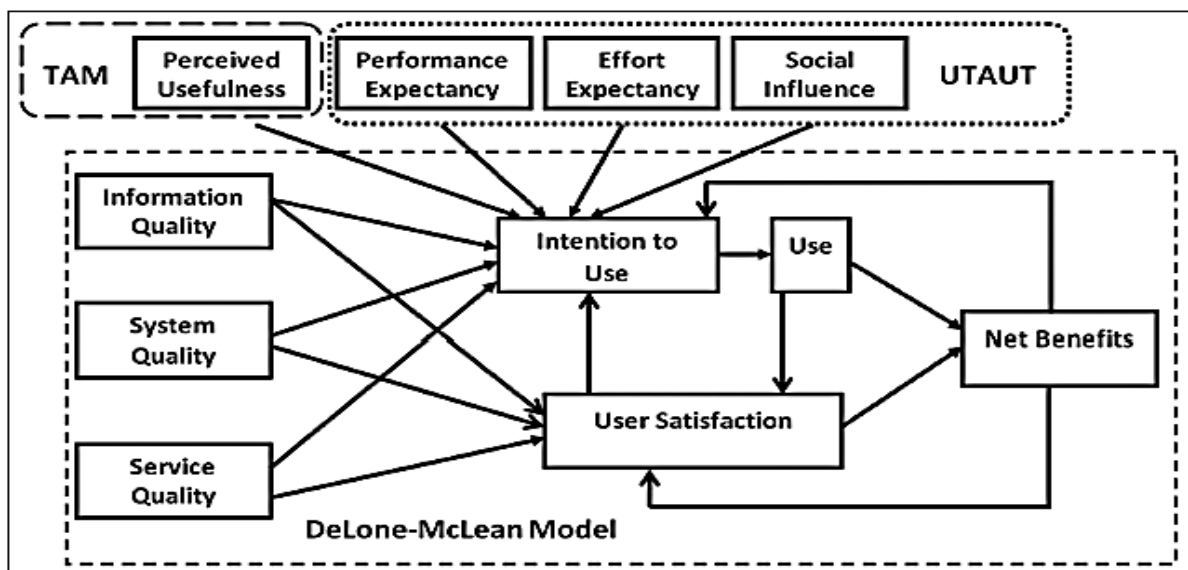
Figure 11: Delone and McLean extended model Mardiana et al (2015)

Although I agree with the principle of integrating the three models discussed above, I have some reservations concerning the model suggested by Mardiana et al. (2015). First, (PU) and (PE) represent the same measure. PU is defined as a person's belief that the use of technology will improve their job performance; while PE is defined as a person believing that using the system will improve his gains from his job. Therefore, only PE or PU should be used in the model. This argument is in line with Dwivedi et al. (2011) who noted that PE and PU in one hand and PEOU and EE, on the other hand, are mostly the same and they should not be used together. Second, Mardiana et al. (2015) did not provide a reason for neglecting the construct FC, which, as reported above, has consistently proved significant in all conditions. I argue instead that facilitating conditions should be incorporated in the integrated model, which will require removing information quality, system quality and service quality constructs. This because facilitating conditions will replace their relationship with user satisfaction after the user experience using the system. Also, EE and PE will better explain the intention to use or not use technology than those three constructs.

Proposition:

Different competing theories were reviewed in this section with each suggesting a different group of constructs that explains why or why not an end-user uses an information system. Table 1 below summarises the propositions of these theories. These propositions will be examined further in the analysis section. As noted above, I do not believe that UTAUT constructs will be enough to explain the individuals' decision to use or not use the PMIS in Group2.

Analysis level	Theory in Use	Possible sources of implementation challenges
The Individual	DeLone & McLean	Low information quality
		Low system quality
		Low service quality
	TAM 3	Lack of perceived usefulness
		Lack of perceived ease of use
		Negative subjective norms
	UTAUT	High effort expectancy
		Low performance expectancy
		Negative social influence
		Unsatisfactory facilitating conditions

Table 1: Individual Level Propositions (Source: the author)

2.2 Stream 2 - Group Level

It was evident that the theories discussed in the previous section cannot explain group resistance to the PMIS in Group2. As reported in the story chapter, during the early stage of the implementation, I noticed the technical teams' fierce resistance to use the PMIS. Thus, the next section will explore resistance theories to identify a suitable theory to help understand this phenomenon in Group2. This section is therefore concerned with answering the question: Why do users resist the use of an information system? The section aligns with Lapointe and Rivard's (2007) perspective in conceptualising resistance to information system implementation and use as a group phenomenon. As such propositions deduced from the below review were used in analysing the data from a group-level perspective.

2.2.1 Resistance

Resistance to change, in general, and IT user resistance, has been a popular research subject for decades. Many researchers assume that effectively managing resistance will improve the success odds of any IT implementation (Henderson and Ruikar, 2010; Sivnert and Jöneros, 2014; Ali et al., 2016). Further, since most of IS introductions encounter some resistance, it is a universal phenomenon that deserves researchers' attention (Markus, 1983). Many scholars also argued that understanding resistance would better equip implementers to succeed in introducing new technologies by enabling them to a better plan and manage the implementation (Klaus & Blanton, 2010). Resistance research is also praised for tackling implementation issues at its micro-level. Klöcker et al. (2014) argued that catching a glance from the users' perspective is a useful device for improving understanding of the implementation terrain; and thus, enables a smoother change introduction.

On the other hand, change management literature is also occupied by the resistance phenomenon. Regardless of the change strategy, an implementer opts to adopt, the main issue that occupies organisational change scholars remains the same. The problem with change is that it disturbs the status quo and thus evokes resistance (Karsh, 2004; Kotter & Schlesinger, 2008). A better comprehension of the reasons behind resistance allows managers to choose the right strategy to mitigate or avoid its possible adverse impact. Some argued that it is human nature to tend to resist change. Pinto and Millet (1999, p. 59) stated that:

"We tend to be leery of anything that can cause disruption in our thought patterns, approaches to decision-making, or work habits. An [information system] is bound to cause disruptions in all three of these areas".

Generally, ISs are implemented to make organisations better, which requires changing them in some way. Pinto and Millet above argued that technology introduction is disruptive in many ways, as it attempts to change the way organisational members perform their duties and, in so doing, IS introduction will probably evoke resistance. Many scholars view resistance as a psychological defence mechanism that is activated by IT disruption.

Markus (1983, p. 433) defined resistance to IT as "behaviours intended to prevent the implementation or use of a system or to prevent system designers from achieving their objectives." Although it is widely accepted that resistance is harmful to IT implementation, some upheld that resistance may benefit IT implementation (Ferneley and Sobreperez, 2006). Resistance may flag genuine issues that system implementers must address to achieve better results. It is argued that if a change agent listens carefully to resisting stakeholders, they might be able to identify areas of improvement, which will eventually lead to enhancing the overall introduction results. Some also learned that resistance could be used as a scapegoat while institutionalising the power of implementers. For instance, Almatrodi and Cornford (2013) discovered that IT professionals occasionally abused resistance to secure more power for their departments.

Another unique view suggests that resistance should not be considered as exclusive to change recipients - implementation managers and strategies could also manifest such behaviour (McKay et al., 2012). This unique perspective implies that since resistance is conceptualised as a potential behaviour that may arise from any of the implementation stakeholders, more room for the conceptualisation of implementation is required. For change agents to avoid their resistance, they need to be open-minded and to listen to the change recipients genuinely. However, this will not happen unless they have sufficient mandate to alter the implementation in response to their open discussions with the recipients. More striking is the need for reflection from the change agents, to apply self-critique and spot any resistance behaviour from their party (McKay et al., 2012).

Paradoxically, although most experienced managers know that change would most likely face resistance, they do not spend the necessary time to analyse their stakeholders and identify

who will change, and why they will. Consequently, managers are often caught by surprise when a change initiative backfires.

Resistance is a widely debated subject; many prominent scholars have suggested opposing views. For instance, based on a semantic analysis of the literature that was followed by a triple case study analysis, Lapointe and Rivard (2005) offered a warranted critique to four dominants IS implementation resistance models, while establishing their view. Although the authors valued the work of their predecessors in theorising for IT resistance, they criticised them on three different fronts. They first argued that all extant models address a single level. Some address resistance on an individual user level while others try to untangle group resistance. However, resistance often manifests at both levels at the same time. Secondly, of the four models discussed (Markus, 1983; Joshi 1991; Marakas and Hornik, 1996; Martinko, 1996) all lacked empirical evidence, except Markus (1983). Thirdly, all the models, with no exceptions, ignored the time dimension to the evolution of resistance to IT. The argument of Lapointe and Rivard (2005), in this regard, is that the resistance evolves and changes in different ways, based on the stage of the IT implementation.

Lapointe and Rivard (2005) suggested a model based on the five resistance components that they identified during their literature review. Figure 12 below illustrates these factors, which are the resistance behaviours, object, subject, threats, and initial conditions. Resistance behaviour is viewed as the manifestation of the resistor's reaction to technology introduction. Resistance behaviour taxonomy suggested by Coetsee (1993, 1999), which was cited by the authors, is profoundly useful for incarnating the resistance phenomena. The taxonomy classified resistance behaviour into four types based on the resistance level. The four types are apathy, passive resistance, active resistance, and aggressive resistance. Apathy is a very weak manifestation of resistance, where users try to distance themselves from the technology by employing tactics such as inaction. Passive resistance is also somewhat weak, but in this case, users may more deliberately try to delay change progress. Active resistance is an active manifestation of contempt; however, users do not proactively seek to incur damages. Lastly, users employing aggressive resistance strongly oppose technology introduction to the extent that they may try to sabotage the project.
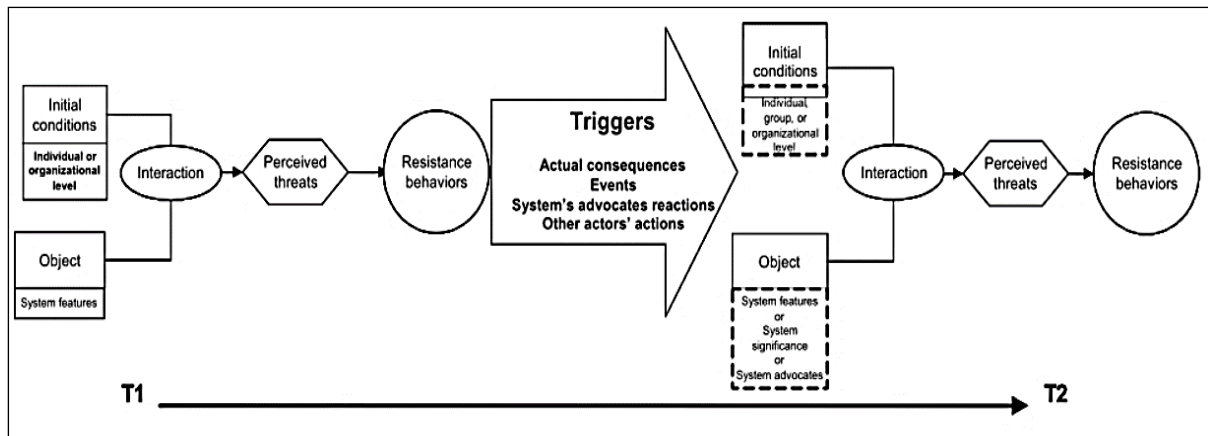
Figure 12: Resistance Dynamics Over Time Source: Lapointe and Rivard (2005)

The second element in Lapointe and Rivard's (2005) resistance model is the resistance object. Understanding the object of resistance is essential because, in part, resistance is shaped by its object (Jermier et al., 1994) cited in (Lapointe & Rivard, 2005). The resistance object may change during the system introduction, based on the stage of the implementation and the users' circumstances. The subject of the resistance phenomenon is like the unit of analysis; the implementer must observe if the resistance is stemming from an individual level, group level, or organisational level. The fourth element, which is perceived threats, is worth understanding because in many cases it explains the resistors' motivations and as such, provides the implementer with the opportunity to address the resistors' reasons to resist. For instance, users may decide to oppose implementation because they think that the implementation will result in a loss of equity (Joshi, 1991). They may also resist as a coalition when they reckon that the implementation will lead them to lose some of their powers (Markus, 1983). Lastly, the initial conditions are about subjectivity. The way the potential resistor perceives the change will determine their resistance strength.

What makes the Lapointe and Rivard (2005) resistance model, especially appealing, is its multi-level nature and its temporal dimension. Multi-level models acknowledge that although resistance originated at an individual level, it became influential only after accumulating momentum at the group level. It is seldom that a single user's resistance results in severe damage to the implementation of new technology. Acknowledging the importance of a multi-level perspective necessitates employing a longitudinal view because as resistance starts to shape at the individual level and then transforms into a group phenomenon, it changes and evolves in response to changes in initial conditions.

The model suggests that users who are uncomfortable with the system will be reluctant to resist it individually, but when events provide an opportunity for a group reaction to occur, disproportionate collective resistance accumulates quickly. For instance, when the system suffered from some technical issues, I noticed that a large group of users did not bother themselves to inform their supervisors of the PMIS issue.

According to the Lapointe and Rivard (2005) resistance model, the PMIS implementation was challenged in Group2 because some user groups perceived the PMIS as a threat. Interestingly, the model suggests that a user's perception may positively or negatively change over time. Consequently, adverse changes in favourable initial conditions may trigger user resistance at any stage of the PMIS implementation. Changes in initial conditions largely deal with more than the perception of system's utility as suggested by individual-level literature in the preceding section. As illustrated in MacVaugh and Schiavone (2010) discussion of innovation non-adoption, resistance is better understood by looking at the micro, the meso, and macro levels within which the phenomenon took shape. This proposition will be examined further in the analysis section.

2.3   Stream 3 - Organisational Level

Many scholars consider the process of introducing new technology as nothing other than a project. IS research has been a central theme in most of the major project management (PM) journals for decades. 63% of the PM articles published between 1987 and 1996, were investigating projects within the IS domain (Urli and Urli, 2000). The importance of the IS as a research field in the PM literature was also confirmed recently in a Rivard and Dupré (2009) historical study of the PM journal, published by the Project Management Institute (PMI).

PM scholars propose to enhance IS implementation success prospects through the utilisation of critical success factors (CSF), which were accumulated from past experiences. That is in line with the core philosophy dominating PM research. PM literature is mostly inspired by the accumulation of best practices in the field (Garel, 2013). The project management body of knowledge (PMBOK), a reference that represents the PM bible to many, is a collection of best practices that have been tried and proven successful in many organisations (Project Management, 2013).

At the organisational level, the question the review aimed to answer was what the organisational factors that made an IS system implementation successful are?

2.3.1   Critical Success Factors (CSFs)

The first objective of this study was to identify the challenges that faced the implementation of the PMIS in Group2. CSFs advocates argue that challenges might be the result of the absence of all or some of the CSFs.

CSFs could be defined as the mechanisms that need to be managed with care for an organisation, initiative, project, or even an operation to secure a chance of success (Boynton and Zmud, 1984; Sherry Finney and Martin Corbett, 2007; Al Saleh, 2015). There is a broad agreement on that learning from CSFs investigation enables organisations to avoid IS deployment failure (Norton, 2012; Shaul and Tauber, 2013; Hughes et al., 2019). In this sense, the CSFs literature is of high relevance to this research.

PM literature concerned with ISs advocated the great importance of CSFs to the effective and efficient introduction of a new IS. Pinto and Millet (1999, 47) argued that CSFs represented a vital tool that was of equal importance to the quality of the implemented system itself. Managers may develop successful implementation strategies based on an understanding of the role and the influence of individual CSFs on the implementation outcome and the interaction between them (Gupta and Naqvi, 2014). More recently, Tarhini et al. (2015) argued that understanding CSFs increases the likelihood of a successful implementation, which is the ultimate objective of this study.

Many authors studied CSFs in both the public and private sectors, and they suggested different sets of CSFs (Tarhini et al., 2015; Williams et al., 2015; Alhajaj, 2018). The various and numerous studies demonstrate the lack of consensus on a definitive list of CSFs (Hughes et al., 2019). It also justifies criticism of CSFs researchers' approach, in arguing that naturally, research that is dominantly based on interviews is susceptible to bias (Sherry Finney and Martin Corbett, 2007).

However, CSFs that are independent of context are mostly similar in one way or another (Axelsson, Melin and Söderström, 2011). In a study of CSFs for an Enterprise Resource Planning (ERP) system implementation, Shaul and Tauber (2013) reviewed 341 articles published between 1998 and 2010. Their findings suggested a group of 15 CSFs. The authors

suggested that CSFs are to be used in focusing implementation team effort through the life cycle of the ERP system. In contrast, a general view held by many scholars is that CSFs are to do with preparation for the implementation and to be monitored during the implementation as well (Pinto and Millet, 1999; Hartman and Ashrafi, 2002; Shatat, 2015). The CSFs compiled by Shaul and Tauber (2013) were thus reduced in Table 2 below to include only factors relevant to the context and implementation stages examined in this study. The same elective logic was applied to Finney and Corbett (2007).

Pinto and Millet (1999) used three studies that they argued were of the "best-known" to build a framework of 10 critical success factors. Other scholars adopted a similar approach. Some, such as Hartman and Ashrafi (2002), suggested that software projects are not different from any other type of projects, IS implementation should be managed by employing a PM methodology. A list of ten CSFs was also suggested in Hartman and Ashrafi (2002), who argued that if the project team attended to those CSFs, implementation success probability would improve significantly. A recent empirical study carried out by Shatat (2015) followed the same route. The Shatat (2015) study was carried out in Oman, a Gulf country with a culture similar to the culture in KSA. Although the literature review conducted by Gupta and Naqvi (2014) uncovered a vast number of CSFs, they argued that research had not yet uncovered all possible CSFs. Tarhini et al.'s (2015) review of the literature identified 51 CSFs. However, most of them were not cited in more than 15% of the 35 articles reviewed. The most cited CSFs in their paper are also included in Table 2 below. Most recently, Hughes et al. (2019) endeavoured to illustrate the interrelated dependency between different CSFs using interpretive structural modelling. To achieve their objective, the authors conducted a literature review to identify prominent CSFs in IS literature.

Table 2 below lists the CSF examined by Hughes et al. (2019) besides the top factors suggested by the studies mentioned above. Selecting some of the CSFs over others is based on the logic that not all CSFs are worth an equivalent level of attention. As argued by Ginzberg (1981) if multiple issues are involved, it is unlikely that all issues are equally important.

#	K. Pinto and Millet, (1999)	Hartman and Ashrafi (2002)	Shaul and Tauber (2013)	Shatat (2015)	Tarhini et al. (2015)	Sherry Finney and Martin Corbett (2007)	Hughes et al. (2019)
1	Project mission	Clear Mission	Implementation strategy	Clear Goal and Objective	Top management support and commitment	Top management commitment and support	Clear business case
2	Senior Management Support	Top Management Support	Top Management Support	Project Champion	Training for different user groups	Training and job redesign	Engaged and committed sponsorship
3	Project Plan/Schedule	Detailed project plan	Project Management	Top Management Support	Project management	Project management	Use of PM methodology
4	Client consultation	The owner is informed and has approved each stage	User involvement	User Involvement	Clear vision, goals, and objectives of the ERP system	Visioning and planning	User involvement throughout the project
5	Personnel	The formal change management process	Change management	Monitoring and evaluation	Careful change management	Change management	Integrated change and project management
6	Communication	Proper communication	Enterprise system selection process	Strategic Planning	Interdepartmental communication	Communication plan	Resistance management process
7	Client acceptance	Owner consultation	Acceptance control	User training	Project champion	Project champion	Skills, experience and style of PM
8	Monitoring and feedback	The project will achieve the stated business purpose	Project tracking	Teamwork	ERP implementation consultant	Consultant selection and relationship	Short stage duration
9	Technical Task	Appropriate technology and expertise are available	Project team competence	Vendor Support	Business process re-engineering (BPR)	BPR and software configuration	Formalised role definitions
10	Troubleshooting	Complete project with minimum scope changes	Education and training	Training in new business processes if any	Communication among the implementation team	Client consultation	Tools and infrastructure

Table 2: A Contrast of Some Critical Success Factors

In Table 2 above, the ten CSFs suggested by each of the mentioned studies are contrasted. Despite the different wording of the CSFs in the mentioned studies, after all, all the cited studies essentially suggested similar CSFs.

CSFs research was criticised for being both simplistic and static (Pinto and Millet, 1999; Aladwani, 2001). The search for success/failure factors is content research since it attempts to explain success/failure by attributing it to the implementation context. In comparison, the process research focus is the process of the implementation itself. Because of its static nature, content research falls short of anticipating the results of the interaction between various factors within the research environment. This shortage of CSF theories has implications for this research since the researched problem is highly nested in its context.

Davis (1989) argued that CSFs research had overemphasised the importance of some factors while marginalising others. For example, Tarhini et al. (2015) recently conducted a study aiming at classifying CSFs from a stakeholder perspective. Their literature review resulted in a list of 51 CSFs. However, only the top 9 CSFs in their list were cited in more than 30% of the articles reviewed. This supports the conclusion of Gupta and Naqvi (2014), who argued that most of the CSFs lists available in the literature fell short of addressing the implementation full picture.

Additionally, CSF studies are limited to the context, setting, scope, and stages examined in the respective studies. As a result, some CSFs have been more widely cited in the literature. Not because of their relative importance but because the specific system and the stage of their existence received more considerable attention. Some researchers even referred to the development of long lists of CSFs in ERP implementation research as "laundry lists" since they lack insight into how one affects another and vice versa (Akkermans and Van Helden, 2002; Richmond, 1993).

Although CSFs have their limits, they offer critical insights on ways to improve the likelihood of IS implementation success. Therefore, this study theorised: absence CSFs selected above might represent the reason for the setbacks faced Group2 PMIS implementation. This is proposition will be examined further in the finding and discussion section. Hughes' et al. (2019) CSFs were selected as they represent a recent summary of earlier work. An

examination of Table 2 above supports this selection as it reveals the inclusiveness of the Hughes et al. (2019) study.

2.4 Literature Contribution to This Research

The literature review detailed above contributed to this action research project in two significant ways: first, the theories reviewed provided an analysis template, which facilitated the understanding of the challenges facing the PMIS implementation. Second, the literature review also informed the thinking of the implementation team during the struggle to identify the actions needed to improve the effectiveness of the PIMS implementation.

In terms of guiding the data analysis, the conclusion of the literature review revealed the multi-level nature of the implementation phenomena. As such, the analysis followed the process used by Lapointe and Rivard (2007) in analysing the data from a multi-level perspective. Table 3 below summarises the proposition deduced from the literature review. This summary will be used as an analysis template to help in examining the data to answer the first research question: What were the challenges that faced the PIMS implementation in Group2?

Analysis level	Theory in Use	Reason for PMIS implementation challenge based on a theory construct	Status
The Individual	Information Systems Success Delone and McLean (2003).	Low information quality	
		Low system quality	
		Low service quality	
	TAM3 Venkatesh and Bala (2008)	Lack of perceived usefulness	
		Lack of perceived ease of use	
		Negative subjective norms	
	UTAUT Venkatesh et al. (2003)	High effort expectancy	
		Low-performance expectancy	
		Negative social influence	
		Unsatisfactory facilitating conditions	
The Group	Resistance Lapointe and Rivard (2005)	Users' group perceives PMIS as a threat	
The Organization	Top Critical Success Factors based on Hughes et al. (2019)	No clear mission	
		Lack of top management support	
		Lack of project management	
		Lacking user involvement	
		Lack of change management	
		Lack of resistance management process	
		Unskilled project manager	
		Lengthy implementation	
		Undefined roles	
		Lacking vendor support	
The Implementation Result in an Embedded Unit of Analysis			

Table 3: Analysis Template (Source: The author)

Second, the theory reviewed suggested the actions aimed at improving the PMIS implementation. The literature review was a continuous process that ran in parallel to the PMIS implementation in Group2. In hindsight, I can now see that during the different implementation cycles/stages reported in Chapter 4 (The Story), I have used different theories from the literature to suggest the actions implemented at each stage. Looking at my diaries, and the story of what happened, I concluded that the actions implemented or suggested was influenced by espousing a theory or a set of theories. The chronology of the research is thus a manifestation of a learning trajectory through which the researcher learned of theories that were relevant to the researched phenomena. In addition, learned to integrate the insights brought from those different scattered pieces of relevant theories into actionable knowledge. Figure 13 below illustrates the chronology of the literature contribution to the PMIS implementation improvement efforts reported in this study.

It is very critical to point out that the literature review reported here was carried continuously in parallel to the action research process reported in the "Story" chapter. My knowledge of the theories discussed was very limited at the beginning of the action research process and increased with time. As such, the early actions implemented to improve the PMIS implementation were at best only partially informed by the above discussed theories. This is important because even if the literature review suggests that at the individual level UTAUT is the best available theory that may help to identify and understand the implementation barriers at the individual level, I used TAM3 and IS success during most of the action research process. Luckily TAM3 and IS success models together cover all the constructs and relations that exist in UTAUT apart from facilitating conditions.

As illustrated in Figure 13 below, during the earlier stages of the implementation, I used PM literature and its suggested critical success factors as a guiding theory of action (reviewed in section 2.3.1). The adoption of the CSFs theories was tailored to the understanding of Group2 as a temporary organisation (Burke and Morley, 2016). As the implementation progressed further and in response to questions evoked by the practical reality of the implementation results, I reviewed and espoused theories from information system success and introduction models (reviewed in section 2.1) and from resistance management theories (reviewed in section 2.2).

Theory in Use	When?	Implementation stage and location

Theories Espoused
Project Management K. Pinto and Millet (1999) critical success factors Temporary Organizations Goodman and Goodman (1976) aligning implementation mission to the particular expectations of a temporary organization members.

May-15

Construct

Reflect — Plan
Group2 HQ
Evaluate — Act

Reflect — **Plan**
Hospital-Q
Evaluate — Act

Reflect — **Plan**
Hospital-A
Evaluate — Act

Oct-15

Theories Espoused
Insights from above theories +
Information systems success and acceptance Models Mardiana et al. (2015)
+ Resistance to technology introduction Rivard and Lapointe (2012)

Reflect — Plan
Group2 HQ
Evaluate — Act

Jan-16

Re-construct

Reflect — **Plan**
The triple Twins
Evaluate — Act

Apr-16

Theories Espoused
Refining Insights from above theories led to the disregard of CSF and project management theories and to the integration of IS, TOs and Resistance theories.

Reflect — **Plan**
Hospital-K
Evaluate — Act

Reflect — **Plan**
Hospital-M
Evaluate — Act

Jun-16

Reflect — **Plan**
Hospital-B
Evaluate — Act

Theories Espoused
Actionable Knowledge: Implementing IS from a multi level perspective Von (2009) and Cummings et al. (2016), CATS used to integrate the insights from MIS, TOs, Stakeholders and Resistance theories into an implementation framework.

Reflect — **Plan**
Hospital-H
Evaluate — Act

Reflect — **Plan**
Hospital-S
Evaluate — Act

Mar-17

Learning Synthesis

Figure 13: Theory in Use Trajectory Source: The author

I then worked on creating an integrated understanding of the discrete insights brought by the different theories reviewed and espoused. Knowledge synthesis was achieved by attending to the actions implemented and observing their results. Lastly, I reflected on how the knowledge on hand has helped in shaping the changes noticed as a result of action (Ramsey, 2014).

During the final implementation stage reported in this study, I reviewed implementation literature to create a comprehensive implementation strategy that benefited from the trajectory of learning experienced and the emergent understanding of the complexity of the implementation landscape. Therefore, the accumulated learning was integrated into the implementation framework discussed in the finding section. This was the actionable knowledge resulting from answering the second research question: How to improve PMIS implementation in Group2?

3 Research Methodology and Design

This chapter provides the research design and methodology employed in this study. The motive to adopt action research as a meta-methodology is explained and how it aided the achievement of the research objective is described. In addition, I justify the rationale behind using a single case with embedded units in conjunction with a multi-site action study under the umbrella of action research as a meta-methodology.

This chapter is divided into six sections. Section 3.1 provides the underlying reason for selecting action research as a strategy. Section 3.2 contains a detailed description of the research strategy and explains its suitability to the research problem and context. Section 3.3 describes the research design and lays out the argument for using an embedded case study in conjunction with multi-site action research as a methodological angle. Section 3.4 provides a detailed description of the methods of inquiry that improved the validity and quality of the research. Section 3.5 outlines the research quality measures, while section 3.6 concerns the process I applied for analysing research data.

3.1 Research Objective and Context

My pragmatic beliefs are the primary motive behind the choice of a practice-based problem as a topic of inquiry. Cherryholmes (1992) comprehensively described the pragmatist's approach to scientific inquiry when he explained how each pragmatic researcher determines his or her research topic and research methods. According to Cherryholmes (1992, p. 13), "Pragmatic choices about what to research and how to go about it are conditioned by where we want to go in the broadest of senses."

It is the potential practical outcomes of the inquiry to the stakeholders that matter. These potential ends were what conditioned and determined the research protocol and techniques used in this study. As a researcher, I share a similar perspective with Reason and Bradbury (2001) and Coghlan and Brannick (2009) that management research must cater to and benefit at least three different audiences. First, it must strive to produce results that are of value to the research's immediate stakeholders. Second, it should contribute to knowledge repertoires. Finally, management research should nourish the personal and professional development of the researcher.

With this triple objective in mind, I elected the Group2 PMIS implementation issue as a topic of inquiry. The problem was a real practical challenge harbouring the potential to benefit the researched organisation in multifarious ways. First, identifying and understanding the challenges that faced the implementation in Group2 can facilitate their elimination. This can improve the implementation effectiveness, which may contribute to the overall improvement of the delivery of Group2 projects (Raymond & Bergeron, 2008). Second, the research process may end up embedding a new capability into Group2 by enacting action research as a new way of learning that could be redeployed for other practical problems (Roth et al., 2007). Academically, this research is significant in various ways; it holds potential to contribute to the bridging of the apparent gap in the PMIS implementation empirical literature in developing countries (Al-Saleh, 2005; Ejodame, 2015). This research will also help develop me professionally and scholastically. Also, the scope and nature of this research has potential to develop my skills in managing change, information systems, and research.

The research was conducted in a natural setting, whereby I formed part of the problem to be investigated. The research covered a research problem encountered in a real-life situation at a temporary organisation (further details about the context is provided in section 4.2). A practice-based problem induced the research design employed in this study. The research stakeholders worked for different organisations that were all in a contractual relationship with the MOH of Saudi Arabia (the owner of the construction projects group that was the site of this research). My professional role evolved during the research journey, from being solely focused on the implementation of the PMIS in Group2 projects to a broader role that covered several areas such as Group2 quality practices, governance, and monitoring and control. Concerning this research, the geographical disparity of research sites and the complicated political relationship between the different stakeholder groups were the contextual characteristics that affected both the research design and process.

When I joined Group2 organisation the PMIS implementation had already commenced. The implementation was not progressing smoothly as exemplified in the implementation progress official report issued by Group2 PMO. Stakeholders were not willing to adopt and use the PMIS, despite the "MOH" client being keen to finish the implementation. Originally, the MOH required the implementation to finish within 6 months starting March 2015. The MOH expected the PMIS to improve their decision-making capability by enhancing information

flow, transparency, and control. A team from the PMO, I included, was responsible for implementing the PMIS. Therefore, I was compelled to study Group2's PMIS implementation process to improve its outcomes. As discussed in the introduction section, to achieve this objective, it was necessary to identify the challenges facing the implementation, understand them, and to intervene to overcome them. This was an ambitious objective considering the timeframe of both the implementation process and the DBA program.

Several reasons made me believe that the identified research objective was achievable. First, because the implementation issue was anchored on top of Group2 management agenda, hence; it was expected that the research would receive ample support. Second, because there were several sites where the implementation was yet to start in semi-parallel sequence. I was convinced that several action research cycles could be observed in a short time period. Third, being fully dedicated to the PMIS implementation, I thought that I could devote adequate time to research activities that were perceived as part of the implementation process. Fourth, access to the research sites was not problematic as I was part of the team responsible for the implementation in Group2. Finally, the multi-site action research design facilitated the smooth movement of research activities between different PMIS implementation sites. Therefore, I was certain that action research was the most suitable approach for enabling the achievement of the multiple research objectives within this complex context.

3.1.1   Justification for Using Action Research

Because, of the tight relationship between researcher identity and research design, I strove to explicitly highlight my scholar-practitioner identity as I saw it. Ontologically, being a realist, I believe in the existence of a world that is independent of me. Although this ontological position has been traditionally attributed to the positivist tradition, Johnson and Duberley (2000) correctly sustained that there is still room for other philosophies to claim this ontological position while distancing themselves from positivist epistemology. Based on this perspective, I subscribe to the pragmatist view in regards to epistemology. It is critical to note that being a pragmatist; I depart from positivism's philosophical conceptions concerning access to knowledge about the world. I do not believe that it is possible to objectively observe the social world out there. The observer and the observed are always interdependent which always affect each other one way or another.

One of the main implications of this position is that I view reality as what works in a specific context at a specific time (Simpson, 2009). It is thus temporal and contextual. My concern as a researcher is to uncover practical solutions for practical problems. I acknowledge and understand that as a participant in creating and understanding the social context into which I am enquiring, I both affect and am affected by the inquiry's context. Consequently, to me, it is unwarranted to suggest that while researching a social context, a researcher may detach oneself in a manner that enables "objective" evaluation of the enquiry. My position is in line with the thinking of American mainstream pragmatist philosophers such as Charles Sanders Peirce, William James, John Dewey, and George Herbert Mead (Simpson, 2009).

Instead of debating issues of truth and reality, pragmatism focuses on 'what works' concerning the truth and the research questions. Pragmatism accepts the existence of reality but does not see reality as stable; reality is constantly changing as a result of actions (Teddlie and Tashakkori, 2003) cited in Faffelberger (2018).

Considering my ontological position, my epistemological believes, the research objective and context, I decided to select a qualitative methodology for this research project. Qualitative research is considered optimal when the researcher wishes to explore a contextual setting (Creswell et al., 2007). This research setting is considered highly contextual due to the particularity of the temporary organisation nature and the high impact of the research stakeholders on the research process and results.

This thesis departs from the tradition of equating qualitative research to interpretive research and instead submits to the notion that qualitative research has different varieties, which originate from different research paradigms (Goldkuhl, 2012). One of those alternative paradigms is pragmatism, which is different from the interpretive paradigm in two main facets. First, pragmatism does not dismiss the use of quantitative data as invalid, while interpretivism does. The second difference, which is critical to this research, is that pragmatism's focus is action, rather than meaning (Creswell et al., 2007; Morgan, 2014).

Bearing in mind the action focus of my research project, I evaluated my options within the qualitative research realm. Creswell (2006) discussed five of the most prominent qualitative strategies in management research. The author compared narrative research, phenomenology, grounded theory, ethnography, and case study. The author rightly

demonstrated that the primary differentiator between these five qualitative research approaches is the objective of the research. Narrative studies are commissioned to explore and report on an individual life story. Phenomenology is about understanding and describing the essence of a lived experience. Ethnography is very similar to phenomenology except that it focuses on a shared cultural experience. Case study research focuses on understanding and providing a rich analysis of a lived experience which could be an event or a process of single or multiple cases. Lastly, grounded theory is commissioned with the intention of producing a theory that is grounded in the data collected from the field. Although some of these approaches may fit the requirement in my research contexts such as case study and grounded theory, none of them promises to guide the change intended in this project. As the lack of action focus on those five approaches, I decided to employ action research as a research strategy.

3.2   Research Strategy

A research strategy is a broad boundary that determines the research's direction. In the context of this thesis, it is the effort toward helping the research stakeholders to better understand the challenges they faced during the PMIS implementation. This would enable them to plan, act, and evaluate action taken to overcome those challenges. I selected Action Research (AR) as a research strategy for several reasons. First, AR supported the multiple objectives of the project. Unlike other methodologies, AR does not limit the researcher to the observatory role. Instead, action research aims at changing things and studying them while they are changing (Creswell et al., 2007; Easterby-Smith et al., 2008). Second, AR precisely fulfils the required congruence between my pragmatic commitment and the research contextual and multi-objective nature. Third, action research was well suited to help me achieve personal development through enabling reflective learning, while I progressed in both solving a practice-based issue and in fulfilling my doctoral thesis requirements. Thus, I concur with the many who argued that action research is the most suitable approach to relevant research that has the potential to contribute to the development of both practice and theory (Zuber-Skerritt and Perry, 2002; Brydon-Miller et al., 2003; Levin & Greenwood, 2006; Zhang et al., 2014).

This research embodied both theoretical and practical objectives and was undertaken within the context of the researched organisation. Therefore, AR was deemed a suitable research

strategy to facilitate both the understanding of the Group2 PMIS implementation challenges and to suggest ways to improve the implementation results.

3.2.1   Action Research

Action research was selected as the research strategy for this study based on the justification discussion in section 3.1.1 above. Nonetheless, I found it challenging to establish which action research variety to implement. This because a myriad research approaches are professed as action research. Action learning, community-based participative inquiry, youth participatory action research, educational action research, appreciative inquiry, action science, and soft system methodology are some of these action research varieties (Dick, 2009). Burns (2007b) advances one of the most profound, albeit simple definition of action research; 'it is the progression of knowledge'. In this view, AR is professed as a process that is full of surprises and discoveries, learning, and understanding the discipline. Similarly, O'Brien (1998) suggested that the simplest definition of action research is "learning by doing." In support of this definition, Hillary Bradbury advocated for adoption of the premises of pragmatism in its argument for knowing by doing (Brydon-Miller et al., 2003).

Conversely, O'Brien also tried to explicate action research further. He illuminated action research in terms of its objective. From this perspective, he suggested that the purpose of action research is to help the immediate stakeholders of the researched problem while simultaneously contributing to science. This view entails that action researchers are committed to both scholars and practitioners' communities. O'Brien's (1998) dual commitment view is supported by many scholars (Baskerville and Myers, 2004; Seror, 1996; Avison et al., 2001; Coghlan and Holian, 2007; Coghlan and Brannick, 2009; Dick et al., 2015).

Another endeavour to define action research was dependent on clarifying what action research is not. From this perspective, scholars argued that action research could not be simply defined as another research methodology. Instead, action research must be conceived as an approach to inquiry. Advocates of this view, such as Reason (2003), Burns (2007a), and Bodil and Jesper (2006) argued that action research as an experimental knowing approach is sanctioned to harness multiple research methods to enable learning and sense-making. According to these scholars, researchers experiment critically, reflect on the results, and apply intellectual analysis while drawing on several forms of evidence. Many other scholars

advocated action research as meta-methodology: an umbrella process that subsumes multiple sub-processes (Dick, 2009; Phelps and Graham, 2010; Coghlan and Brydon-Miller, 2014; Dick et al., 2015; Dick; 2015). Attwater (as cited by Coghlan and Brydon-Miller, 2014) emphasised the pluralistic perspective espoused by action researchers applying it as a meta-methodological framework. Attwater argued: instead of debating weakness and incompatibilities of this strategy, a meta-methodological approach leverages and develops frameworks for interpretation that respect the existence of multiple viewpoints. In the process, it critically explores complementariness and leverages it in "apprehending through experimentation with the outside world" (Coghlan and Brydon-Miller, 2014, p.4).

More recently, Dick et al. (2015) provided an example of the use of action research as a meta-methodology. They argued that this approach enabled them to be flexible and effective while managing their funded research project. They attributed the success of the research project despite the contradicting demands of the stakeholders to the use of action research as a meta-methodology. The advantages of action research as a meta-methodology was emphasised by Dick (2015, p.440) who argued: "In partial summary, action research is not so much a methodology as a meta-methodology. Its cyclic iteration between action and reflection confers great flexibility, increasing its relevance in complex situations. Under its umbrella, several methodologies can be used, and other methods incorporated to enhance deeper understanding of the situation. When relevant participants are engaged fully in each turn of the action research cycle, the complexity and strength of action research can be further strengthened."

Referencing to the above discussion while considering the context of the research imperatives, I decided to utilise action research as a meta-methodology that embodied the research methods and protocols operationalised during the actual fieldwork. The research followed an emergent design that endeavoured to retain its flexibility during the research process enabling the study to adjust to the unfolding changes of the research terrain.

3.2.2   Insider Action Research

During the entire period of this research, I was a full-time employee of the researched organisation. Most of the time, I served as the lead project manager and change agent of the researched phenomena, which was the PMIS implementation. The duality of being a member

of an organisation that was the subject of research and researching it was a challenging practice. Moreover, employing action research as a research strategy in such a context meant accepting the tensions inherited in an insider action research project. In this context, I was burdened by the responsibility of keeping a delicate balance between my organisational duties and my research interest.

In such a situation, a researcher must manage to reflect on how his or her practitioner-researcher role affects his or her view of the organisational dynamics and how being a researcher affects how he or she is perceived by others (Coghlan and Holian, 2007). AR's rigorous iterative inquiry process of construct, plan, act, and evaluate may sometimes conflict with the reality of the organisational processes and politics. In such events, an insider action researcher who is working toward an academic degree in addition to his or her everyday organisational role may face an unfortunate conflict between the personal and organisational objectives. The conflict between researcher and practitioner identities was pointed out by Coghlan and Brannick (2009) as one of the three challenges encountered by an insider action researcher. Another challenge highlighted by the authors is the pre-understanding challenge, which stands for the presumptions the researcher holds about the researched system before starting the research. Owing to the researcher's original role as a part of the system, he or she holds beliefs that are constructed prior to engagement with the research. The insider action researcher should leverage the benefit of closeness to the researched system to enhance the research findings (Roth et al., 2007) while fulfilling managerial obligations and when necessary, distance oneself to enable critical reflection.

'Closeness to the data' is a general criticism of most qualitative research methodologies. Roth et al., (2007) view closeness as an advantage in a qualitative research. They argued that being native to the research context offers the researcher uncontested insights into the social and political landscape. In their quest to develop new organisational capabilities, the authors successfully mobilised insider action research, both as an instrument and as a result. Gummesson (2003) dismissed the claim that closeness to data will eventually result in a subjective interpretation of the data. He illustrated that since all humans are somehow part of a system, everyone is a native; everyone is entering the social research field with presumptions one way or another.

The last challenge that Coghlan and Brannick (2009) pointed out is the access problem. Naturally, the insider action researcher is granted access to primary data but accessing secondary data may prove problematic. Superiors may not feel comfortable about organisational data being published as part of an academic report. Insider action researchers need to consider such resistance early in the research and plan a negotiation strategy to overcome it.

In this research, I was unlucky in being confronted with the three challenges discussed. However, despite the frustrations that accompanied the research experience, it was full of insights, learning, and development. Enacting "political entrepreneurship," taking advantage of red-hot issues, and managing stakeholders as advised by Hans and Sundgren (2005), helped to overcome these issues. Monitoring the political system at the insider researcher organisation, analysing, and acting when required is more vital to insider action research than adhering to a prescribed research process, as emphasised by Coghlan and Brannick (2009). Section 3.4.1 provides more details on collecting data as a participant-observer.

3.3   Research Design

3.3.1   Research Methodology

A qualitative research design was adopted for this research project to enable the achievement of the research objective. Qualitative research is considered optimal when the researcher wishes to explore a contextual setting while submitting to the notion that multiple views of reality exist (Creswell et al., 2007). The research setting in question was considered highly contextual due to the particularity of Group2 which has highly impacted the research process and results. It was most likely that the research problem was of a behavioural nature. Thus, the research context was expected to have a considerable influence on the research process and outcomes.

Qualitative research methodology has gained momentum as more researches that employ a qualitative approach are increasingly accepted and published in leading management journals (Bluhm et al., 2011). Some of the prominent qualitative methodologies include case study, phenomenology, and ethnography.

The aim of this research was twofold; the first objective was to understand why the implementation of the PMIS at Group2 was failing? The second objective was to use the

understanding drawn from the first phase of the research to improve the implementation results.

Yin (2009) suggested that case study research is best suited for a research that intends to answer why and how questions. He pointed out that case study research allows the researcher to study a contemporary phenomenon whereby the boundaries between the event and its context are not clear. Further, case study research uses multi-data collection methods such as interviews, historical records, and observations, thus facilitating the understanding of the issues in hand (Schramm, 1971).

This research was intended to span the multi-construction sites both where PMIS has already been implemented and where the implementation is yet to begin. As such, the research examined the Group2 PMIS implementation process to find out what were the challenges facing the PMIS implementation in Group2. This embedded case study design researched Group2 PMIS implementation, which embodied multiple embedded units of analysis (PMIS implementation in hospital construction projects) (Yin, 2017, p.52).

During the research process, I collected data about each about each embedded unit (implementation site) in several ways. Historical data represented by earlier implementation reports, letters, emails, and meeting minutes served as sources of data for the sites where the implementation started before the research. Interviews and participant observations were used in the sites where the implementation occurred after the inception of the research. However, the results of the embedded case studies would not be enough to satisfy the research's immediate stakeholders. Group2 management was keen to improve the PMIS implementation effectiveness.

Action research was employed as a meta-methodology that orchestrated the entire research project. Action research was proposed as a vehicle to operationalise the results of the case study phase of the research. The action focus and the reflective cyclic approach embedded in action research would allow the generation of an actionable knowledge to be utilised in improving the PMIS implementation result. Many scholars such as Levin & Greenwood (2006, p. 89), Burns (2007a), and Dick et al. (2015) supported this perspective of action research. If successful, the case studies on the sites where the PMIS was already implemented or under implementation would support the construction of the research context, as well as the

planning stage at the action research level. Case study results would provide an in-depth understanding of how resistance to the implementation evolved and why it did. On the other hand, the latter case studies on the sites that follow the implementation of the actions recommended from the planning stage on action research level will facilitate the reflection on what were the results of the actions and what modifications to the action plan should be implemented in the next cycle. Thus, following the spiral approach in the strategic level as explained in Coghlan and Brannick (2009) while utilising case studies on the tactical level was the selected approach to bring change to the implementation of the PMIS at Groupe2 projects. Holgersson and Melin (2015) employed an intervention that utilises case study and action research successfully. The authors observed that case studies facilitated the understanding of the complex context of their research at a profound level.

This research employed a hybrid research design that contained two main elements: Multi-site Action Research and Embedded Case Study. Figure 14 below depicts the research design. The two main elements of a hybrid research design are discussed in further detail in the following paragraphs.
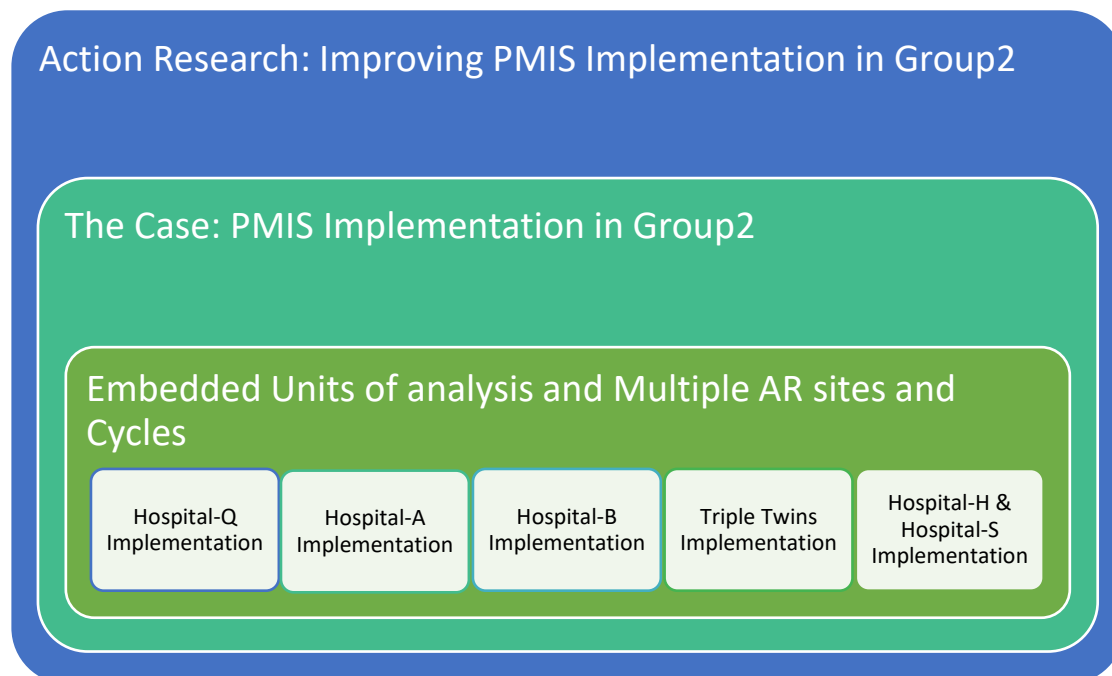
Figure 14: Hybrid Research Design

3.3.2   Embedded Case Study Design

One of the case study designs covered by Yin (2017) that can be used in a research is the single embedded case study design. This is an appropriate approach when the research involves several units of analysis. The difference between multiple case study and single embedded case study designs is that the latter has a holistic focus. Multiple case study designs strive to replicate across different cases, whereas embedded designs use the embedded units of analysis to inform the analysis and the conclusions drawn at the holistic level.

In this study, which spanned several construction projects that were part of the PMIS implementation, each implementation at each site represents a unit of analysis. The holistic conclusions that I wanted to deduce were to do with the implementation in the Group2 organisation to which the unit of analysis belonged. Scholz and Tietje (2002) argued that an embedded case study approach is valuable when the research subject is both highly contextual and complex. Besides, as this research strives to learn about the reasons inhibiting the implementation of the PMIS with a view to overcoming them, it falls within the study of change and evolution. Bass, Beecham, and Noll (2018) compared single and embedded case studies using real examples. One of their notable conclusions is that embedded longitudinal case studies are useful in addressing research questions related to a fluid context where transformation represents a main theme of the research. Souza, Malta, and De Almeida (2017), and Chung (2019) both deployed single embedded case studies in environments that were like this research in being both complex and flux.

This study utilised the single embedded case study approach to identify the challenges that face the implementation of the PMIS in Group2. This design was deemed appropriate because it allows within and cross-unit analysis comparison. The flexibility and the harmony the approach embodies, facilitated managing the research project towards its objectives while attending to the stakeholders' requirements (Dick, 2015).

Like several other case study research varieties, the embedded design allows for the use of several data collection techniques. The multi-data source approach was deemed advantageous as it enables both triangulation and the inclusion of several perspectives. Both advantages are arguably important to reinforce research validity and reliability. The in-depth

understanding of the challenges that faced the implementation was the result of employing an embedded case study, which was a chief objective of this study.

3.3.3 Multi-site Action Research

The second research question was: How to improve the PMIS implementation in Group2? AR was the selected approach to answer this question. However, the field in this study spanned multiple sites and involved multiple organisations. The nature of the research made designing of the research as a traditional action research impossible. The iterative spiral process of constructing, planning, acting, and reflecting is usually conducted at the same site, in the same organisation, and with the same people. Many AR varieties share a single site focus.

Besides, several traditional AR approaches covering multiple research sites have become prevalent in the last two decades (Blackford and Street, 2012; Fuller-Rowell, 2009). The two different types of multi-site action research are coordinated AR and coalition AR. Even though both approaches cross the borders of several organisations, coordinated AR does not require a central AR project. A complicated collective decision-making process is required in coalition multi-site AR (Fuller-Rowell, 2009). The AR project undertaken in this study was a multi-site action research (MSAR). However, it did embody elements of both the coalition and the coordinated models conceptualised by Fuller-Rowell (2009) (see Figure 15 below). At some sites, the constructing, planning, actioning, and evaluating the AR cycle took place more than once; while in others, it was built on the insights developed from AR cycles at other sites. This approach built on the MSAR advantages such as improving the quality of the research through knowledge-sharing across participating sites (Fuller-Rowell, 2009). However, despite having a centralised structure in this study, the research did not suffer from a complicated decision-making process when it came to inter-organisational decision-making. This was because of the existence of a central PMO team that was set up with the mandate of unifying practices and processes across the multiple sites concerned in this research.
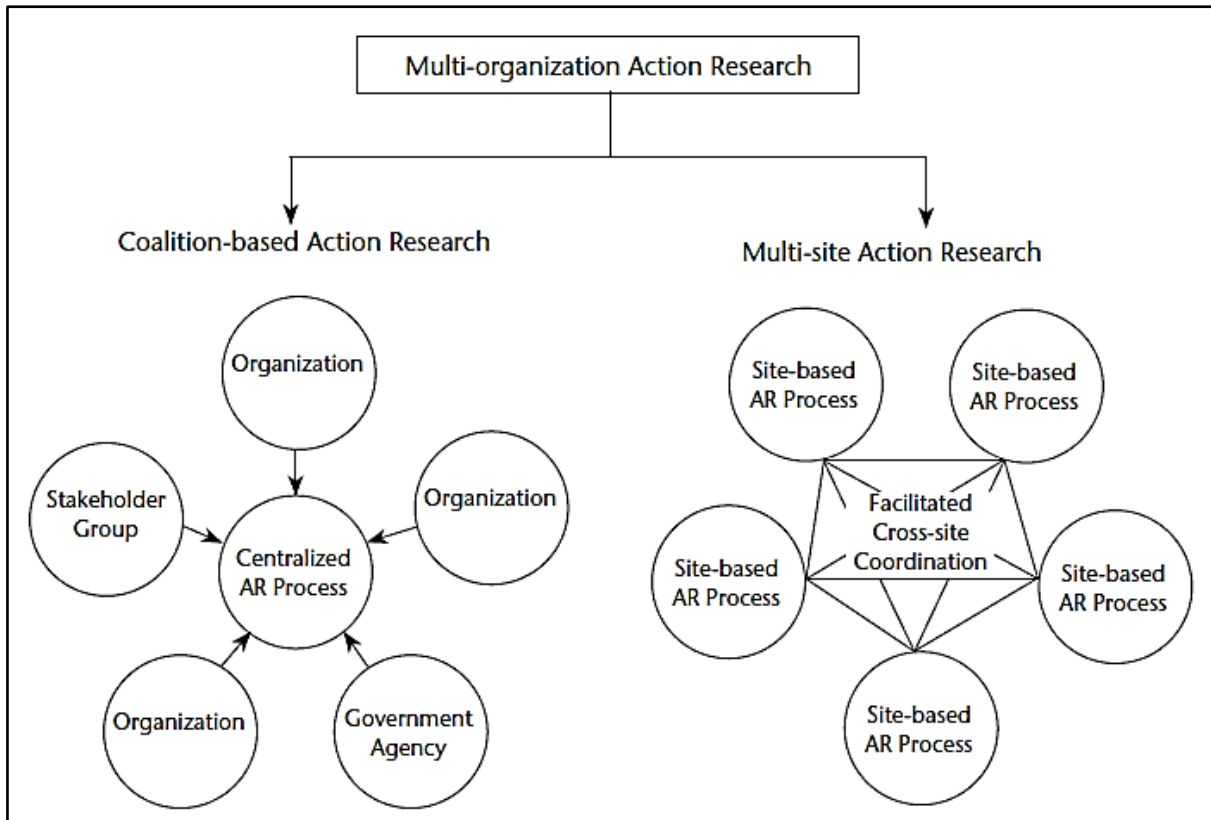
Figure 15: MSAR Fuller-Rowell (2009)

Group2's PMO oversaw eleven construction sites. Group2's headquarters co-located technical and managerial teams from four supervising consultants in addition to the PMO and the MOH teams. Eight contractors were engaged in the construction of the eleven hospitals. All those different organisations were virtually part of Group2; hence, all had a stake in the implementation of the PMIS, the subject phenomenon of this research.

The application of an AR framework for several sites whereby each site's story represents a cycle/cycles in the action research spiral allowed the research to benefit from the synergy of multi-sites insights. In this sense, the spiral in this research was a representation of the learning process at the virtual organisation (Group2), rather than at the level of the single hospital construction project. Thus, data and learning generated during the implementation of one hospital project were fed into the planning for the implementation in all the following hospitals. Furthermore, learning gained in a later hospital sometimes triggered an action to improve an earlier PMIS implementation.

The approach imposed chronological learning to the research trajectory that is illustrated in Figure 16 below. The approach ensured that data collection, literature reviews, and data

analysis were conducted continuously in parallel with the PIMS implementation from the commencement of the research. Further, the approach necessitated the continuity of a deliberate reflection on actions which enabled immediate learning. The reflection benefited the next stage of PIMS implementation, particularly at the next embedded unit of analysis.

As demonstrated by the figure on the right, this AR study began with the constructing phase whereby I, in collaboration with the implementation team, brainstormed the challenges encountered in the PIMS implementation. Once the process was completed, an action plan was agreed and implemented at the Group2 HQ. The results were then reflected upon and used to inform the implementation plan in the Hospital-Q project. Overlapping with Hospital-Q was the implementation in Hospital-A, which benefited from the insights of the Hospital-Q cycle and learning carried from Group2 HQ implementation. The learning achieved until that stage was fed back in the implementation of an improvement plan at the HQ. I found that the results were still imperfect, which led to the decision of undertaking a reconstruction phase in an endeavour to improve my understanding of implementation challenges. During the preceding activity, a parallel implementation at three hospitals was carried out, which is
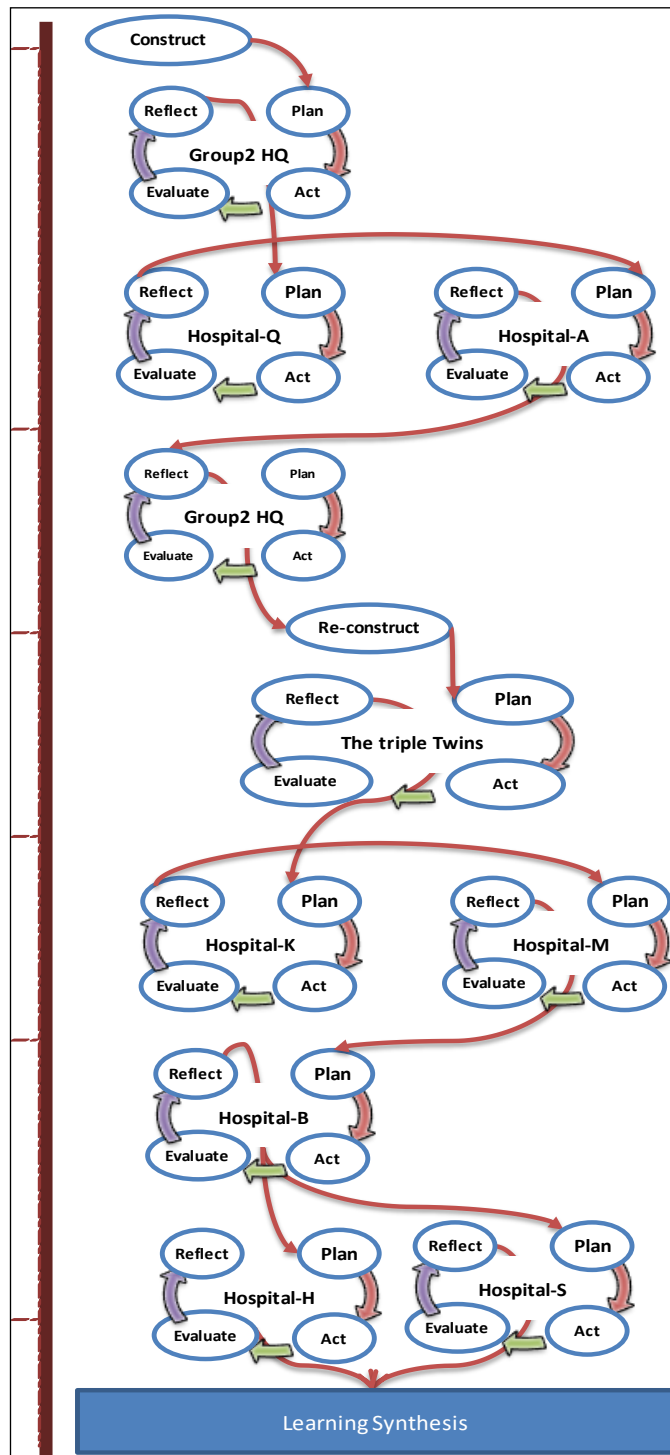
Figure 16: The Action Research Spiral in Group2 Projects
Source: The author

referred to as the triple twins. The triple-twins learning was used at Hospital-K and then fed into Hospital-M. Hospital-B implementation cycle followed, and its resulting learning was used at the parallel implementation of Hospital-H and Hospital-S. Following the implementation of the last hospital's project, a synthesis of the learning journey was collated. The details of the above AR spiral are reported in Chapter 4 "The Story."

3.4   Methods of Inquiry

This research concurs with Byrne (2017) concerning the treatment of research methods collectively as the protocols followed in the field. Methods relevant to the research objective were followed in this research in the field during the gathering and data analysis. This research used a variety of qualitative research methods to enable triangulation and cross-validation of the data analysis outcomes. The data used included both primary and secondary data. Following Alvarez (2004), semi-structured interviews, participant-observations, and journaling were the primary data collection method (examples are included in appendices C, E, and F). Secondary data was obtained through the collection and recording of official and unofficial records such as official emails, official reports, official correspondence, and informal discussions.

Action research was used as a meta-methodology rather than a method of inquiry. Consequently, it enabled the research to benefit from operating several tools in collecting research data. Following O'Brien (1998), the methods that I used in this study were predominantly based on qualitative research paradigms. Case study scholars recommend the use of multiple data collection techniques. Yin (2017) emphasises the importance of using multiple sources of evidence in case study research. The case study expert notes that the variety of sources of evidence increases research constructs validity and reliability.

The following paragraphs clarify the protocols followed while operationalising the methods of inquiry used in this research.

3.4.1   Participant observation

Participant observation is a type of qualitative research method since data collected through this approach is predominantly qualitative in nature. Participant observation was originally used by anthropologists, who travelled to remote areas to interact with local communities to

understand their cultures in its natural settings (Iacono et al., 2009). Although participant observation is a very simple data collection technique, it has its challenges. The method is easy to use since it is naturalistic. All humans practice observing their context, communities, workplace, families, and everything around them in order to interact, learn and get things done. What makes applying this natural technique to research challenging is the need to systemise the natural human behaviour in a way that fulfils research requirements (Guest et al., 2013).

The participant-observer studies a social group or a community while recording the observed events. This approach aided me in collecting a rich amount of data in the field from the studied groups. This is advantageous because the collected data help overcome the main challenge of social research, which is avoiding misinterpretation of social data while understanding the culture, norms, and feelings of the human subjects (Iacono et al., 2009).

Guest et al. (2013) argued that if the researcher must be in the field, then no data collection technique could surpass participant observation. Participant observation allows the capturing of social aspects that are immune to other methods such as unspoken rules and routine actions induced subconsciously. In this study, since I was an employee within the researched organisation, participant observation was deemed ideal for data collection. Another reason behind the selection of this data collection method was that the study of the employees' reaction to the system implementation involved uncovering possible differences between the official views of the implementation challenges and the real case (Runeson and Höst, 2009).

An example from this research was the unwritten practice of Group2's managers, who avoid formal communication to request actions from the client-side. When this was investigated, it turned out that this was an unspoken rule based on a generalised perception of Saudi managers preferences. It is most unlikely that such information could have been discovered through another data collection procedure, such as interviews.

One of the seminal participant observation studies in management history is the work of Roy (1952). The author asserted that researching on the job and loafing between factory workers as a participant-observer allowed the discovery of an alternative view of the phenomena. Loafing on the job from the participant-observer view "may not be the simplest line of

inactivity that some students of the subject have thought it to be." Being part of the phenomena while observing it allows one to draw incontestable insights that could not be produced by a detached "scientific" spectator.

As an insider researcher in Group2, my observations were central to the data generation processes. The observations were captured in the form of diaries and notes. They were later analysed in conjunction with other primary and secondary data (examples are in appendix E). Taking notes was not always immediate as it sometimes evoked suspicions; I strived to follow Coghlan and Brannick's (2009) advice by taking notes in public only when it looked like part of the usual business. Despite that, at some stage during the research, Participant-3 started informing colleagues to exercise caution when talking in front of me because I recorded everything!

Despite the hurdles faced, it was critical to continue observing and recording. My participant observations captured dynamics at the multi-sites level, while most of the other primary data sources are concerned with either a discrete site or a small group of sites. Also, since this study aimed at both understanding the challenges and improving the PIMS implementation results, it was impossible to separate action from research. An advantage pointed out by Yin (2017) in the participant observation method, is the ability of the participant-observer to manipulate minor events. For example, scheduling a meeting to observe the attendees' discussions and behaviours for the benefit of inquiry. The downside of this advantage is the possible impact resulting from me, as a researcher observing the participants. Data triangulation played an integral role in limiting the effect of the observer on the validity of the data collected. Critical reflections had also helped in preserving the integrity of the observations.

3.4.2   Semi-structured interviews

I decided to interview some of Group2's research stakeholders to facilitate construction of the research concept while reflecting the stakeholders' views. Yin (2017) asserted the importance of using interviews in conducting case study research. He explained that interviews are expected to illuminate the causes of key events. In essence, interviewees help in painting a clear picture of the case by answering (from their perspective) the questions of how and why events had taken place. The identification of the challenges that were facing

the PMIS implementation was a prime objective of this study. Many scholars argue that implementation challenges are mostly behavioural in nature. As such, it was essential to conduct interviews to shed light on the way the participants perceived the PMIS implementation challenges.

 I conducted semi-structured interviews with the participants that were involved in some areas of Group2 projects where the PMIS implementation had already started. In most of these projects, the implementation faced several challenges. The criterion for selecting the participants was that potential participants must have been involved in the PMIS implementation in one or more of Group2 projects. It is important to note that it was not a condition that the participant should be working in Group2. For example, the PMIS admin in Group1 and the contact person from the system provider were invited. Participants external to Group2 may not have been aware of the dynamics inside the Group2 organisation, but they brought the benefit of being exposed to the implementation of the same system in other organisations in other contexts. The total number of participants was not predetermined. I stopped interviewing new participants when saturation was reached. Redundancy of data occurs when the information provided by participants' starts being repeated (Lincoln and Guba, 1985) cited in Lapointe and Rivard (2007). In this purposeful selection of interviewees, I ensured that the participants selected included people from each of the organisational levels that were involved in the PMIS implementation. Also, the participant's selection ensures that all stakeholders' groups were represented in the selection. The stakeholders' groups were the consultants' management, consultants' site engineers, consultants' technical team, contractors' engineers, contractors' management, MOH team, PMO management, and PMO team. A typical invitation email is in appendix A. The list of participants invited is included in Appendix D.

The invitation urged the potential participants to read the information sheet about the research that was attached to the email (appendix B) to gather further information about the study. The invitation and the information sheet emphasised the voluntariness and the confidentiality of the potential participants.

The interview was semi-structured with pre-set open-ended questions that were intended to allow participants to elaborate on their views comprehensively (refer to Appendix B). All the interviews were conducted in English, although in certain situations, the discussion featured

the Arabic language to enable some of the participants to explicate their views better. I preferred not to use voice recording because of the sensitive nature of some of the interview questions. In line with Yin (2017), not having a voice recording made the participants more comfortable while talking about their managers and the client.

Most of the interviews took place in person at Group2 head office in Riyadh, the capital of Saudi Arabia. Participants who were located at construction sites were interviewed at their sites or over the phone. The interviews took approximately 60 minutes, and I discussed the interview transcript with each participant after the interview to ensure that it accurately represented his or her views. The respondents were asked open-ended questions to allow them to elaborate on their views. In addition, I asked follow-up questions to encourage the participants to share all their perceptions. Having no voice recording allowed participants to freely discuss their feeling towards their managers and their organisation in the context of the PMIS implementation.

The questions asked during the interview were designed to encourage the participants to discuss their views concerning the reasons hindering the PIMS implementation and to suggest which groups of users were the most resistant to it. Besides, the questions encouraged the participants to share their opinion concerning the influence each organisational group played in enhancing or hindering the implementation. One of the main questions that the participants were asked during the interview was about the challenges that they faced in daily practice as a result of PMIS implementation. The responses to this question allowed me to understand how the participants perceived the PMIS. The literature reviewed suggested that perceived usefulness and perceived ease of use are the main drivers for technology acceptance (Wallace & Sheetz, 2014). A second important question was what you would do to improve the implementation results? The participant answer to this question helped in identifying the barriers they feel hindered the PIMS implementation and potential ways to overcome them. A third question was how the participants view the role of different organisational groups in the PMIS implementation? The answer to this question helped in understanding which group was resistant to the implementation. This question was followed by the question of why the group was resistant to the PIMS implementation.

A second round of interviews was conducted that enabled the research to embody a longitudinal view of the implementation evolution. Most of the interviewees in the second

round had already participated in the first round earlier. To improve the reliability of the research report, second-round participants were invited to read the 'Story Chapter'. Their comments on the "Story" were discussed, and an agreed version of what happened was incorporated into the final version of the thesis. The participants' comments on the story helped in validating the claimed improvement of the PMIS implementation outcomes as a result of the several actions taken by the research team. The interview data was further validated by reviewing secondary documents such as reports, emails, and letters. It was part of my professional duties to monitor the usage of the system, which enabled me to compare participants' words to their actions.

3.4.3   Secondary data

Secondary data was heavily used in this research. Reports on implementation progress, letters, emails, minutes of meetings, and memos were all considered during reflections and analysis. All the secondary data that was considered valuable to the research was imported into NVivo to enhance data search and coding. The secondary data used in this research was considered as a representation of the writers' views at the specific time when the materials were written and in their context. As such, they were not taken at their face value. Secondary data was dealt with as one reality of the multiple realities that coexisted in the research context. Thus, it held transient validity, and it was treated as such throughout the study. As Coghlan and Brannick (2009) observed, secondary data's suitability and validity should be substantiated by reflecting on its origins and the reasons for its generation.

During the analysis, secondary data insights were compared with each other and with primary data. Further, I reflected on the source, the circumstances, and the objective of the data. One important source of data was the implementation progress reports. These reports were issued sporadically by the PMO and distributed to all implementation stakeholders. The reports included an evaluation of the success of the implementation in each of the embedded units of analysis included in this study. These reports were significant to this research because they were the best source of data that evaluates the results of the intervention carried out to improve the implementation. The integrity and validity of the reports were highly valued since they were officially issued to both the top management of the MOH and the different contractors and consultants that were part of Group2.

Group2 PMO director authorised the access to reports letters and other secondary data. A copy of the authorisation is included in Appendix I.

3.4.4   Data Storage and protection

All data collected during this research, whether primary or secondary, was transformed into electronic format. Hard copies were destroyed as soon as the data was converted into electronic format. All electronic data was saved to a privately-owned computer protected by a password. A backup copy was saved to an OneDrive account that is also password protected. Passwords were only available to me. Details such as names of the participants and organisations the system studied were all disguised to protect the identity of the research participants. To ensure the reliability and traceability of research evidence, the data was stored separately from the case study report created following the data analysis as advised in Yin (2017). The entire case study database is saved in a single NVivo file, which is also password-protected.

3.5   Research Quality

Historically, validity and reliability have been the most important measures of research quality. This is based on a positivistic convention of what constitutes knowledge. In a positivistic sense, research validity simply means that the instrument used to collect research data is collecting data that answers the research question. Furthermore, the instrument measures what the research promise to measure. Reliability from a positivistic viewpoint means that the research data collection results will remain the same if the research was conducted again at a different time with the same research subjects (Action Research, 2020).

However, in this research, I selected an action research approach informed by a mix of qualitative research methods. The methods I used for collecting data were interviews, reviewing official documents, and participant observations. The validity and reliability measures defined above based on positivist assumptions are considered inappropriate for qualitative methods (Saunders et al., 2019). They are also considered inappropriate for action research (McNiff and Whitehead, 2009). They are inappropriate for this specific research mainly because this research did not try to measure anything. Instead, it only strived to understand and interpret the research phenomena. This research has aimed at investigating the PMIS challenges in a specific context. The research was not striving for generalizability through

replication logic. It rather aims at understanding the PMIS implementation in the specific context of Group2. Therefore, the challenge is to answer the question paused by Feldman (2007), 'How can we tell whether an action research study is good?'.

The dilemma paused by the need to demonstrate research quality while studying a social phenomenon from a paradigm other than the positivist paradigm is not unique to this study. In response to this issue, qualitative scholars generally adopted one of three different standpoints. Action research scholars have followed similar contentions.

Some continue to use the concepts of reliability and validity while adapting them to qualitative research. For example, Anderson et al. (1994) and Heron (1996) prefer to maintain the term "validity" and redefine it. Similarly, Greenwood (2015) argued that validity in action research should be redefined as "the degree to which a group process of research, action, and evaluation has engaged the stakeholders in a successful change process. In the course of this process, the validity, reliability, and credibility of knowledge are not only tested in action, but its validity is attested to by the stakeholders' confidence in it."

Others developed specific measures comparable to reliability and validity. Perhaps the most famous is Lincoln and Guba (1985) cited in Saunders et al. (2019) who suggested 'dependability' for 'reliability', 'credibility' for 'internal validity' and 'transferability' for 'external validity'. Certain action research advocates have adopted the same approach such as Stringer (2007) who suggested trustworthiness, Champion and Stowell (2003) who promoted authenticity, and Reason (2006) who argued for quality.

The third group of scholars argued for alternative evaluation criteria which are not analogous to validity and reliability. They are rather specifically invented to match the objective of constructionist epistemology. For example, Lincoln et al. (2011) have developed 'authenticity criteria' as an alternative to validity. Similarly, some action research scholars promoted quality criteria inspired by the objectives of action research. Herr and Anderson (2014) suggested dialogic and process validity, outcome validity, catalytic validity, democratic validity, and process validity.

With the wide divergence in the scholar's definition and application of validity and reliability concepts in qualitative research in general and in action research in particular, this research needed to adopt a working definition of these concepts. I decided to adapt the sage

encyclopaedia of action research definition, which states that reliability is a concept derived from quantitative research. Hence, a reliable measure is one that yields consistent results. Reliability is often contrasted with validity; a valid measure is one that measures what it claims to" (Coghlan and Brydon-Miller, 2014). Therefore, from a pragmatism paradigmatic viewpoint, the validity and reliability of this research is a function of the level of correspondence between research data and results with the researched reality. During the research process, I applied several verification strategies to maximise the reliability and validity of research data and results. As advised by Sagor (2000), Feldman (2007), Yin (2017), and Saunders et al. (2019), I collected data in multiple ways such as interviews, observation, and review of documents. I had also asked the participant to confirm the accuracy of the interview data both during and after the interviews. Participant verification was also another strategy that was applied by asking participants to review research results and confirm their level of correspondence to reality as they view it (Saunders et al., 2019). Data triangulation played an integral role in limiting the effect of the observer on the validity of the data. Critical reflections have also helped in preserving the integrity of my observations. I was using multiple sources of evidence, which had helped to preserve and ensure the validity of the case study report.

Data triangulation is considered a powerful research technique as it employs several

Figure 17: Data Triangulation (Source: The author)

types of data available to the research to draw a conclusion that considers the events from several perspectives. Yin (2017) called on case researchers aiming at producing good case research to use data triangulation. Action researchers also praise this approach. Sagor (2000, p.5) noted: "Observing a phenomenon through multiple "windows" can help a single researcher compare and contrast what is being seen through a variety of lenses". He further argued that data triangulation ensures action research validity and reliability.

The application of multiple data sources to a large extent guarantees the coverage of all possible areas of convergence and divergence. This study used multiple sources of qualitative

data, as illustrated in Figure 17 above. In some cases, the cross-checking of the data resulted in a better understanding of the motives behind the data on hand. In other cases, the triangulation uncovered inconsistencies in the data collected as exemplified by participant 10 interview results. The participant did not want to reveal that his subordinates' resistance was partially to blame for the failure of the PMIS implementation in one of his projects. When I compared his interview transcript to the official reports and letters and considered his political position in Group2, I concluded that he was not honest during the interview.

3.6 Data Analysis Process

Data analysis was carried out in this research to answer both the first and second research questions:

- What were the challenges to successful PMIS implementation in Group2?
- What were the next steps required to overcome these challenges?

The analysis was carried iteratively in three distinctive overlapping stages. The first stage aimed at identifying the barriers that were obstructing a successful implementation of the PMIS in Group2. The second stage aimed at examining the identified barriers in relation to the analysis template discerned from the literature (refer to section 2.4). Associating the implementation barriers to theoretical constructs that were well defined in the literature facilitated answering the second research question by providing an in-depth understanding of the implementation challenges. The third stage built on the first two stages in identifying actions to improve the implementation of the PMIS in Group2. It is critical to note that this was an iterative process. New embedded cases were added as the study progressed, enhancing the research scope, and introducing new data. This required revisiting the literature and the analysis in several instances. As argued in Dubois and Gadde (2002) following such nonlinear approach can expand the researcher's understanding of both the theory and the empirical world.

Yin (2017, p. 208) proposes four strategies to guide case study analysis: "relying on theoretical propositions, working your data from the "ground up," developing a case description, and examining rival explanations". Both the third and fourth strategy were employed in this research. Chapter four provides an analytical case description that examines the research subject in depth. Chapter five presents a detailed analysis of the research data and uses rival explanation through the employment of alternative analysis lens.

The analysis followed an integrated process to answer the first research question, which included both deductive and inductive coding, as described by Fereday and Muir-Cochrane (2006). This abductive reasoning approach is well documented and proposed for application in case study research (Dubois and Gadde, 2002; 2014). Thematic analysis was the primary technique I used in interrogating the data. Thematic analysis is defined as the process of finding themes of interest through immersing oneself within the data by reading and re-

reading it (Daly, Kellehear & Gliksman, 1997) cited in Fereday and Muir-Cochrane (2006). Thematic analysis is also a tool to connect data to theory during the coding process by selecting codes from theory before or during the coding process (Almatrodi and Cornford, 2013). The thematic analysis process aims to identify relevant themes within the research data by subjecting it to a six-step process. This study broadly followed the thematic analysis guideline reported in Braun and Clarke (2006). The stages of the analysis were data familiarisation, code generation, identifying themes, reviewing themes, defining themes, and finalising analysis results. Thematic Analysis has been employed successfully by many action researchers (Chukwu, 2015; Birkeland, 2015; Gross, 2016).

The analysis was a continuous process that ran in parallel to the multiple action research cycles carried out in different sites. At an earlier stage of the research, I decided to use NVivo to store and help in analysing the research data. NVivo was selected for many reasons; for instance, NVivo lends itself well to thematic analysis, it improves the accuracy of a qualitative study, and it has a simple, but effective and efficient node connection system that facilitates the coding process (Zamawe, 2015).

I started with no prior codes while reading and re-reading interview transcript. Later, emerging codes were used as a template for coding and recoding all the secondary and primary data collected. A book of codes was created (Appendix G), which included all codes used and their meaning. This process of analysis was iterative in the sense that every emerging code I felt might be of critical importance was applied to all recorded data. During the re-reading, I also deleted some of the codes that were perceived as redundant and unified others under one umbrella.

The first phase of the analysis resulted in identifying two themes: barriers and enablers. These themes were then utilised in the second and third stages of the analysis to find answers to the second research question.

In the second phase, the focus of the analysis was on connecting the codes under the barrier theme to the template of analysis discerned from the literature review. This second stage provided an answer to the first research question that was well informed by existing theory. In conducting this pattern matching exercise, the nodes were re-examined to ensure they were coded under a specific embedded unit of analysis. This facilitated the comparison of

implementation's barriers across the several embedded units of analysis. This has also helped focusing the implementation improvement efforts.

This stage has also examined the main argument of this thesis which was that IS introduction in a context similar to this research, is a multilevel phenomenon. To achieve this, I carried out a rival explanation exercise which was similar to the approach Zelikow and Alisson (1999) used in their endeavour to explain the famous Cuban Missile Crisis. During this exercise, I used propositions from different competing theories examined in the literature review to build an explanation of the implementation success or failure at each embedded unit of analysis. IS introduction theories addressing the phenomenon at the individual, group, and the organisational levels were used in the exercise. I then conducted a comparison between the different explanations each theory has provided, and I drew my conclusion based on the rival explanation results.
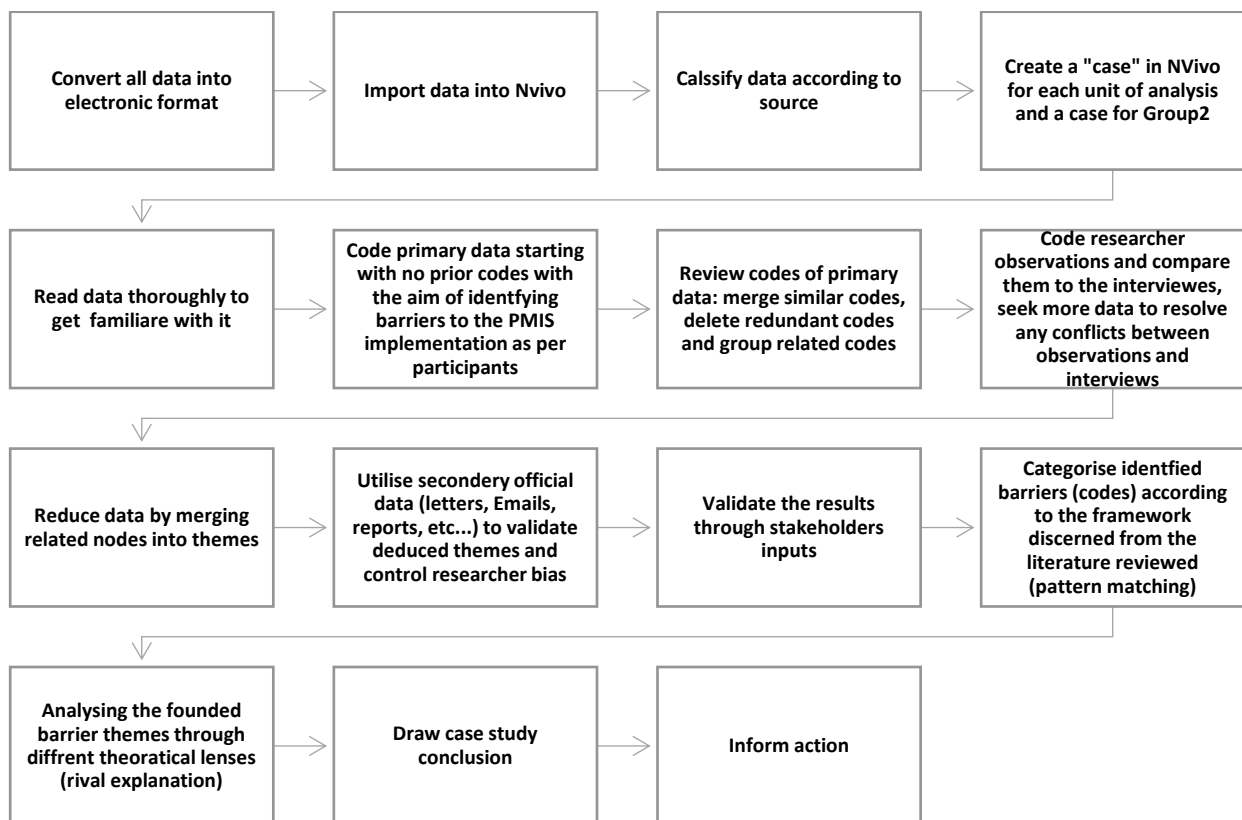
Figure 18: Analysis process Source: the author

The third stage of the analysis was centred on the utilisation of the results from the first two stages in addition to the accumulation of actionable knowledge reported in the 'Story' chapter. The analysis was significant in informing the actions of the implementation team and therefore answering the second research question.

The story reported in the next section represents the action research thesis' core. In this section, I did construct the story of what happened during the research transparently. I had also clearly voiced the analytical eye I used in examining the events and through which I was trying to understand the implementation process. Through this process, my team and I took our decision to intervene in a specific way to improve the PMIS implementation at each action research cycle. In this respect, I followed the advice of Coghlan and Brydon-Miller (2014) in endeavouring to provide a comprehensive and transparent story that allows the reader to self-judge the validity of the research and the claims it incorporates for the creation of knowledge. To further strengthen the quality of the "Story", I asked several research participants to read it and provide any comments on its factual value. The participants who accepted and read the story provided useful comments that were discussed with them and then incorporated in the "Story" final version.

The creation of a story based on raw data is a well-known analytical technique for process studies concerned with innovation and organisational change (Pentland, 1999; Van de Ven and Poole 2005; Shibeika and Harty, 2015). In this thesis, I used the writing of the story chapter as a primary apparatus to contextualise the research, support sense-making, and distil the learning generated during the struggle to improve the PMIS implementation in Group2. In my view, surfacing and capturing actionable knowledge created during the endeavours to change an organisation is better served through the analysis and construction of a thick narrative. This is primarily because the objective is to apprehend and understand what type of learning occurred while considering the external and internal context during a long-term process of several action research cycles. This is in line with the theory of method adopted by the Centre for Corporate Strategy and Change (CCSC) at the University of Warwick and discussed in the work of Pettigrew (1990).

The construction of the story presented in the next section follows the guidelines suggested by Pentland (1999). It contains a time sequence, an identifiable narrator voice, and densely explore the context and the content of the PMIS implementation in Group2. I am confident that with these elements and through action research, I explained and discovered the interwoven influences impacting the implementation of the PMIS in Group2. This facilitates the intellectual process of suggesting a framework for improving the PMIS implementation success.

MacIntyre (2013, 216) had well explained my approach to capturing actionable knowledge in his following statement: "I can only answer the question 'What am I to do?' if I can answer the question 'Of what story or stories do I find myself a part?"

4 The Story

4.1 Overview

This chapter reports on the challenges that have been faced during the PMIS implementation. The chapter also describes the various interventions that I carried out while trying to improve the results of the PMIS implementation. Several unfolding events affected the outcome of the interventions and changed the way I perceived the process. The story reported here began before the commencement of the formal action research project. In this report, I chose to discuss events that preceded the formal research inception, simply because this was when the research problem started to take shape. I decided to include this part of the story because this early stage of the implementation played an integral role in shaping my pre-understanding of the research context.

The problem undoubtedly played a seminal role in shaping the way that the story itself is told. One could not ignore that, before the research inception, as well as after it, pre-understanding influenced one's perception of the research context (Coghlan and Brannick, 2009). In supporting this line of thinking, Herr and Anderson (2005) pointed out the challenges a scholar-practitioner may face in determining the starting point of an action research project. Both Yin (2017) and Shibeika and Harty (2015) argued that constructing a thick description of the research story from the data represents a powerful analytical instrument.

This chapter also contains a glimpse of my reflections on the implementation's "unfolding reality" in the form of "reflective pauses" *(*Coghlan and Brannick, 2009). The reflections are included for two crucial reasons. First, they help the reader to get a grasp of the research motivations underlying the selected course of action. Second, they make the action research cycles reported here more transparent for the audience.

Although many of the events reported here were not sequential, but somewhat synchronous, I strived to give the story a chronological structure. This was intended to ease the understanding of the speculated cause and effect relationships. The story thus started from the earliest attempts at the first PMIS implementation, the pilot phase, and it reported the following events in chronological order. Whenever a group of events coincided, I opted to group them in an endeavour to comprehensively report on the interwoven reality produced by their synchronous nature.

4.2   The Terrain

The following paragraphs describe the context in which this story took place. The description addresses the organisational structure, the different roles of the primary stakeholder groups, and the contractual responsibilities of all stakeholders.

4.2.1   Organisational Structure

Group2 is a virtual organisation that is structured around the construction of 11 government-owned hospitals. As illustrated in Figure 19 below, Group2's structure was pyramid-shaped. At the top is the client representative, the MOH Group2 General Supervisor (Group2 GS), who is supported by a small team of engineers and administrative staff. Next, is the Group2 project management office (the PMO), which is operated by a Saudi-Irish joint-venture. Underneath the PMO, there is a group of supervisory consultants assigned to the different projects. At the bottom is a group of contractors who are in a contractual relationship with the MOH to develop and execute hospital designs.
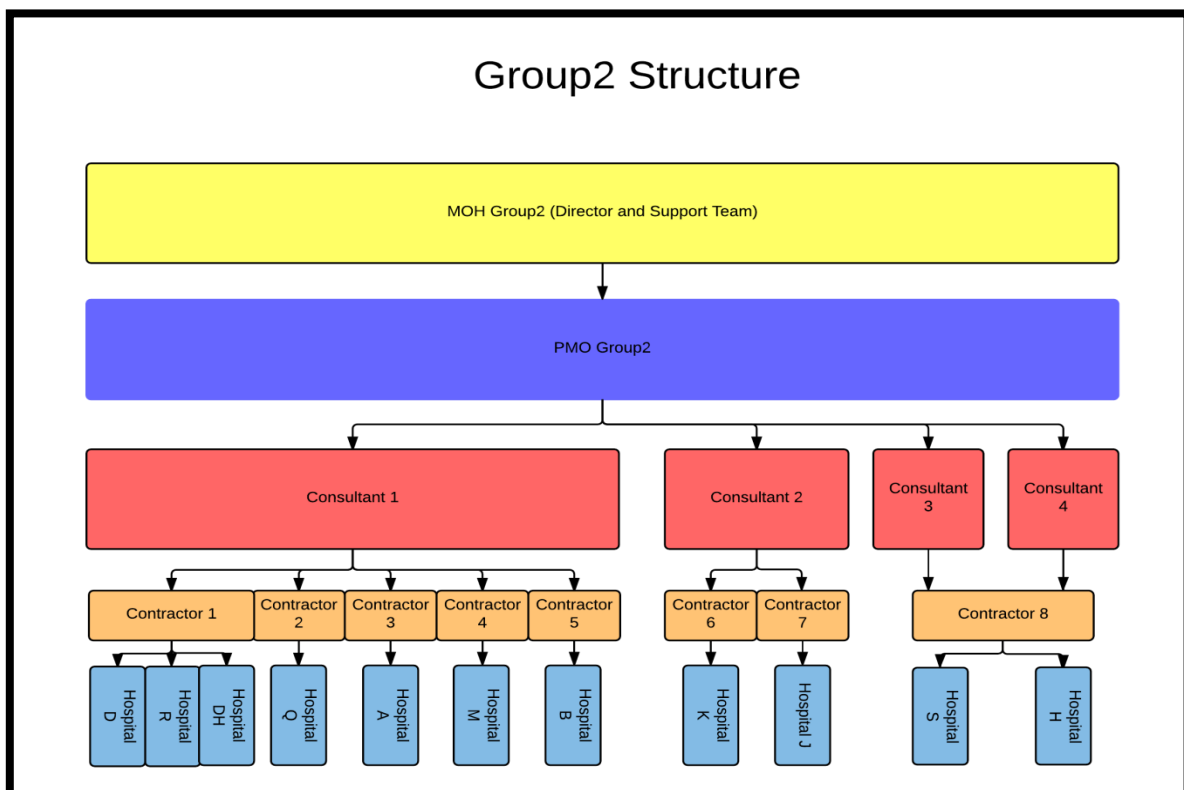
Figure 19: Group2 Organisational Structure

4.2.2 Main Stakeholder Group

As demonstrated in Figure 19, the Group2 structure includes four stakeholder groups, which are the MOH representatives, the PMO, the supervisory consultants, and the construction contractors. Below is a brief explanation of each of the stakeholder group roles in Group2.

4.2.2.1 MOH Representative:

The MOH team managed by the Group2 GS is responsible for overseeing the contracts of the MOH with all stakeholders in Group2. Some of their responsibilities include ensuring stakeholders honour the terms of their contracts, instruct stakeholders to remedy any unacceptable performance, advise MOH top management on the legitimacy of stakeholder claims, and coordination of the construction activities to align with the end-users' requirements.

The MOH representative's role in the PMIS implementation includes approving the selected list of processes that are managed by the PMIS and instructing stakeholders to employ the PMIS in Group2 activities.

4.2.2.2 Group2 PMO

The PMO was established to provide international expertise in managing the construction of Group2 health facilities. It is responsible for monitoring and controlling the 11 hospital projects that constitute Group2. The PMO is responsible for collecting and analysing data and finally recommending to the MOH team the best course of action. It is also responsible for identifying the best processes for managing Group2 projects and overseeing the implementation and standardisation of those processes across Group2 projects.

Another responsibility of the PMO is providing Group2 with a PMIS. This responsibility includes buying or building the PMIS, oversee its implementation, and maintain its operations.

4.2.2.3 Consultants

The different consultants in Group2 are responsible for supervising contractor construction activities and certifying that the construction deliverables are fulfilled as specified in the contract. They are also responsible for reviewing and approving construction drawings

produced by the contractor. Consultants are additionally responsible for recording the construction and design activities and confirming that the progress occurs as per the approved schedule.

Concerning PMIS, the consultant teams are mandated to use the system to review contractor submitted work, such as construction Inspection Requests (IRs) and construction drawings. Consultants are also responsible for issuing Non-Conformance Reports (NCRs) through the system whenever they identify work that does not conform to the contractual requirements.

4.2.2.4   Contractors

Contractors are responsible for the development of the hospital design model into construction drawings and getting construction drawings approved by the Consultant. They are also responsible for building the hospitals as per the approved construction drawings. Regarding PMIS, the contractors are responsible for most of the data entry activities relating to the system, which includes, but are not limited to submitting construction IRs, submitting material inspection requests, and responding to consultant NCRs. Further, the contractors are to provide all stakeholders on-site with working facilities, such as offices and internet connections.

4.2.2.5   Contractual Relationships

Contractually, the MOH represents the beneficiary side in all Group2 contracts. The MOH has an individual contract with the PMO, the consultants, and the contractors. The GS is the MOH representative in those contracts. The PMO is under contract with the MOH to provide the services mentioned in section 4.2.2.2 above. However, the PMO has no contractual power over the consultants or the contractors.

In contrast to the PMO, the consultants are the designated MOH representatives in the construction contract in all technical matters. The last primary stakeholder group is the contractors who are in a relationship with the MOH to provide construction services while abiding by the consultants' instructions as per their contracts with the MOH.

The contractual situation of Group2 forced the PMO to work through the consultants whenever dealing with the contractors. The PMO would draw on the MOH's power whenever

instructing the consultants. This contractual situation created a delicate power balance between the consultants and the PMO, which often forced them to compromise.

4.3   Context and Problems

The PMOs' contracts state that each PMO must establish a Management Information System (MIS) to facilitate the communication process and to report on its project's status.

Group1, which was created before Group2, selected an out-of-the-box solution, which is referred to as the PMIS. Group2, under pressure from the MOH, followed suit and adopted the PMIS system to fulfil the MIS role. A senior manager in Group2 framed this politely when interviewed, saying, "The client (MOH) referred us to the PMIS."

In hindsight, Group2 should have resisted the pressure and explored alternative systems. This is not to say that the selected PMIS is not a good system, but if different options had been considered this might have shed light on the advantages of the selected PMIS and convinced the stakeholders of its quality. The literature reviewed suggested it might have been beneficial to the implementation to engage stakeholders in the PMIS selection process. The consultants and contractors were excluded from the selection process.

A Group2 senior manager pointed out that the selection of the PMIS was advantageous because of three factors:

"I took my decision to go with the PMIS based on the low cost (the MOH already paid for the licenses), a new system promises a learning possibility, and because of client satisfaction (the system was running in Group1, with no major issues)."

The central theme of this study is the failure by both PMOs to unleash the full potential of their PMISs. The PMIS did not contribute positively to the broader objective of their projects. This issue was essential because, surprisingly, large multinationals that specialise in PM were running both PMOs. Supposedly, these organisations should have verified processes in place to implement such systems. Group2's PM service provider has been in business for more than 40 years and is currently operating in more than 35 countries. Group1's PM service provider is one of the largest project management service providers worldwide.

When I first joined the PMO, I was given only one task to accomplish: implementing the PMIS across the eleven construction projects overseen by Group2's PMO. During my interview, I

was informed that this implementation project should be finished within nine months. I was also instructed that the client (the MOH) was very interested in getting this project completed quickly. Unusually, the GS personally interviewed me to make sure that I would be able to deliver.

I was under the impression that the MOH would closely monitor the progress of the implementation and would effectively support our efforts to accomplish the task promptly.

The PMO assigned Participant-7 as the head of the team in charge of implementing the PMIS. Besides Participant-7, the team included the PMO quality manager and me. Participant-7 was an experienced manager who had successfully implemented management information systems for some of his previous employers. Also, Participant-7, who had more than 20 years of management experience, had worked as a management consultant for several years before joining the PMO. It seemed that Participant-7 was the "perfect" choice to lead the PMIS implementation initiative.

Participant-7 believed that his role was twofold. First, he should proactively manage client expectations regarding PMIS implementation. He was the one who always reminded us that we should not give away too much too early to the client since from his experience, the client would always want more. The second aspect of his role in the implementation process was to keep the cost at the minimum possible level for the PMO. As he argued, the joint venture awarding the PMO contract had only budgeted a certain amount for honouring their contractual obligations to provide Group2 with an MIS. Their original plan was to put a Microsoft SharePoint based system in place. Despite the apparent effectiveness of the share-point system in the joint venture's previous projects, it was not as expensive to the organisation as the selected PMIS since an internal IT team would implement it. The SharePoint system was also less costly because there was no need to buy a license from an external provider.

The PMO quality manager viewed the role of the information management system as merely an automated quality system. In his view, the PMIS would perform as a database to facilitate quality assurance and quality control audits at the construction site activities, as well as in the design development process.

When I started my position, I first tried to understand the objectives that the PMO and the MOH were trying to achieve by implementing the system; the specifics were vague. I asked Participant-7, the quality manager, and the PMO-director, to explain the objectives of the system implementation. In other words, how would they measure the success of this implementation project? In the first few months, I never received a definite answer. Later, Participant-7 responded that if the client was happy, then the system had fulfilled its role. In fact, for most of the stakeholders, **the client perception of the system was the measure of PMIS success, regardless of the system's functional reality**.

Initially, I was informed that there had been a tentative implementation plan in place, which had been discussed but not finalised with the MOH. The plan was to customise the system, by including specific data collection formats already in use as part of the unified PM processes that the PMO had implemented previously. The overriding idea was that, since all Group2 stakeholders had already accepted the then-current processes, it made sense to follow the same processes when using the system. This plan was also logical, as it minimised the disruption in stakeholders' working patterns and also minimised implementation resistance. This method entailed the need to adapt the system by customising data entry and reporting forms. It was assumed that the PMIS provider would customise the forms and the reporting tools within a short period.

In parallel, training on using the PMIS was scheduled; the plan was to train every relevant stakeholder during a month or two. The sessions were to be provided by the system supplier. It is worth noting that the training started before the required customisation was finished. People learned about data capturing forms that they were never going to use.

Similarly, people were trained to retrieve reports that were irrelevant to the expected real practices. Indeed, the concept of operating the system remained largely the same. This mismatch between the training and the latter operating system had an adverse effect on some of the end-user's perceptions of the system's ease of use. Perceived Ease Of Use "PEOU" is one of the main factors that determine the information system's acceptance, as discussed earlier in section 2.1.2. To make the situation worse, the customisation of the system took much longer than anticipated. Instead of commencing to use the system immediately, or within a short period after the training, the first users waited almost three months before using the final version of the system.

In the beginning, I was trained by the system's supplier to assume the role of a power user for Group2. This later changed to Group2's system administrator and followed by Group2's system trainer, champion, and implementation manager. These changes were a result of the unfolding realities of the relationships between some of the implementation stakeholders. Changing my role was mostly an unplanned response to emerging challenges during the implementation.

In this section, I have briefly laid out the implementation terrain and the historical background of the implementation project. The following sections will be devoted to reporting on what happened during the implementation project which forms the subject of this thesis.

4.4   Early Challenges: Ambiguity, Confusion, and Conflict of Interests

The PMIS was initially sold to the MOH Group1 by a US-based organisation. The MOH suggested to Group2 PMO that they should use the same system as Group1. The Group2 PMO accepted the proposition and conducted a series of meetings with Group1 PMO to understand the system's use and benefits. MOH already paid for the system's license and that the system was hosted on MOH servers. When the implementation plan suggested above was initially agreed to, the Group1 PMO in conjunction with the PMIS provider, was responsible for providing resources for the training and the customisation of the system. Participant-23, a PMIS provider employee, travelled to Riyadh and visited the Group2 PMO office where he discussed the required customisation.

A Group1 PMIS administrator (Participant-22) conducted the first round of training for Group2 stakeholders. Participant-23 departed, and the Group1 PMIS administrator refused to continue with Group2 training. After wasting valuable time, the Quality Manager and I concluded that Participant-22 was hoping he would be employed by the MOH directly to assume the role of the system administrator for Group1 and Group2. Thus, he initially started the training hoping that this would help him to achieve his objective. He was under this illusion that because the provider's Consultant (Participant-23) reinforced the idea that, as a system provider his role was already accomplished by migrating the system to the MOH servers; thus, the MOH should assume the responsibility for the system. It appeared that Group2's GS had given Participant-23 and Participant-22 the impression that the MOH would take responsibility for the system and employ Participant-22 to assume the MOH system

admin role. Because of these manoeuvres, the PMIS implementation in Group2 was about to fail.

<table>
<tr><td align="center">*Reflective Pause 1*</td></tr>
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Holding my head between my hands, I was looking at the draft of the first implementation report. I was supposed to be reading it, but my mind was not there at all. I was thinking about the rough start of the project. Based on my previous experiences and what I learnt from the many management courses I had taken, there is no 'one size fit all' solutions for "political" organisational problems. The implementation landscape proved highly politicised. For example, the implementation involved a very large group of stakeholders from fourteen different organisations that were considered internal stakeholders to Group2. In addition, there was the system provider and the Group1 administrator who were external stakeholders. This complexity represented a serious challenge even if all of them were in favour of the implementation, let alone being hesitant and unclear about their position towards the PMIS. Moreover, the political games the external stakeholders were playing made the situation worse.

Reflecting on this complex reality, I concluded there were problems that needed to be addressed quickly. It was evident to me that I could not depend on the support of the external resources from the system supplier and Group1's administrator. My view was that their interests were not in line with the implementation objectives. The second issue was the lack of internal stakeholders' engagement with the implementation process. I remembered how the attendees in the first training session furiously attacked the trainer. I thought there was a lot that needed to be done to convince the internal stakeholders to give the system a chance. Another problem was the mismatch between some of the current organisational processes and the PMIS workflow. This last issue needed urgent action; if this mismatch continued, we would soon be in a situation where we had to choose to scrap one of the conflicting processes. The environment suggested that all internal stakeholders would opt to scrap the PMIS.

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The Group2 implementation team attempted to save the project by deciding to train me to assume the trainer role for Group2 stakeholders. In parallel, Group2 team would finalise and implement an agreement with the PMIS providers' representative (Participant-23) to finish the customisation of the system.

Group2 negotiated a fee for the customisation and the training with Participant-23 and paid the fees in advance. The customisation and the training started in May 2015.

The implementation strategy was modified because the first trial was bogged down by the delay in the customisation of the system. The delay allowed me to take some time to reflect on the implementation plan and to further consult literature. I was convinced we needed to change the training approach, and I decided to persuade Participant-7 and the QA/QC manager to allow me to separate the training into two sessions. In the first session, I planned to train the on-site people who were mostly concerned with filling data collection forms and applying an automated workflow process. The second session involved training the technical team who would use the system to submit, review, comment, and approve engineering submissions such as construction drawings.

I convened a meeting with Participant-7, and the quality manager in July 2015 to (hopefully) agree on a new strategy for the implementation. Process-wise, we were either to implement all the system modules simultaneously or to deploy them individually. I demonstrated that an incremental approach where we separate the construction team training from the technical team training would be more appropriate than training all the stakeholders together at Group2's HQ. Technical teams in this context were the stakeholders responsible for developing and approving designs and specifications for each project. In contrast to the construction team, most of the technical team members were office-based.

My efforts were successful, and I was authorised to travel to the construction site to administer hands-on training to the Consultant and the contractor site's construction teams. I was also granted access to a training facility in the Group2's office to utilise for training the technical team.

We also agreed we should first implement one pilot project. Then, based on the pilot project results review, we would examine possible improvements to be incorporated in the implementation of next projects.

In principle, this was the first AR cycle which started at PMO headquarters, where the situation was constructed and analysed, and the first action plan created. The agreed action was to reconfigure the training to align it with Group2's reality. The training intervention was

suggested as a useful tool to improve both the PU and PEOU, which would hopefully improve the PMIS acceptance, as suggested in the literature (Venkatesh and Bala, 2008).

4.5   The Hospital-Q Story (terrible luck or a blunder?)

4.5.1   Why was Hospital-Q Selected as a Pilot?

The second implementation attempt was carried out at the Hospital-Q project. Hospital-Q was chosen with the expectation that it represented a quick win situation:

> "The decision to select the Hospital-Q project for this initial phase of the rollout was based on the findings of ongoing QA/QC audits of all project sites. These reviews have shown that the [contractor] and [the consultant] team [s] on this project consistently have the best managed and maintained design development and document control department."

> (PMIS Status Report, June 2015)

The stakeholders who participated in the selection of the pilot project concluded that the contractor and Consultant in Hospital-Q represented the best option for a quick acceptance of the PMIS. The personnel of both the Consultant and contractor were well organised in comparison to the other projects. Also, project records demonstrated a high level of commitment from both the Consultant and contractor to quality control and assurance. Additionally, the contractor was already employing a similar technology internally. Because of all these advantages, in early August 2015, I commenced training the consultant and contractor site teams to commence the pilot PMIS period.
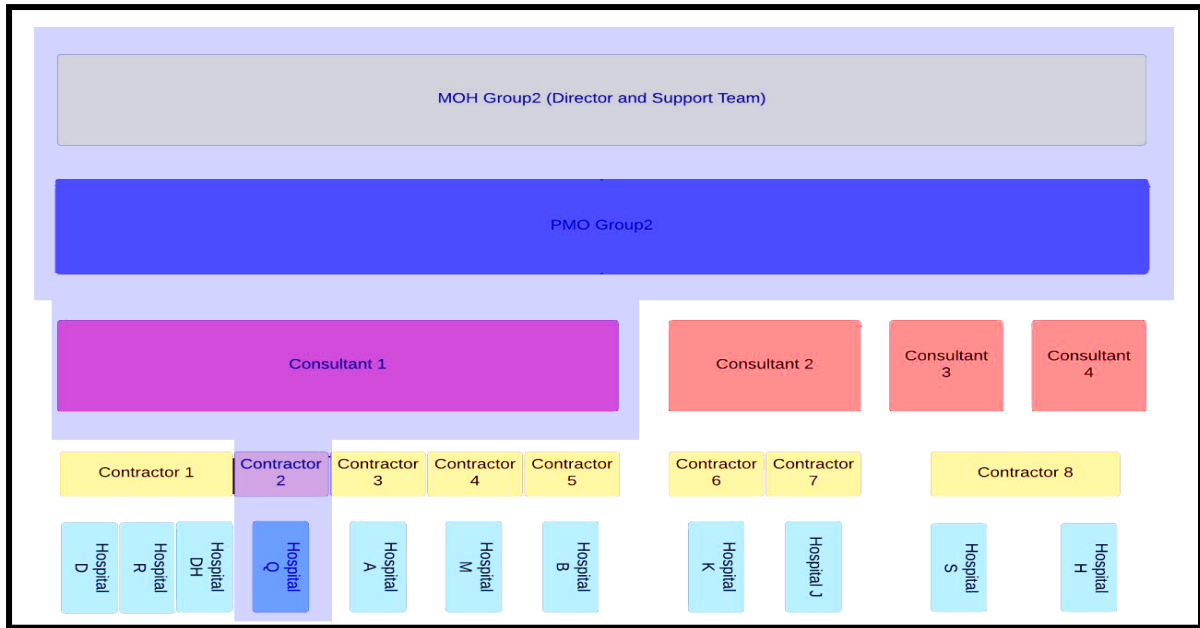
Figure 20: The Hospital-Q Main Stakeholders' Groups

4.5.2 Site Training

At the site training, three of the main stakeholders should have been present: the supervision consultant team, the contractor team, and the PMO team. The consultant team was fully engaged even though most of the relevant contractor personnel did not attend.

The plan was to implement a trial period following the training before the system went live. The first manifestation of the contractor's resistance to the PMIS implementation was the absence of his project manager and senior engineers on the first training day. The second problem was that the contractor did not provide the Consultant with an Internet connection, which was a precondition for the PMIS' functionality. In retrospect, I now see that the Consultant was trying to use the PMIS implementation to flag the contractor's non-compliance with the contract. Providing the supervision consultant with internet connectivity, among other requirements, was a contractual obligation the contractor was required to honour. At first, this issue seemed trivial to me, however, I started to recognise that even solving this small problem would prove frustrating. Following the site training, I submitted a report to the client (MOH) regarding the challenges faced and requested a meeting. At this stage, I discovered that my implementation project was an orphan. Both the PMO-director and the Group2' GS showed no interest in the implementation. After weeks of trying to meet with Group2's GS, I finally stopped him in a corridor. His response to me was to meet with his assistant for architectural engineering.

It took approximately another two weeks to meet with the GS assistant. The meeting was not official, as I had taken advantage of a minute when his secretary was not guarding the door, and I just popped into his office. When I explained the issues with Hospital-Q implementation, he suggested he would examine it later. I insisted he picks up his phone immediately and calls the contractor's manager to pressure him to resolve the internet issue. Much to my surprise, he did and accepted the contractor's request to allow the contractor to settle the issue.

4.5.3   Technical Training

The technical training of the Hospital-Q contractor was seamless because it was decided that all submissions would be handled by a single person: the document controller.

The Consultant's technical team's training was considered successful; despite the fact, the contractor did not start submitting work through the system. Without these submissions, the practical results of the training were never put to the test.

At this stage, the technical training revolved around enabling the consultant engineers to review and comment on submissions, such as construction drawings. If the submissions were reviewed online, the PMIS would provide all stakeholders with reports that included critical information on the progress of the project. On construction projects that are as complex as those in Group2, engineering submissions must be well managed to avoid unfavourable delays. During the discussions with the technical trainees, I observed that they were obsessed with the fact that the PMIS would allow all stakeholders to monitor the progress of the submissions. In their view, the system would not reflect the complete story and as such, this could result in them being negatively judged by top management.

Reflective Pause 2
As I was reviewing the implementation schedule, it came to mind that Hospital-Q, although frustrating, generated valuable knowledge that I could benefit from. I started writing down my reflections on the issues facing the implementation in Hospital-Q. The experience showed me that the MOH was not willing to throw its weight behind the PMIS implementation. It also revealed that both the consultant and contractor had concerns that needed to be addressed if the implementation were to succeed.

4.5.4   The Hospital-Q Implementation Results

The selection of Hospital-Q was, unfortunately, the wrong decision; the contractor was losing control of the project because of financial issues, and the project was frequently struggling with industrial actions. These problems had profoundly affected the chances of the PMIS's success despite being unrelated directly to the implementation. For example, internet access was not provided to the on-site consultant team for more than three months. Also, key individuals from the contractor's side showed little interest, as they were concerned with their roles in the project. Many of the PMIS-trained contractor's staff left the project in the following months. In these circumstances, the implementation was destined to fail, and it finally did.

4.5.5   The Hospital-Q Learning

Notwithstanding the Hospital-Q's implementation failure, the experience provided valuable lessons. As Participant-7 stated: "without the failure and learning of Hospital-Q, we would have failed on the following implementations." In hindsight, Hospital-Q taught us the following:

1- An essential element is that the environment of the implementation should be studied carefully to identify possible risks and to plan responses if hazards materialise.
2- If the client is not genuinely interested in the PMIS, it will fail.
3- Different organisations often hold conflicting interests.
4- The idea of customising the training to cater for the different stakeholders seems promising, but needs to be validated.
5- Stakeholder's concerns must be tackled before the commencement of the implementation to guarantee their support.

4.6 The Hospital-A Story (Some Hope) September 2015

4.6.1 About Hospital-A

Because of the frustrations of the Hospital-Q experience, the implementation team decided to move the pilot implementation to another project. Hospital-A was recommended for many reasons: the contractor in Hospital-A was Contractor-2 and the Consultant was Consultant-1 (Figure 21 below). The project is the construction of a massive Psychiatric Hospital. The Hospital-A project was more than double in size of Hospital-Q in terms of both monetary value and human resources. The magnitude of the new project suggested that a successful implementation could offset the frustration that resulted from the Hospital-Q experience. Hospital-A was selected because of the contractor and consultant professionalism, plus the satisfactory rate of the construction progress. Therefore, it was believed that the implementation would not suffer the sort of issues that were faced in Hospital-Q's implementation. Another factor was that the Consultant in both the Hospitals was Consultant-1. His experience enabled building on the knowledge that the consultant organisation had earned during Hospital-Q's implementation.
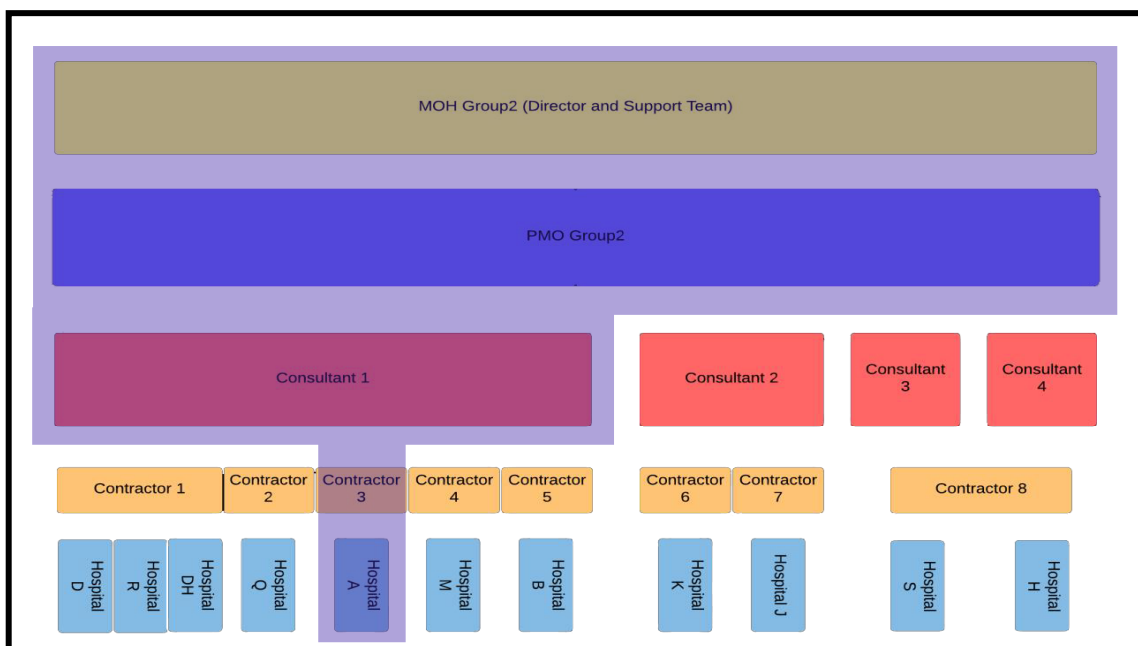
Figure 21: The Hospital-A Stakeholders' Groups

The implementation plan was to use the training as an intervention tool to improve the potential users' PEOU and PU (refer to the literature review section 2.1.2 for the information on PU and PEOU). To achieve this, I studied the role of each user and placed them into five

groups that had different training needs. Next, I customised the training to each user group's specific system role. I also decided to allow a one-month trial to assist users to become familiar with the PMIS. Providing a safe practice environment was necessary to allow a positive user experience.

4.6.2 Site Training

The training in Hospital-A was divided into different sessions. Both the consultant and contractor site teams were trained on-site. Accounts for trainees were created before the training. The training was focused on the specific role of each participant. A meeting chaired by the PMO construction manager was held with the Consultant and contractor's project managers before the training. The meeting discussed the training process and addressed the concerns of both the Consultant and the contractor. I observed the interaction of the participants and the way each person thought the system would impact their current practices. Overall, the training was successful, and the system acceptance was positive. All technical issues that were voiced by the Consultant and contractor team were addressed in September 2015. By the end of the month, the site teams were ready to move to a live database. The Hospital-A site implementation represented a quick win where the system moved from the trial phase to live as planned. However, as I discovered later, not all functionalities agreed upon were utilised by the Consultant and the contractor.

For example, the non-conformance reports "NCRs" were not used. Non-conformance reporting is a quality assurance process where the Consultant officially notifies a contractor of deficiencies in ongoing or finished work. I later learned that the absence of NCRs in Hospital-A had already been agreed upon between the Consultant and the contractor. Neither had the hospital used NCRs before or after the PMIS implementation. The NCR issues in Hospital-A were a clear example of the tendency among Group2 stakeholders to avoid the transparency brought by the PMIS. Unfolding events suggested that transparency avoidance was a reoccurring theme in most of Group2's projects. The reluctance of the stakeholders to accept the PMIS transparency was often manifested through the fierce resistance to its implementation.

4.6.3 Hospital-A Implementation results

At the construction site level, the commitment of the PMO construction manager helped in advancing the implementation. By the beginning of 2016, the Hospital-A site teams had the best performance compared to the other seven PMIS projects. However, the technical teams' usage of the system remained an issue. For a short period, Participant-10's initiative showed some progress. However, Consultant-1 technical team's engagement with the PMIS stopped as soon as the champion (Participant-10) left the project.

4.6.4 Technical Training

The technical training of the contractor's team was conducted on the premises. I thought it was a good idea to build rapport with the engineers who would be operating the system and to understand their concerns. This approach later proved valuable when the technical teams started to operate. The open and close interaction we created positively influenced the team's perceptions of the PMIS.

One advantage was that they positively viewed the system quality. As a Contractor-2 engineer stated: "the system features allowed us to overcome many configuration issues that are typically unavoidable in developing designs in projects as big as ours." One of the common problems that PMIS helped to overcome was the issue of versioning. This occurs when people working on a joint project discovered they were working on different versions of the same document. When a PMIS is set up correctly, all relevant stakeholders are notified automatically when a new version of a document is approved to replace an older one. A second advantage was that service quality was also positively viewed because of the trust between the users and the implementation team. Delone and McLean (2003) argued that system quality and service quality, in addition to information quality, are the primary determinants of system success.

Despite the contractor's technical team engagement with the PMIS, the Consultant's technical team was very frustrating. They did not respond to the contractor's submissions expediently. The problem was more significant than mere delays in responding. They should have been managing the process of the system implementation, as they were the contractual representative of the client (MOH). Besides, the Consultant was the only adequately

resourced party, with appropriate access to the information to control and evaluate the contractor engagement with the PMIS.

The PMO implementation team's first response to the disappointing consultant performance was to wait, hoping the situation would change with time. Unfortunately, waiting was not good enough. Pinto and Millet (1999) criticised implementers for wrongly assuming that by waiting, things would improve with time. The literature reviewed earlier suggested that employing "inaction" as a resistance response strategy is a recipe for failure (Lapointe and Rivard, 2005). Thus, I decided that I must act to manage the resistance.

By the end of September, I had successfully lobbied the Consultant's top management to conduct a workshop with their staff to look at what was preventing them from using the system effectively. A new assistant employed by the Consultant-1 project director (Participant-10) was crucial to the success of the workshop. It was ostensibly held to assist Consultant-1's technical team to overcome system use challenges: in other words, to retrain them. The covert objective of the seminar was to identify the factors behind the resistance to system usage. Participant-10 both understood and supported this hidden goal.

On the morning of the workshop, the Consultant-1 project director decided he would not allow us to use Consultant-1's meeting room to conduct the workshop, which annoyed me. Consultant-1's director, the manager of seven of the eleven hospitals where the PMIS had to be implemented, was overtly resisting engagement with the PMIS. After a long, heated debate with Consultant-1's director, the meeting room was made available; however, the damage was already done. The Theory of Reasoned Action (TRA) suggests that subjective norms represent a critical factor in determining the behaviour of an individual toward performing a task. In the TRA, subjective norms stand for "the person's perception that most people who are important to him think he should or should not perform the behaviour in a question" (Ajzen and Fishbein, 1975). In the second update to TAM, Venkatesh and Davis (2000) argued that the subjective norms alongside PEOU and PU are the determinants of a user's attitude towards system use. The overt opposition of Consultant-1's director to PMIS engagement had negatively and profoundly affected Consultant-1 engineer's "subjective norms." The result impacted the workshop, as most of the department heads came out against the PMIS.

Participant-10 and I observed the responses of the participants and shared our observations after the workshop. We discussed our views on why the Consultant-1 team was not performing on the PMIS technical submittals front. We agreed that the main reason was that the department heads were unwilling. We shared the feeling that the Consultant-1 director did not think they should perform. Furthermore, the loyalty of the Consultant-1 employees to the Group2 organisation was low because of the temporary nature of Group2 (Burke and Morley, 2016).

However, our opinions to resolve the department head's resistance varied. Participant-10 argued that if I supported the department heads technically and he pressured them organisationally, the situation would improve. In my view, it was better to neutralise the department heads by marginalising their role in the submittal approval process. I wanted Consultant-1 to grant every consultant engineer the right to approve, comment on, or reject submittals, and send them to the contractor directly. If an engineer was not sure, he could consult the department head before acting on the submittal. Participant-10, on the other hand, believed that the Consultant-1 director would never authorise this move. We went forward with Participant-10's proposal, as it was the only compromise that he would support to change the status quo.

On reflection, Participant-10's proposal showed some promising results in the following months. Consultant-1's technical team started to utilise the PMIS. The causal relation between Participant-10's actions and the improvement in the Consultant-1's technical staff engagement with the PMIS was blurred by one fact: around the same time, a new MOH GS took over. [One of his first actions was to issue a circular that explicitly directed all Group2 staff and organisations to engage with and use the PMIS actively.] It might have been the circular, Participant-10's actions, or a combination of both that led to an improvement of the PMIS implementation.

Unfortunately, after approximately two months, Participant-10 left Consultant-1. The result of his departure was devastating to the PMIS on the technical submittal front. Consultant-1's staff stopped utilising the system entirely. The PMO issued many reports, letters, and conducted meetings with the Consultant to attempt to persuade Consultant-1 to use the system actively. At this stage, the PMO-director's support for the PMIS was nominal at best. During the same period, the MOH Group2 GS had never evinced an interest in supporting the

PMIS implementation, apart from the circular he sent. The PMO Quality Manager also left during the same period. By losing the support of critical stakeholders in Group2, it appeared that the PMIS implementation was about to cease despite the success achieved in Hospital-A site implementation.

4.6.5   Hospital-A Learning

In line with K. Pinto and Millet's (1999) idea, the Hospital-A experience suggested that implementation "champions" were of vital importance to the success of PMIS implementation. They helped to improve the PMIS implementation results significantly.

Temporary organisation literature suggests that most of TO's employees' loyalty and dedication would be significant toward improving their status in their permanent organisations (Burke and Morley, 2016; Bakker, 2010; Goodman and Goodman, 1976). This revelation implied that in the following implementation, I should strive to connect the PMIS usage initiative to the user's long-term career goals beyond the boundaries of Group2. As Participant-10 declared:

"If you can make people love the system and see what is in it for them, then they will use it effectively and efficiently, and that will help my projects."

Pinto and Millet (1999) supported this view, as they called on implementers to strive to attract system users by demonstrating how the system would benefit each of them personally.

4.7 The Triple-Twins Story (internal job?) October 2015

4.7.1 About the Triple-twins

Three out of 11 projects shared the same Consultant and contractor. In Hospital-D, Hospital-R, and Hospital-Dh, the contractor was Contractor-1 while their Consultant was Consultant-1. The three projects had the same construction manager (CM) from the PMO, who was Participant-5. The three projects were adjacent to each other, which was why the CM suggested the training for the three projects should be held in Hospital-D. The reason for selecting the triple-twins at this stage was to address time pressure. If successful, the simultaneous implementation of the three projects would have advanced the overall implementation by around 25%.

The proven success of the training customisation in Hospital-A dictated the training approach in the triple-twins. I discussed with Participant-7 and Participant-5 the insights gained from Hospital-A's experience. We agreed that we should use them in the rollout of the triple-twins. Also, we decided to include a focused search and identification of the possible "champions". The first candidate was the PMO site managers who had played a very nominal role during the previous implementations. We also decided we should go through a preparation stage, during which we would work on aligning external stakeholders' interests with the implementation. We sought to align the top management from Consultant-1 and Contractor-1, in addition to attracting the attention of the MOH Group2 GS.
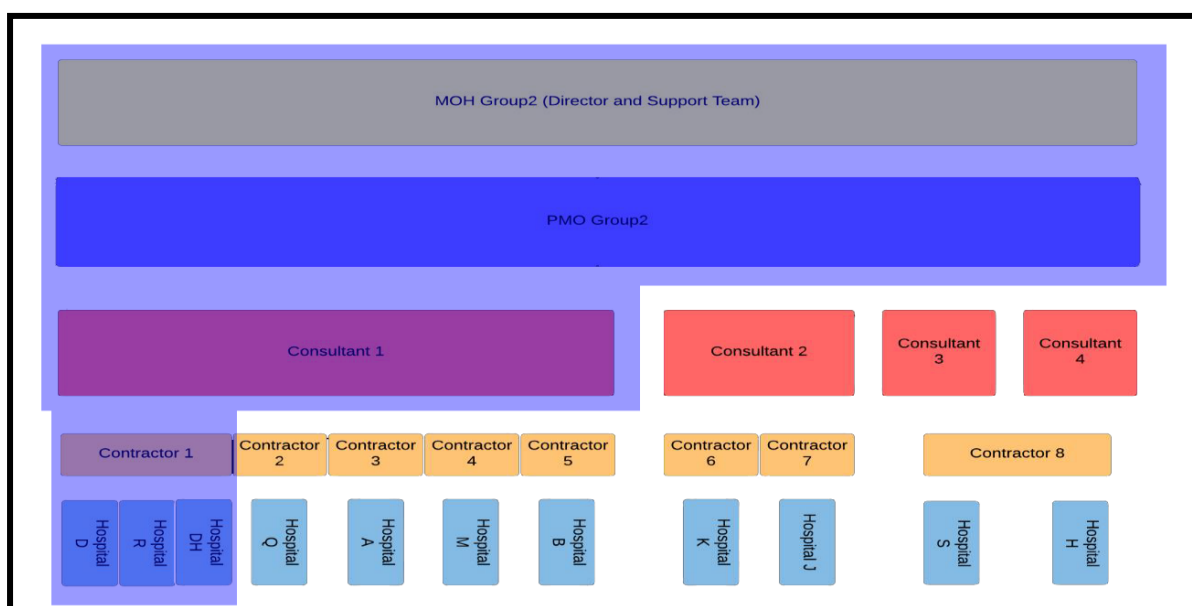
Figure 22: The Triple-Twins Stakeholders' Groups

4.7.2   Site Training

The training was divided into four sessions over two days. On the first day, I worked with the contractor teams from the three projects. The experience was vivid because having three project managers in the same room allowed us to cover every possible scenario. Notably, we held the training in Hospital-D, which was a challenge. The training was interrupted several times owing to the unstable internet connection.

On the second day, I trained the consultant team. In general, consultants training was more complicated than training contractors because every Consultant's engineer must be able to use the system. Also, the Consultant's work involved more collaboration and delegation. I was concerned at the time with the average age of the consultant project managers. I thought they would not be able to overcome their notable fear of technology. I also felt this would be a cause for implementation failure. To address this issue, I decided to hold a one-on-one session with the Consultant's PMs. Following that, I kept in touch with the consultant PMs during the first week to ensure they overcame their fear of technology.

However, it turned out later that my assumption that the Consultant's PMs would represent the weakest link proved to be inaccurate. Despite the low computer literacy rate of the Consultant's project managers in most Group2 projects, they worked diligently on learning and working with the PMIS. Except in one case, the consultant PM's age and computer literacy were never a significant factor in the PMIS implementation failure.

During the site training, I was struck by the negative attitude of the PMO construction manager and his subordinates towards the PMIS implementation. They carried on as if there was nothing new that required their attention. This type of resistance to the change the PMIS was supposed to bring in the way they worked is discussed by many scholars (Morrison and Milliken, 2000; Bovey and Hede, 2001).

A Flashback

Flying back from the Triple-Twins training, my mind was preoccupied with the obvious reluctance of the PMIS end users to engage with the system. It appeared to me like many of the users perceived the system as a threat. Despite the participant's smiles and the laughter during the training, I was positive there was a lot of tension and anxiety beneath the surface. The questions asked after the training and during the lunch break told the untold story. Users were concerned with the question: how to protect oneself from exposure (i.e. lack of computer literacy). There was a war between the consultant and the contractor in these projects. It seemed also like that the PMO staff had an advantage in this situation and were manipulating the consultant and the contractor against each other.

I thought the PMIS implementation team needed to deliver a positive message; one that accentuated the potential benefits of the PMIS. This was critical for the success of the PMIS implementation. Some questions were still looming during the landing in Riyadh. Would we craft a message based on a unified team? Would the consultant, contractor, PMO and MOH work hand in hand to deliver the project? Would not it be more beneficial for the PMIS implementation to take advantage of the politics in those projects and portray the system as a weapon that competing parties could use against each other?

4.7.3 Technical Training

The contractor technical team's training was conducted in Group2's premises. The same contractor was responsible for building the three hospitals. The contractor had one central team that managed the design development because the three projects are almost identical. The three hospitals had the same capacity and were all general hospitals. From a PMIS implementation perspective, having a central technical team provided an opportunity for rapid progress. However, that also represented a significant risk in case the team did not accept the PMIS. The consultant team that oversaw the design development process was also from one organisation, which was Consultant-1. The consultant project director's assistant (Participant-3) was responsible for this team's performance. This assistant was not the same person responsible for the Consultant's technical team in Hospital-A. The implementation of the technical part of the PMIS in Hospital-A and the triple-twins overlapped in terms of

schedule. The overlap between the implementations provided me with the opportunity to compare ongoing implementations in very similar environments.

Once again, factors that were external to the PMIS implementation altered the results during the implementation of the triple-twins. Participant-10 was an "outsider" to the Consultant-1 team, as he had just joined the organisation. His role decreased the power of the incumbent project director assistant (Participant-3). His assignment had also introduced a competition between the two assistants. This contest helped me attract the attention of both assistants until Participant-10 left the Consultant-1 organisation. Hans and Sundgren (2005) called on insider action researchers to assume a savvy political attitude. Following this advice, I tried to fuel competition between the two assistants to the benefit of the PMIS implementation. A further reinforcement supported my efforts in this stage, which was also coming from an unexpected source. By then, the PMO had published five PMIS implementation progress interim reports. This was the first time that MOH Group2 general supervisor responded in writing. He had issued a circular directing all Group2 member organisations to engage with the PMIS implementation process actively.

The circular represented a turning point in the implementation trajectory. The dominant view between the participants I interviewed was that the MOH was not genuinely interested in a successful PIMS implementation. As Participant-16 put it, "The client looks at it [the PMIS] as prestige, and he was the real problem because they want to preserve the status quo." Participant-3 also shared a similar view, albeit putting it more moderately, "They [MOH] conceive it [the PMIS] as secondary; they are implementing it incrementally to use the experience in later and larger projects."

4.7.4   Triple-Twins Implementation Results

By October 2018, the implementation was a complete success on two of the three construction sites. Internet connectivity was still an issue at Hospital-D. Besides, the ongoing politics at this site continued to impede the implementation. I later came to learn that while the implementation was underway at Hospital-D, a fierce struggle between the consultant, the contractor, and the PMO was ongoing. The PMO's CM was trying to identify the causes behind a recent deterioration in the construction progress. Both the consultant and the contractor blamed each other for the delays. This conflict created an unhealthy environment

of power struggles. This eventually ended with the termination of senior staff from both the contractor and Consultant. The implication for the PMIS was losing trained users and losing support for the implementation. In summary, Hospital-D was a complete failure compared to the other sites.

On the technical side, although the contractors welcomed the implementation, the Consultant-1 technical team continued to resist using the system. Apparently, at this stage, we were beyond the resistance of the Consultant-1 director. Two events proved this to be accurate. First, he had given free rein to each of his assistants to deal with the PMIS issue. Second, he had signed a letter informing the contractors that Consultant-1 would no longer accept any technical submittal unless through the PMIS. Despite these positive changes in the attitude of some key stakeholders, Consultant-1's technical team continued to resist the implementation fiercely. Because of this resistance, the PMO interim report issued on 29 November 2015 considered the implementation of the triple-twins a failure on its technical side.

4.7.5   Triple-Twins Learning

Two essential lessons were learned as a result of the implementation of the Triple-Twins. First, realizing support from the senior management is crucial, but may not be enough to win the support of all the stakeholders. The political actions of the consultant and the contractor in Hospital-D demonstrated that interaction at micro levels might result in unexpected challenges to the implementation. To say that top management support is not enough is an oversimplification. This contradiction between what theory suggests and what had happened should lead to a more in-depth inquiry into questions such as Stacey's (2011, p.143):

> "Is this an apparent contradiction, which arises for me, simply because I do not understand the phenomena fully? Or is it a paradox, the genuine, simultaneous coexistence of two contradictory movements?"

The experience of Hospital-D revealed that there was a possibility that "invisible" interactions at the micro-level may disrupt well-crafted macro-level planning. That suggested the need for an investigation at the micro implementation levels before PMIS deployment. This knowledge resulted in the decision to use the insights of the stakeholders' theories for the following implementation. Stakeholders' theories may assist in understanding the micro-interactions between potential participants.

Reflective Pause 4
The Necessity of Involving Site Managers
In retrospect, I concluded that the implementation team committed a fatal mistake when they insisted that the PMO staff should have no active role in the PMIS as users. Astonishingly, going through my notes, I established that we needed to find out how we could benefit from the CMs and the site managers as early as the first failed implementation attempt at Hospital-Q.
In hindsight, I reckoned that if the CMs and site managers were to collect information for their monthly and weekly reports through the PMIS, the results would have been dramatically different; the site managers would have exerted daily pressure on all site users and would have certified the credibility of the system data. In this regard, the Site Managers were the only independent group of users that had enough knowledge to verify the reliability of the data fed by contractor and consultant while having no stake in fudging it. The only "objective" observer in each project that could monitor the information quality was the Site Manager. Delone and McLean's (2003) MIS success model suggested that system information quality as one of the three determinants of an implementation success. Many other scholars support this view as discussed in the literature section. These insights implanted a need for action in me. Site Managers had to be involved, how? This was a question that needed an answer. Adding more tasks to the daily routine of the site managers required a broad support within the PMO. Most, if not all, construction managers needed to be in favour of this change. Most importantly, the PMO-director must support it unreservedly.

The second lesson was that despite changes in Consultant-1's director attitude towards the implementation, the resistance of the technical team did not stop or weaken it. Instead, it grew stronger suggesting that once people start to resist PMIS implementation, objective reasons for the resistance gradually become irrelevant. Lapointe and Rivard (2005) offered a view of resistance to the introduction of technology that depicts resistance as an organic

creature, which grows and evolves from the individual level into a group phenomenon. The Hospital-D experience made me aware of the need to have a resistance management strategy before PIMS implementation commenced. As the story unfolded in Hospital-D, it became evident that the coercion strategy agreed to with Participant-7 failed to produce permanent results. Thus, after consulting the literature, I decided to adopt a strategy which is the gradual resistance management.

4.8 Dealing with Nonsense

This section focuses on the period that followed the "formal" start of the action research project. In this context, "formal" means the process that was carried out following the official acceptance of the research proposal by the University of Liverpool. However, the events reported on earlier in this chapter were carried out with an action research mindset. At some point during my studies in the Doctor of Business Administration program, Action Research became my preferred strategy to solve work-related problems. It was an action research strategy that I used in the PMIS implementation project. In this sense, the research reported here was a continuation of the work to untangle the issues faced during the PMIS implementation in Group2. Herr and Anderson (2005) discussed Dyke's (2003) dissertation proposal to illustrate how an insider action researcher is likely to build their academic work on a history that is in progress:

> "While it is a 'new' piece of research, it is very much nested in the [practitioner's] work that he has done previously."

Like me, Dyke (2003) must have dealt with the problems he faced in his work even if he had no plan to write a dissertation.

The distinguishing feature of the "formal" stage is the well-structured application of the action research strategy to a group of problems: some of which were already challenging the implementation and ones that emerged later. As this is formal research, it was necessary to keep a scholarly trail of evidence (Yin, 2009). It was also during this phase that I was allowed after getting ethical approval, to approach research participants and conduct several semi-structured interviews that helped to elucidate the problem.

The following paragraphs in this section report the PMIS implementation progress from a scholar-practitioner perspective. As such, the story is structured around the action research cycles that were implemented.

4.8.1 Reconstructing the Problem

At this stage, the PMIS was implemented with different results in five of the eleven Group2 projects. The site implementation was considered successful in three projects. The failure of the process at the other two sites (Hospital-Q and Hospital-D) was attributed to factors beyond the control of the implementation team (PMIS Interim Implementation Progress Report No. 5). However, the implementation at the technical offices failed in all five projects. Report #5 openly blamed the Consultant for this failure:

> "In technical submissions, the Consultant is to be blamed since the Consultant is not responding to technical submittals submitted by the contractor."

Earlier attempts to overcome the issues with the technical team reported in section 4.6.3 did not result in long-term improvement.

As noted above, the Consultant's technical team's resistance did not make sense to me. After securing the support of Consultant-1's director and his assistant, I assumed erroneously that the resistance would gradually fade. My observations and the informal discussions with the department heads led me to conclude that Consultant-1's technical team was reacting emotionally to the PMIS. After asking some of them to explain why they hated the PMIS; I listened to answers that were anything but logical, succinct, or clear.

Thus, to better understand the reasons behind the PMIS implementation results, I decided to interview some of the stakeholders. The interview process was carried out as detailed in the methodology chapter earlier. The interviews broadened my understanding of the problems complicating the implementation. The participants provided some eye-opening insights into the issues facing the PMIS implementation. Some of the PMIS implementation failure reasons from the participants' view are listed in Table 4 below.

Problematic theme	Participant Number	Counts in interviews	Example of Participants' quotes
Lack of management support and implementers mandate	23	5	"Group2 is too messy [there are too] many stakeholders and an uninterested sponsor. MOH was not involved in the implementation. They wanted it all to be done. It comes to a point where there was no support from the client at all."
	23		"Also, the many changes to their management structure make it difficult to agree on anything."
	16		"I should also have the power to ask consultants and contractors to change some of their staff if they were not up to the task." "Most workers are X type, and as such, pouring more resources at the monitoring of the implementation and providing them with power (authority) is the only way to make it work."
	7		"However, some people are just troublemakers by nature; you need to be hard on such people."
	23		"In the Middle East and especially in the construction sector, people are not willing to do or learn about any extras unless they are ordered to do that. That entails successful implementation requiring a mandate."
Fear of the PMIS	5	3	The technical teams feared full information being available to all. This was a problem for them in the following ways; • They feared that someone could replace them because their control of information was essential to their power, • They feared being exposed on either the number of iterations and add on comments on

Problematic theme	Participant Number	Counts in interviews	Example of Participants' quotes
			drawings/submittals or precisely what were the item holding a submittal/drawing and that item being viewed as minor or insignificant.
			• If management has access to all the information, it negated the need to bring them to endless meetings to understand the problem/holdups, thus reducing their perceived status.
			• Also, on the subject of organisational culture is the default reaction to "crisis" usually was find someone to blame, and that would solve the problem. This is turn feed the fear that most staff had of transparency.
	16	2	"Head office is afraid of mistakes and thus fears transparency brought by the system."
	7		"They felt threatened by the PMIS. Eventually, they have discovered that it is not a stick. Individuals are living with it, except for some managers who are still afraid of the system."
Unqualified staff	16	3	"But they need qualified people to deal with it. In KSA, in the construction sector, most of the actors are not qualified to deal with technology."
			"The culture of most workers in KSA is weak in terms of technology and the English language."
	3		"Some team members lack basic computer skills."
			"The circumstances in KSA are that consultants hire the cheapest engineer because of the fierce competition. It

Problematic theme	Participant Number	Counts in interviews	Example of Participants' quotes
			naturally follows that one should not expect qualified engineers." "A good system is not enough; I need to hire a good team."
	24		"Some people are not able to use the system properly, especially in the technical department. I think because of the seniority level, some of them are not even able to use computers properly."
Perceived Usefulness	16	2	"They [the Consultant technical team] feel it is instructions, so they wait for the contractor to fail, but if he did not, they would do the least possible while showing collaboration."
	7		"The core issue with the system implementation here is that someone who was playing with a toy developed and evolved the requirement. All other parties want to be seen as fulfilling the MOH requirements. Except for us, this applies to all stakeholders in the implementation of the [PMIS] in Group2 & Group1."

Table 4: summary of top obstacles as per participants

The analysis of the data provided by the interviewees, along with reports and other secondary sources, convinced me that the implementation struggles were a result of many interrelated factors. The most salient, as suggested by the participants, were the lack of executive management support, the users' fear of the PMIS, the lack of English language and technology skills, and the users' negative perception of the PMIS usefulness.

A revisit to the literature confirmed the analysis. It revealed that the top problems the participants in my study identified were similar to the ones discussed in the literature extensively. The following sections explains how I addressed these challenges.

4.8.1.1 Lack of Management Support

Armed with insights from the literature, I decided to discuss the issue of the lack of senior management support with my implementation colleagues. It was evident that the lack of management support was harming the implementation. We agreed with a little effort that we must act, and this was the easy part. The tricky part was agreeing on the course of action. Participant-7 pointed out we could not openly criticise the client. His previous experiences suggested that it is not culturally acceptable in KSA to discuss the shortcomings of the Saudi client openly. Instead, he suggested that we should get the client's attention indirectly. To

achieve this, we made sure the PMIS struggles on the technical submittals were known to the members of Group2. The belief was that the Saudi managers would prefer to be perceived as initiators of events, rather than merely responders to them. We decided to spread the word and wait for the Group2 GS to respond. We expected he might issue a circular directing all Group2 members to expedite the implementation of the PMIS. I was not happy with this approach, as it meant waiting for an indefinite time with little to no control over the results. I took the problem of MOH engagement with the implementation to the PMO-director to benefit from his views. What bothered me was that the PMO-director's view was very similar to Participant-7's, albeit being more precise. He suggested that we should use the implementation reports to craft a message to the client. The message indirectly hinted that the project required more client support to overcome the then-current challenges. I wrote the report benefiting from Participant-7's mastery of "political" language in crafting a cautious message, but the MOH did not respond to it. One month later, we followed up with a similar one, but still in vain.

Reflective Pause 6

The Managers Game

Following my discussions with Participant-7 and the PMO-director, I felt depressed. I felt betrayed and in pain. At this stage of the implementation, I was in charge. To me, the failure of the implementation represented a personal one.

It took me considerable time to overcome these negative feelings. I decided later that I was in need to understand the real reasons behind their reluctance to address the lack of MOH support openly. I was under the illusion that Participant-7 would help me convince the PMO-director to act. PMO procedures stated that unless the PMO-director clearly delegated a PMO member, then, only the PMO-director could approach and communicate with the Group2 GS. Reflecting on the positions of Participant-7 and the PMO-director, I started to notice that their position was not specific to the PMIS implementation process. It was just a manifestation of a broader strategy that managers employed in dealing with the MOH. Therefore, I had to observe the entire context of Group2 to better understand how the relationship between the different components of the organisation was structured.

I noticed that there were informal management conventions, which were prominent within Group2 when it came to managing relations with the MOH. It appeared that most of the member organisations (consultants, contractors, and the PMO) agreed that they must only communicate to the MOH what pleased the MOH, unless it was very critical to do otherwise. I heard stories about people who tried to be honest with the MOH and in so doing got fired. The pervasiveness of this suggested that this perception of the MOH management was accurate. It looked like I had two options, option one was to try to swim upstream and go over the head my PMO-director to deliver the message to the MOH directly. The absence of the MOH support to the PMIS implementation was the primary reason behind its unsatisfactory progress. The second option was to follow the PMO-director's advice and deliver the message indirectly. At that point of time, I chose the second option primarily because I thought if I did otherwise, I might harm some of the research participants.

Later, observing the relationship with the MOH in other matters, I noticed that they responded to dynamics that was not initiated by them only when it came through verbal communication (informal). Investigating this trend further, I concluded that Group2 GS naturally did not read the reports and letters that he did not request. With the amount of correspondence, he received daily that made sense. I was so convinced to the extent that I decided to take the risk and approach Group2's GS personally to discuss the implementation challenges.

After numerous attempts to meet the director, I finally succeeded and met him for a short period. He promised that he was going to act on the problems we discussed. The first was the widely accepted assumption within Group2 that the MOH did not care if the implementation succeeded. The second was the minimal support of the MOH IT department. I thought about my options thoroughly; I revisited the literature several times and I discussed management support with many of Group 2 members both informally and formally. Unfortunately, neither the literature nor the discussions could provide a conclusive road map. It was frustrating; time seemed to never stand still. In my mind, the negative perception of the system was growing.

4.8.1.2 Extra complications

The MOH created extra confusion when someone at a high level in the Ministry hired another company to implement a different PMIS at both Group2 and Group1. The coordinator for the new PMIS was one of the MOH Group2's general supervisor assistants. When I accidentally learned about the new PMIS, I contacted Participant-7 for clarification, but he was not aware of the situation. I also asked the PMO-director, but I was surprised to learn that he did not know the new system. I decided to contact the MOH assistant to understand the new MOH plans for the PMIS I was implementing.

Reflective Pause 6
Frustrated and Confused:
When I ended my phone call with the Hospital-M consultant project manager (Hospital-M PM), I was in shock. The Hospital-M PM wanted to know if my request to arrange training had anything to do with the session, he was invited to by the MOH assistant. In his mind, the assistant and I were talking about the same PMIS. But after a couple of questions, we understood there were two PMISs that were to be implemented in Hospital-M. The Hospital-M PM was not able to hold his laughter, and I could not blame him.
Angry, I contacted the MOH assistant. He tried to calm me down by agreeing it was not professional to start implementing the second PMIS without notifying the PMO. He assured me that if he had known that no one had contacted us, he would have done it. However, as he received the orders to implement the system from MOH top management, he could not start coordination with the PMO without direction from MOH.
I reflected on the problems with the two systems for a long time. It was clear from the discussion with the MOH and the PMO management that no one knew what to do. No one supported stopping the implementation of the PMO's PMIS and no one could stop the implementation of the new system. My biggest problem was that it was obvious that the end-users would not take either system seriously. I thought about ways to limit the damage to my implementation, but unfortunately, I did not find any. The only option, in my view, was to slow down the implementation process while waiting for the MOH's top management to decide. Although I knew many scholars advised against inaction, it was the best option. I shared my thoughts with the implementation team and the PMO-director. As I expected, they supported slowing down the implementation activities and monitor the situation to see how things would unfold.

In my perspective, it was ill-advised to run two similar systems in addition to the paper-based processes. Notwithstanding the problem of having two systems, the new system decreased the PU of the PMO's PMIS because after introducing this new PMIS, users were sure the old PMIS was going to stop. The task of altering the users' perceptions became a sort of a "Mission Impossible," primarily as I was not sure if the PMIS implementation would continue and I could not contact any person with knowledge.

4.8.2   Problem Construction Summary - AR cycle-1 (Dealing with Nonsense)

This first formal Action Research cycle started while the implementation at the Triple-Twins was ongoing and continued to include the implementation at two other sites: Hospital-M and Hospital-K (see **Figure 13** for a visual of the implementation timeline).

In summary, the result of the problem identification phase revealed three groups of challenges that obstructed the success of the implementation. The following are the problems that were identified during this cycle.

Lack of Management Support:

Lack of management support included all key stakeholders. The MOH's top management did not demonstrate enough support for the implementation. The consultants' management did not support the implementation and even opposed it for some time. The contractors' management neither resisted the implementation overtly nor supported it.

Fear of the PMIS and the Low Skill Base:

Both the fears of the PMIS and the low technical skill base were identified as obstacles to a successful PIMS implementation. The two are interrelated because the low technical expertise of the end-users resulted in a lack of self-confidence, which in turn fuelled users' fear of their ignorance being exposed because of the PMIS.

Lack of PMIS Perceived Usefulness:

The lack of the perceived value of the PMIS was the most complicated problem that required the attention of the implementation team. The literature review section revealed that PU is a function of several other factors. Furthermore, the unexpected implementation of a parallel system by the MOH exacerbated the situation.

4.8.3   Action Plan - AR cycle-1 (Dealing with Nonsense)

To improve the effectiveness of the implementation, knowing that multiple interrelated problems existed, I thought it was very critical to consult with the implementation stakeholders before finalising any plan.

Separate discussions with Participant-7, Participant-3, and Participant-24 convinced me that I should forget, for the time being, about acting on the MOH's lack of support. During the first half of 2016, KSA had announced the implementation of economic austerity measures; payments to contractors and consultants were delayed. Some projects, such as Hospital-Q, were practically put on hold. Group2's GS leverage over the stakeholders was at its weakest. Thus, it was not wise to think the MOH would intervene to improve the engagement of different stakeholders with the implementation.

Further, if the MOH intervention failed, it was likely to fail due to the weak leverage, then the implementation team would have no further recourses. Thus, considering the effect of the austerity measures and the fact that a second PMIS implementation was in progress, I decided to reserve the MOH's power as a desperate measure for a most desperate time. Further, my literature review concerning management support concluded that researchers do not understand management support very well as an intervention. This lack of understanding made the use of management support as an intervention, a risky gamble.

Consequently, my plan to address the management support issue was to approach the most potent and useful managers that I could reach in each of the organisations that were involved in the implementation. My strategy was to influence them to support the implementation. Excluding the MOH management from my pursuit for support seemed wise, as I wanted that as my fall-back plan.

In parallel to garnering management support, the action plan also included several measures to overcome the fear of the PMIS, the low skill base, and low PU. First, it was intended that the identification of struggling users would be an integral part of any training session. This would be followed by one-on-one support sessions to help struggling users gain confidence and move forward smoothly with system use. Second, a new implementation discourse would be used. A message that emphasised the non-threatening nature of the trial-and-error period would be delivered to all users to endeavour to help build self-confidence and overcome fears

of the system. Also, more training customisation would help to connect the end-user's daily practice to PMIS usage. Theoretically, this will increase the PMIS's PU.

Finally, Consultant-1's technical team's irrational resistance had to be eliminated. This was a very delicate and vital task that needed to be executed with great care. I felt that the only way to overcome the resistance of Consultant-1's technical team was to change the organisational procedures by isolating the departmental heads and eliminate their role within the PMIS. I had to secure the support of Consultant-1's director and his two assistants. It was not something that could be done quickly; it needed patience and political acumen.

4.8.4   Action Results – AR cycle-1 (Dealing with nonsense)

Following the planning stage, identified actions were implemented in both ongoing implementations and new implementations. On the technical side of the implementation, actions were implemented in all Consultant-1's projects where the PMIS was implemented. Those projects included Hospital-Q, the triple-twins, Hospital-A, and Hospital-M. At the site level, actions were implemented in Hospital-K and Hospital-M.

As outlined above, the source of resistance to the process was the primary differentiator between the technical and site implementation. On the technical side, the consultant was the main reason for the unsatisfactory progress. At the site level, several factors contributed to the implementation difficulties, including the ones identified in earlier implementation cycles. The consultant, contractor, MOH and PMO were all implicated in the failure of the implementation.

At the site level, several letters were sent, and meetings and workshops were conducted with the consultant and contractor teams. A renewed emphasis was placed on the advantages of using the benefits of the PMIS. This communication campaign was tasked with changing the negative perceptions of the PMIS. It was based on identifying value for each group of users. For example, it was part of the weekly routine of the consultant's project managers to report to the PMO and the MOH regarding the number of non-conformance reports issued and closed during the week. The consultant's project managers were shown that by utilising the PMIS properly, they would be able to generate the reports with just one click. They were astonished the reports included hyperlinks to the supporting documentation of every non-conformance report listed. Following the on-site implementation of the action plan, the

comparison in Table 5 and Table 6 below shows the improvement of PMIS adoption in several hospitals.

At the technical facet, more drastic action was required to enhance the PIMS implementation process. I started by pressuring Consultant-1's top management by publicising the failure of their technical team to engage with the PMIS. I believed this would improve my position while I found a solution to Consultant-1's technical team's problems. I was not sure this was the real reason behind Consultant-1's change in attitude to the process of technical reviews via PMIS. I told one of Consultant-1's director's assistant that their technical PMIS performance might improve if they modified the review process. It would work more smoothly if they allowed their technical staff to review and make decisions through the system directly without the need for departmental approval. The negotiations with Consultant-1's management resulted in them modifying their processes. In return, the PMO promised to implement all necessary modifications to the PMIS to allow these changes to occur. The PMO conducted a workshop for Consultant-1's technical team to review their training and help them overcome any technical issues encumbering their full engagement with the system.

Stakeholder	Contractor		Consultant	
Location	Site	Office	Site	Office
Hospital-K	V.Good	Bad	V.Good	N/A
Hospital-Dh	V.Good	Bad	V.Good	Fair
Hospital-Ri	Fair	Fair	Fair	Fair
Hospital-AL	Bad	Fair	Poor	Bad
Hospital-Q	Bad	Bad	Poor	N/A
Hospital-A	Excellent	Bad	Excellent	Poor
Hospital-M	Bad	Excellent	Bad	Excellent

Table 5: PMIS Adoption Status Feb 2016 Source: official PMIS progress report

	Contractor		Consultant	
	Site	Office	Site	Office
Hospital-K	Excellent	Good	Excellent	Good
Hospital-Dh	Excellent	Good	Excellent	Good
Hospital-RI	Bad (stopped from the 8th of March)	Good	Bad (stopped from the 8th of March)	Good
Hospital-AL	Bad Never Started	Good	Bad Never Started	Poor
Hospital-Q	Poor	Bad Never Started	Poor	N/A
Hospital-A	Excellent	Bad stopped since December 2015	Excellent	Good
Hospital-M	Excellent	Excellent	Excellent	Excellent

Table 6: PMIS Adoption Status May 2016 Source: official PMIS implementation progress report

The political change that was implemented resulted in excluding Consultant-1's department heads from the technical PMIS processes. The implications of this reorganisation were significant in projects such as Hospital-Dh and Hospital-R. However, the overall results suggested that more needed to be done to achieve an acceptable level of PMIS adoption at the technical facet.

4.9   Hospital-B Cycle-2

The Hospital-B project was selected for the next stage of the implementation. It was the last site in Group2 still supervised by Consultant-1 where the PMIS had not been implemented. Construction at the site was in the early stages, which meant the process would cover the entire life cycle of the construction.
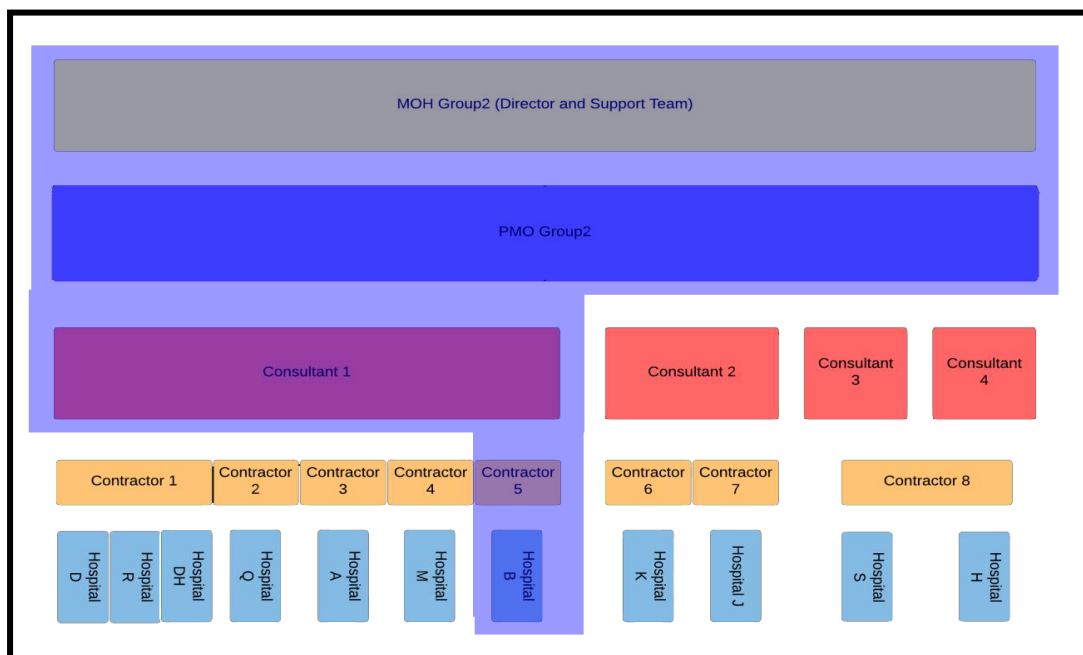
Figure 23: Hospital-B Main Stakeholders' Groups

4.9.1   The Plan Cycle-2

I was confident that the knowledge gleaned from the previous implementations had equipped me to make Hospital-B's successful. Training customisation had been completed and tested successfully in Hospital-K. Consultant-1's technical teams' resistance was mitigated, and engagement with the system was improving. The areas that might generate interest and help increase the PMIS PU were identified and employed. I thought Hospital-B provided an opportunity to demonstrate the success of the new implementation approach, which was based on an understanding of the main theories of technology acceptance and success models (Delone and McLean, 2003; Venkatesh et al., 2003; Venkatesh and Bala, 2008). The strategy was to employ tailored communication and user training as tools. If successful, this could solve some of the problems that had been previously identified. The problems

identified were the low skill base, the low level of the PU, and the fear of the PMIS. In brief, the plan for Hospital-B was to implement learning in a structured way.

4.9.2   Actions Cycle-2

I arranged Hospital-B's implementation to commence three weeks before the training started. The PMO construction manager, as per the communication plan, should have been the leader of the process. However, I discovered that I needed to encourage him to contact the training stakeholders. The CM, however, was not interested in the implementation. He did not subscribe to the benefits of the PMIS and was departing in three weeks. He had been laid off as the PMO was forced to downsize in response to delays in their payments. With some effort, I collected the trainees' information and entered the data into the system before the training day. I informed them their accounts were ready. This early preparation was an effort to engage end-users and facilitate hands-on training. Previous experience had shown that it was essential to identify struggling users early to improve their engagement before they adopted any contrary views.

The most critical personnel in this type of training are the consultant and contractor project managers. If there was an individual whose acceptance of the system would ultimately decide its success or failure, that person was the consultant's project manager.

Twenty-four hours before the training day, the consultant's project manager said he was leaving, and that another engineer would be in charge. I contacted the new project manager, who promised to provide the required technology for the training.

On the day of the training, the internet and the screen were available, but there was no connection cable. This delayed the start of the training by two hours. Finally, we started at around 10 am. The consultant's project manager did not attend the training and had mentioned he did not believe that the internet speed at the site was fast enough. He tried to convince me he could provide the required data without the system. I argued that the system should be tested before being judged. After training both the consultant and the contractor engineers, I persuaded the consultant's project manager to let me walk him through his role in a one-on-one session. I thought it was essential before leaving the site to gain the consultant's PM's support. Afterwards, it seemed that he was impressed and promised he

would put pressure on the contractor (although the contractor was not getting paid) to provide a better Internet connection for our trial period.

During the training, I learned the contractor had not received any advance payment nor had even been paid for a year. I looked around the construction site and saw a few labourers doing very little. The project was practically at a halt. When I noticed that the consultant project manager did not have a computer in his office, I asked him about it. He said he would be getting one from the contractor soon. The plan was to get the internet on-site immediately; then the system would start running.

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Reflective Pause 7

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On my way back to Riyadh, I was wondering about the potential for any success in the Hospital-B implementation plan. With a contractor who had not been paid for a year, a consultant's project manager who had no computer, a PMO construction manager who was packing to leave, and the consultant's and contractor's engineers who were concerned with job security, the picture looked gloomy. Could I do something about these problems? Should I just ignore them and stay the course? Should I have been more proactive before the implementation commenced?

I concluded the real issue was my "ignorance" of the reality of the on-site situation before starting the implementation. I also failed to consider the importance and influence of external factors to the process. Unfortunately, the knowledge I gleaned from the literature and experience failed to provide an understanding of the totality of my predicament. I would need to discover new insights.

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4.9.3   Action Results Cycle-2

Following the session on the construction site, training at Group2's headquarters in Riyadh was to take place. It was designed to enlighten the contractor's technical team on the design development component of the PMIS. The technical team training never materialised because the contractor failed to nominate any candidates. The contractor stopped submitting technical work, even using the conventional process.

PMIS usage was never initiated for the construction team, and the contractor did not respond to several phone calls and letters from the PMO or the consultant who urged him to start using the system. In summary, Hospital-B implementation was a complete failure.

4.10 Unexpected Events

While the occurrence of some events during this AR journey was not directly connected to the PMIS implementation, I believed their ramifications were not to be ignored. These events had, in one way or another, influenced the implementation. This section reports on these events while endeavouring to explain their relationship to the implementation process.

4.10.1 Economic Austerities

Towards the end of 2015, Saudi Arabia implemented economic austerity measures that included cutting funding in many sectors (Financial Times, 2015). One of the worst-hit industries was the construction sector. Over 70% was cut from the government's 2016 budget for Group2's eleven projects. As a result, contractors, consultants, and the PMO were not getting paid. Most of the consultants' and contractors' staff started experiencing delays in payment of salaries, which in some cases led to industrial action.

One of the first organisations in Group2 that downsized in response to the austerity measures was the PMO. Since the level of construction activities was significantly lower than 2015 and it was anticipated that it would further decline, the PMO decided to decrease its staff to match both the level of activities and its 2016 budget. Contractors followed the PMO's lead in decreasing their staff to limit their overheads and match their budgets. Consultants joined the downsizing club after being directed by both the PMO and the MOH to save money and to match the level of construction activities.

The changes caused by the austerity measures created a new reality for Group2. On the macro level, the power balance was disrupted. Due to the cash flow issues, the MOH was no longer able to enforce its will on Group2. This new reality weakened the PMIS implementation mandate and resulted in deterioration of the PMIS's effectiveness and efficiency at some of the projects.

At the micro-level, people were concerned with their job security. The PMIS lost some of its most prominent supporters in Group2. For example, the construction manager of Hospital-K and Hospital-A was one of the essential actors in the success in these projects. On some projects such as Hospital-Q, trained people left without being replaced, which led Hospital-Q to the total cessation of the PMIS.

Last, the downsizing of the PMO coincided with the arrival of a new PMO-director. This led to a change in the PMO operational style. His style was more detail-oriented and focused on driving Group2 teams rather than collaborating with them. With a smaller staff and the increased workload due to the strategy change, I needed to become more involved in other facets of the PMO operations, in addition to the management of the PMIS implementation. The new PMO-director was not an enthusiastic supporter of the implementation, and I found myself slowly shifting toward a different role.

4.10.2 Vision 2030 and the 2020 National Transformational Program

In April 2016, Saudi Arabia announced an ambitious plan, "Vision 2030" (KHAN, 2016). One of the first programs that were initiated to deliver the "Vision 2030" was the 2020 National Transformation Program. The program aim was to improve public-sector management. A team of Aramco project managers (here and after Aramco Consultants) was assigned to the MOH PM department. Their role was to evaluate the status of project delivery and to work on improving PM practices. The Minister himself highly empowered the Aramco team.

The first significant change made by the Aramco team was the replacement of the Group2 general supervisor. He had been on the job for less than a year after replacing his predecessor earlier in 2016. The second significant change was the reorientation of the PMO. This was in response to the combination of high pressure from the Aramco Consultants to deliver more added value services and the pressure of the austerity. The PMO responded by restructuring and re-prioritising its objectives. It was clear that the PMO, with its new director who was installed during the second quarter of 2016, was more oriented toward control and governance than monitoring and reporting. The third critical change was the replacement of the MOH PM Department general manager with an ex-Aramco manager. The changes were relatively quick, and the PMO was continuously under pressure to adapt to the new business environment.

This affected the implementation in several ways. First, during the second half of the year, the general trend was deterioration in the effectiveness and efficiency of the PMIS's contribution to Group2. This was because many trained people had already departed. Also, contractors and consultants were underperforming due to financial struggles.

Second, the implementation team, including myself, was preoccupied with adjusting to the new PMO operations and Aramco Consultants directives. The Aramco Consultants, the new Group2 general supervisor, and the new general manager were all trying to leave their fingerprints on the evolving management approach in Group2. Thus, neither the implementation nor the implementation improvement achieved any significant progress during the second half of 2016.

4.11 Reconstructing the Implementation Problems Cycle-3

4.11.1 Introduction

After Hospital-B implementation failure and the changes in my responsibilities brought by the new reality of Group2 practices, I took considerable time to reflect on what had happened, the future of the implementation, and my thesis project. At some moment during the second half of 2016, I considered stopping the research or reporting only the case study part rather than a complete action research project. Despaired at my repeated failure to convince the PMO-director and Participant-7 to try and do something about the deterioration of the PMIS; as my words fell on deaf ears. After several attempts to convince the PMO-director and Participant-7 in mid-December 2016 to sit down and discuss the issues around the PMIS implementation, we finally had a conversation.

I walked both managers through the system, to help them understand the value the system could add to the Group2 operations. It was the first time the director had taken a close look at what sort of PMIS we had in Group2. We discussed the situation regarding the eight projects where the system was implemented. He agreed that there are two conditions needed to be fulfilled for the system to work and add value:

- The information generated by the system had to be used as a part of the PMO monitoring and reporting processes.
- Construction managers, who were the primary point of contact with both supervision consultants and the contractor, must lead the implementation of the system.

Although the PMO-director agreed to increase the effort into improving the PMIS, he did not give me the authority to do it, nor did he instruct the construction managers to collaborate. He was simply listening giving it lip service. I believed he would not act or empower me unless the MOH complained about the system performance.

My analysis was that he and Participant-7 perceived the effort required to improve the system implementation as unnecessary because the information the PMIS would provide was available using the traditional paper-based processes.

Moreover, the system crashed and was down for three days, which reinforced the opinion of its critics and affirmed that it was unreliable. The system was down because something went wrong when the MOH information technology department team was trying to update their server.

With Christmas and New Year's Eve approaching, there was insufficient time for me to try to move things forward. It appeared to me that unless an unexpected event occurred, the current PMO-director would not support my efforts. I concluded that my only option apart from inaction was to employ a political and entrepreneurial approach (Hans and Sundgren, 2005). I could lobby the MOH to put pressure on the PMO to do more to improve PMIS usage. However, I needed to reflect on such action since I felt it was ethically questionable.

Reflective Pause 8

Ethical?

For several days, I was trying to evaluate the lobbying of MOH to force the PMO to act on the PMIS issue along the moral axis. Just feeling that I was considering an action that fell into a grey area was a bitter experience by itself. I recall that I felt strained and my stomach started aching. For days, I kept listening to discussions inside my head. There were convincing arguments in favour of and against the lobbying.

Me: The goal of the PMO was to support the MOH in delivering Group2 projects. Thus, any action that does support this objective could be ethical.

Myself: But there are two problems with categorising the PMIS improvement as a contributor to the ultimate objective. First, it was not evident that the absence of the PMIS would decrease the chances of a successful delivery of Group2 projects. The Group2 experience proved that the PMIS could help in bridging shortfalls on the Group2 communication and quality practices. However, the view that the effort required to achieve an effective and efficient PMIS greater than the expected benefits could not be ignored. If this view was considered, then the inaction strategy called for by the PMO-director and Participant-7 was well justified. Following this argument, the MOH lobbying could be deemed as sabotaging stakeholders' interest in the project, thus unethical.

Second, one could not ignore that I had a personal interest in the PMIS improvement. If the improvements were successful, my thesis project would look much better. This critical view also suggested that the MOH lobbying was selfish and unethical.

Me: Although there was no evidence of decreasing the chances, there was evidence it might increase the chances of Group2 success. Also, it was perceived that the improvements required tremendous effort, which was not true. It was the external, uncontrollable, and unexpected events that delayed the improvement. If those circumstances changed, the improvement would not require as much effort, bearing in mind the experience gained. Yes, I have a personal interest in making the PMIS successful. But this interest is aligned to the MOH interest and thus, it will benefit both me and the customer.

Lastly, and most importantly, the MOH should have all relevant facts and decide for themselves if they wanted to improve the PMIS or not. In my view, it was unethical to decide on behalf of MOH.

These discussions kept repeating inside my head in several variations.

4.11.2 Implementation Issues Reconstructed

Several discussions held with Group2's GS, the PMO-director, and Participant-7 convinced me the issues around the implementation were becoming more political, rather than technical. The "inaction" strategy employed by the PMO during the second half of 2016 was justified by many organisational changes that the MOH and the PMO were undergoing (Lapointe & Rivard, 2005). The PMO was waiting to understand what the new priorities of the MOH were going to be and to align itself accordingly. The PMIS implementation gains were decreasing because of the principal stakeholder weak support and the layoff of many trained users. Technical issues related to the MOH IT department's poor performance also played a role in negatively impacting the image of the PMIS. The severity of the initially identified issues, such as perceived usefulness and fear of the PMIS's were growing under these new circumstances.

The current problem was twofold. The first part had to do with stopping the deterioration of stakeholder engagement with the PMIS in Group2. The second aspect was the need to align PMIS usage with the new MOH priorities.

4.11.3 Unexpected Reinforcements

Around December 2016, a new general manager (GM) for the MOH General Directorate of the PM was appointed. He held a series of meetings with his MOH team, which included the Group2's GS. The GS was tasked with producing KPIs to measure the performance of the PM General Directory, and he passed this assignment to us in the PMO. Both the PMO-director and I worked on it, which created an opportunity to collaborate with Group2's GS. During one of the meetings, he started talking about the PMIS and threatened if the system did not deliver better results, the PMO would get fired. This assumption was predicated on the belief that the PMO could have done more to support the PMIS implementation. I defended the PMO's position, and I also changed his perception that the PMIS was not working at all in Group2. The Group2 GS then asked what would make it better?

Moreover, he requested a report on the implementation status. I prepared the report immediately, but waited until Participant-7 and the PMO-director returned from vacation before publishing it. The Group2 GS asked about the report again because he wanted to discuss it with the GM. This implied that the PMIS was becoming a hot issue. A discussion regarding the implementation report at the level of the GM would involve Group1, Group2,

and the MOH management in a quest to resolve the implementation issues. Although no clear action plan was formulated as a result of the meeting, I decided to take advantage of the new situation.

4.11.4 Action Plan Cycle-3

Since I thought the PMIS declining usage was a universal issue across Group2, actions were needed to match the magnitude of the problem. Thus, it was critical to be able to demonstrate the support of MOH and the PMO for any plan.

I utilised every opportunity to remind the Group2 GS that something needed to be done to reinvigorate the implementation process. The GS promised he would write a letter criticising the key stakeholders' lack of meaningful engagement with the PMIS. Eventually, the letter was sent to the stakeholders requesting an action plan from the PMO in two weeks.

Empowered by the letter, I persuaded Participant-7 to help set up an action plan, which avoided most of the pitfalls identified during earlier engagements (see Figure 24 below). It mainly aspired to apply a tailored version of GE's change acceleration process discussed by Detwiller and Petillion (2014). Following a heated discussion, it was agreed to implement the new plan.

First, we sent a letter to the contractors and consultants delineating their responsibilities concerning the PMIS. We also planned to continue the implementation on the rest of the projects which are not yet using the system. In parallel, we held several meetings to review the audit team's procedures and to align PMIS usage with standard procedures.

- PMO is going to employ GE change acceleration model as an overarching framework to enable the reimplementation of PMWeb at Group2.
- PMWeb will now be geared towards a narrower objective.
- PMWeb will provide required timely access and transparency to empower the PMO quality function.
- To achieve this, the mission is to efficiently and effectively run the IR, NCR & MIR processes in all Group2 projects except Qateef.
- In addition all final design documents will be uploaded to the system.

1

Change Acceleration Process (CAP)

The Change Acceleration Process Model

PMO Group 2

Objectives

- MOH is currently supporting PMWeb usage (**Senior Management Support was tackled**)
- To seize this opportunity a quick win that demonstrate the system value is needed (**fulfil a shared need**)
- Keeping in mind that to sustain the momentum, the system usage should be integrated in one of the PMO ongoing processes.
- The audit process is suggested for the following reasons:
    - The team responsible of the audit is almost new to the organization and thus will be unbiased.
    - The PMWeb will be of value in providing a monitoring tool to the audit team since they need to be informed on both the NCR the MIR and IR processes that the system proved capable of covering comprehensively in previous implementations (**New PMWeb Vision/Mission**).

3

PMO Group 2 - Projects

- If the audit team accept this proposal then the system status will improve since the audit team is supported by the majority of the most powerful stakeholders (**Tackling power struggle and mobilizing commitments**).
- There is an untapped resource that is valuable to the job, which is the PMO site managers (**creating Change Champions**)
- If this approach proves successful, then the next focus will shift to isolating & tackling individual user resistance.

4

Next Steps ....

5

- **Immediate Actions**

- **Short term Objective is to demonstrate a progress in two weeks time.**
  1. Write to all trained consultants citing MOH letter instructing them to fulfill their responsibilities and to drive the contractors to do the same. Letter will be per project citing current status.
  2. Writing to Jizan inviting for training.
  3. Plan Hail & Skaka training to start connecting Audit and Quality with PMIS.
  4. Integrating PMIS in the audit team new process.

6

Quality Management Enactment

QA / QC Management Procedures, Policy and Implementation

- Two Stage Quality Assurance process

- Step 1: Development & application of Quality Audit procedure.

- Step 2: Implementation and Management of the PMIS, a web-based Portfolio & Project Management System

- QA/QC Audits and Reporting

- Training and Mentoring

7

Figure 24: Cycle-3 Action Plan

4.11.5 Cycle-3 Macro Results

Astonishingly, the responses to the letter were almost instantaneous and positive in tone (Sample Letter Cycl-3 Actions, Appendix c). Projects such as Hospital-R, which had stopped using the system five months earlier, requested more user accounts and retraining in facets of the system. The Consultant-1 technical team was in touch with me almost daily.

Maybe, as Participant-7 explained, there had been changes in the environment that affected the attitudes of most of the stakeholders. Contractors and consultants used to get paid, no matter how much they underperformed. Because the new MOH management and the Aramco consultants seemed determined to hold people accountable, attitudes had changed. Also, due to the austerity measures previously implemented in the Kingdom, end-users were now worried that their disengagement might be perceived as underperformance, and in turn, legitimise their termination.

Integration of the PMIS into the audit teams working procedures did not go smoothly. The audit team manager resisted the process, and the PMO-director did not seem keen either. After several failures, I decided to postpone this part of the plan. My rationale was that any delay would help to focus my efforts on re-engaging the end-users. Following that, it would be easier to demonstrate the value of the PMIS to the audit team.

Empowered by the PMO and the MOH's newfound engagement with the process and to increase its momentum, the next step was to implement the PMIS in Hospital-H and Hospital-S. The two projects were crucial because an influential Aramco consultant was closely monitoring them. A successful implementation might secure Aramco team support.

4.12 Hospital-H and Hospital-S - The non-identical twins - Cycle-3 Micro
4.12.1 Introduction

The numerous changes that resulted from the arrival of the Aramco Consultants and the Saudi austerity measures profoundly affected the operation of the PMO. Now the focus of the PMO shifted from the construction progress to a more balanced view that considered other aspects of the PM. Quality became the issue at Hospital-S and Hospital-H. The contractor and the consultant on these projects, according to the PMO construction manager, committed some fatal mistakes in quality control. This was an opportunity to demonstrate the value of the PMIS. Because the progress of their construction was highly advanced, the two projects were

initially exempt from PMIS implementation; the perception was that the PMIS would not be of any value to them. Since quality became the driver of most of the PMO activity, I convinced their management to initiate the PMIS. The same contractor and construction manager were responsible for both projects, but they worked with different consultants. The projects were under the supervision of the top management from the MOH and Aramco. These similarities in the organisational structure made it possible to compare results. I internalised what I learnt from the successes and failures from the previous implementations and spent considerable time preparing for the next one.

Figure 25: Hospital-H and Hospital-S the non-identical twins' main stakeholders' groups

4.12.2 Action Plan Hospital-H and Hospital-S

In this attempt, I tried to mitigate the issues that had plagued the earlier PIMS implementations: the lack of management support, the fear of technology, and the perceived shortcomings of the PMIS (Section 4.8.2). Also, the system, data, and service qualities were critical to the system's success and had to be seriously addressed.

My previous experiences suggested that it was essential before commencing implementation to gather and analyse enough information about the site and stakeholders to tailor the strategy to local conditions. Ejodame (2015) concluded that the introduction of technology should never be expected to follow a standard path that disregarded the local conditions. At

this stage, I was convinced that both the macro and micro factors that had impacted the fate of the earlier implementations were as crucial as the success determinants identified by different IS theories. With this in mind, I tried to craft a plan that had a level of flexibility to adjust quickly to any changes in the local conditions. However, it must be comprehensive enough to account for the complexity of the implementation landscape. I also decided to increase the pace to avoid unfavourable changes as much as possible.

To achieve these seemingly paradoxical demands, I crafted a strategy that took into consideration the macro and micro-dynamics. The plan was inspired by revisiting literature, which suggested applying change management and stakeholder management theories to enable an understanding of the macro and micro dynamics of the implementation landscape. This understanding would improve the possibilities of successful action on several of the determinants that IS theories postulated. The plan could be summarised as follows:

- Understanding the implementation landscape - What are the organisations involved in the project? What is the relationship between the involved organisations/groups? What is currently going on in the project? Why implement the PMIS in the project? Why now?

- Identifying and analysing key stakeholders - Who are the key stakeholders? What are their current, primary concerns? Who wants the implementation to succeed? Why? How influential are they? Will they help? Can I make them? Who wants the implementation to fail? Why? How influential are they? Can I change their minds? If not, can I decrease their influence?

- Defining and communicating a common objective - After understanding the major concerns of the stakeholders and the current landscape, I needed to tailor an implementation objective and get key stakeholders to agree with it.

- Nurture local champions - Previous experiences in Group2 suggested the importance of having a PMIS champion at each implementation site. PMO site managers were the perfect candidates.

- Training users - Deliver tailored training to each group focusing on overcoming any obstacles to PEOU, PU, and the acceptance of the system.

- Service Quality - The availability of immediate support to PMIS users is critical to the continuity of the system's operations.

- Information Quality - Monitor the use of the system and ensure the validity and relevance of the entered data.

- Continuous monitoring and realignment - When a complex landscape change is inevitable, monitoring and realignment of PMIS objectives and functions to the landscape are critical conditions for its survival and success.

4.12.3 Action Results Hospital-H and Hospital-S

Table 7 below summarises the key actions that were implemented at Hospital-H and Hospital-S. They were similar; however, small differences between the two projects required different approaches at the micro-level.

Table 7: Actions & Results - The non-identical-Twins

Action	Key Results in Hospital-H	Key Result in Hospital-S
Analyse implementation landscape (Lewin's CATs)	The MOH, the PMO, and the ARAMCO Consultant were putting tremendous pressure on the consultant and the contractor to improve the quality of the workmanship of the project. There was a common perception that both were badly performing as far as quality was concerned. Because the consultant's contract was about to end, his staff were concerned about their job security. This resulted in two contradicting attitudes: some evinced no interest in learning and using the PMIS, while others considered it an opportunity to acquire a new skill that might improve their career prospects. However, there seemed to be a non-formal alliance between the consultant and the contractor versus everyone else. The environment was full of conspiracies and mistrust.	The MOH, the PMO, and the ARAMCO Consultant were putting tremendous pressure on the consultant and the contractor to improve the quality of the workmanship of the project. There was a common perception that both were badly performing as far as quality was concerned The Implementation coincided with the arrival of a new, young project manager from the contractor who was trying to prove himself. He was very supportive of the system implementation. The consultant project manager; however, was not good with computers. Not unsurprisingly, he was not fond of the PMIS. Unlike the situation in Hospital-H, the consultant and the contractor worked against each other and everyone else.
Stakeholder analysis	The stakeholders' power-influence grid suggested that the contractor PM was	The stakeholders' power-influence grid suggested that although organisationally the consultant manager engineer's role

Action	Key Results in Hospital-H	Key Result in Hospital-S
	the most influential actor opposing the implementation.	in the PMIS implementation should be nominal, he became the key stakeholder who could make or break the project at the micro-level.
Acting on stakeholders' major concerns	Quality was a primary concern of all the stakeholders, and the PMIS was promoted to the PMO, MOH, and Aramco as a quality monitoring tool providing transparency and oversight. The PMIS was also marketed to consultants and contractors as a system allowing them to demonstrate achieved quality improvement directly to the client and senior management.	The concerns of the PMO, MOH, and Aramco were similar to Hospital H. Thus, the same marketing message was used. Framing the PMIS as a tool to improve quality made perfect sense. By using it correctly, the consultant and contractor could communicate accurate results immediately to all key stakeholders. The message reached stakeholders "undistorted." Undistorted was the keyword to address the contractor's concerns. He was worried that the consultant was trying to use him as a scapegoat for any problems.
Identifying Common Objectives	Generating transparent, accurate quality status reports.	Like Hospital-H.
Early engagement of stakeholders and end-users	During training, trainees were allowed to suggest modifications to the PMIS at their projects. All suggestions were discussed, and some were implemented immediately following the training session.	Like Hospital-H.

Action	Key Results in Hospital-H	Key Result in Hospital-S
Address Ease of use factors	During the training, the focus was given to struggling learners, followed by one-on-one sessions. The PMO site manager was trained in troubleshooting to assist participants.	During the training, the focus was given to struggling users, followed by one-on-one sessions. Unfortunately, the site manager was not suitable for the champion's role.
Create a champion	The PMO site manager enthusiastically assumed the champion's role.	The PMO site manager was not willing to assume the champion's role.
Address perception of usefulness constructs	Function-based training allowed the promotion of specific benefits for different groups. A clear connection between the daily practice of participants and PMIS usage was established.	Like Hospital-H, Hospital-S received function-based training.
Ensure service quality	The implementation team and the PMO site manager acted immediately on all technical concerns.	The implementation team acted immediately on all technical concerns. In comparison to Hospital-H, the unwillingness of the PMO site manager to engage with the implementation created some issues. However, they were not significant.
Data Quality	Continuous audits and crosschecks of paper-based reports and system reports were carried out. As a result, users felt that the quality of the data in the system was integral to their professional image. This was very critical to them as the system highlights individuals' actions rather than the organisations.	Like Hospital-H.

Action	Key Results in Hospital-H	Key Result in Hospital-S
Monitor and realign as necessary	The monitoring of the implementation landscape signalled the shift by key stakeholders from quality to health and safety issues. The implementation team reacted by introducing a health and safety audit reporting mechanism within the PMIS.	No realignment was required until this report.

4.12.4 Cycle-3 Micro Results

The results of the tailored PIMS implementation plans at Hospital-H and Hospital-S were some of the most positive in comparison to the other eight sites. When comparing Hospital-H to Hospital-S; however, it was clear that Hospital-H outperformed the latter. This was due to some critical differences between the two implementations. The first was the willingness of the site manager to assume the champion's role. At Hospital-H, the site manager made tremendous efforts to ensure the success of the implementation. In comparison, the site manager at Hospital-S showed no interest in being part of the implementation process. The second critical difference between the two projects was the relationship between the consultant team and the contractor team.

To some extent, the consultant and the contractor at Hospital-H were working together to cover-up quality deficiencies at the site. They viewed the PMIS as a threat. The relationship between the consultant and the contractor at Hospital-S was tense, but professional. Despite the contractor's belief that the consultant was trying to set him up, they both viewed the PMIS as a tool to improve their professionalism. The dynamics at Hospital-H and Hospital-S showed that although PMIS implementation might succeed under normal circumstances without implementation champions, they were critical when resistance and political struggles were expected.

4.13 End of the Story

After approximately two years of engaging with Group 2's PMIS implementation, during which I travelled to eight different cities and made many friends as well as enemies, we reached a saturation point at the PMO. We had implemented and improved the system in

Group2 projects. Our final task was to ensure that the knowledge accrued during this journey was recorded and transferred to the PMO organisation and the Group2 owner: the MOH.

The Implementation Closure Report was submitted to the MOH and was of immediate benefit in assisting the preparation of tender documents for a new PMO contract.

In the following chapters, I will discuss the learning distilled from the story and endeavour to outline the methodological, theoretical, and practical contributions this experience has offered.

5   Findings and Discussion

This research was undertaken with the primary objective of improving the PMIS implementation in Group2. The following two research questions were formulated to achieve this objective: what were the challenges encountered by Group2 in a successful PMIS implementation? what steps were required to overcome these challenges?

To answer these questions, I employed a hybrid research design that utilizes action research as a meta-methodology. This design subsumes two overlapping research phases in several iterations. The first research question was answered based on an embedded single case that collected data through interviews, official records, and participant observations. The unit of analysis selected in this research was the implementation process in each of the first six projects examined. Namely: Hospital-Q, Hospital-A, Hospital-D, Hospital-DH, Hospital-R and Hospital-B in a chronological order. In parallel, a multi-site action research project put in use the results of the investigation into two action research cycles. Cycle-1 that involved Hospital-Q, Hospital-A, Hospital-D, Hospital-DH and Hospital-R and cycle-2 that involved Hospital-B. A third action research cycle that utilized the accumulation of learning resulted from the case study results and the prior action research cycles was carried out at Hospital-H and Hospital-S simultaneously.

A recent round of data collection was carried out which helped in improving the understanding of the challenges faced during the PIMS implementation. In addition, it has also helped validating the research results. The participants who accepted to partake in the second round of data collection were asked to read the story chapter and comment on its validity. The participants confirmed that the story reflects reality as perceived by them.

The following paragraphs summarise, reflect on, and examine the outcomes of the scholar-practitioner journey reported in this study.

5.1 What were the challenges to a successful PMIS implementation in Group2?

The first and second stages of the analysis were carried out to answer the above research question. Below is a detailed account of the process and the results of each stage:

5.1.1 Stage1:

The first stage of the analysis involved the steps illustrated in Figure 26 to the right. The steps are discussed in section 3.4.6 of this study.

The aim of this stage was to identify the barriers faced during the PIMS implementation in each of the embedded units. To achieve this, I interviewed several participants and collected official documents. The interviews served as the starting point for data coding. Coding involved applying an analytical lens while reading and re-reading the data. The perspective that I employed focused attention towards data patterns representing the challenges that were facing the PMIS implementation in Group2.
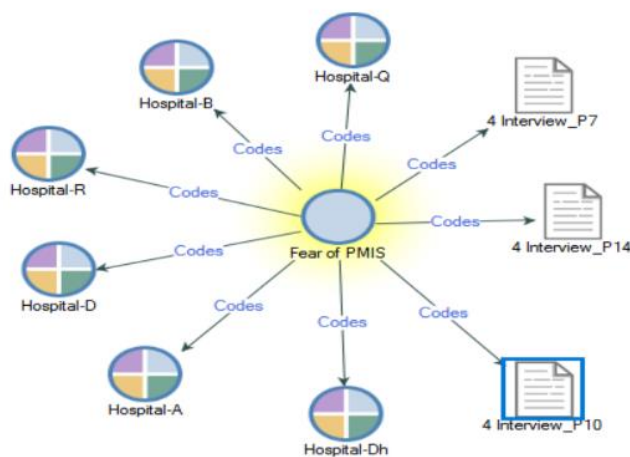
Figure 27: Example: Codes against interviews and cases

Each interview was coded according to the procedure discussed in section 3.6. The coding was an iterative process

Convert all data into electronic format

Import Data into Nvivo

Calssify data according to source

Create a "case" in NVivo for each unit of analysis and a case for Group2

Read data thoroughly to get familiare with it.

Code primary data starting with no prior codes with the aim of identfying barriers to the PMIS implementation as per participants

Review codes of primary data: merge similar codes, delete redundant codes and group related codes

Code researcher observations and compare them to the interviewes, seek more data to resolve any conflicts between observations and interviews

Reduce data by merging related nodes and delete redundats

Utilise secondery official data (letters, Emails, reports, etc...) to validate deduced codes and control researcher bias

Validate the results through stakeholders inputs

Figure 26: Data Analysis: Stage 1

whereby related codes were merged and their presence at each embedded unit of analysis examined as illustrated in the example shown in Figure 27 above.

Each coded passage was also attributed to its relevant unit of analysis by tracing it back to the source in which it was coded. Each interview script was already attributed to its relevant case based on the role the interviewed participant in Group2 played in the research. In addition, my observations were recorded in a word document (a journal) and further coded in accordance with the interviews script's coding. The codes discerned from the interviews coding were used as a template to code the journal as illustrated in Figure 28 and Figure 29 below.

Figure 28: Example: Observations coding

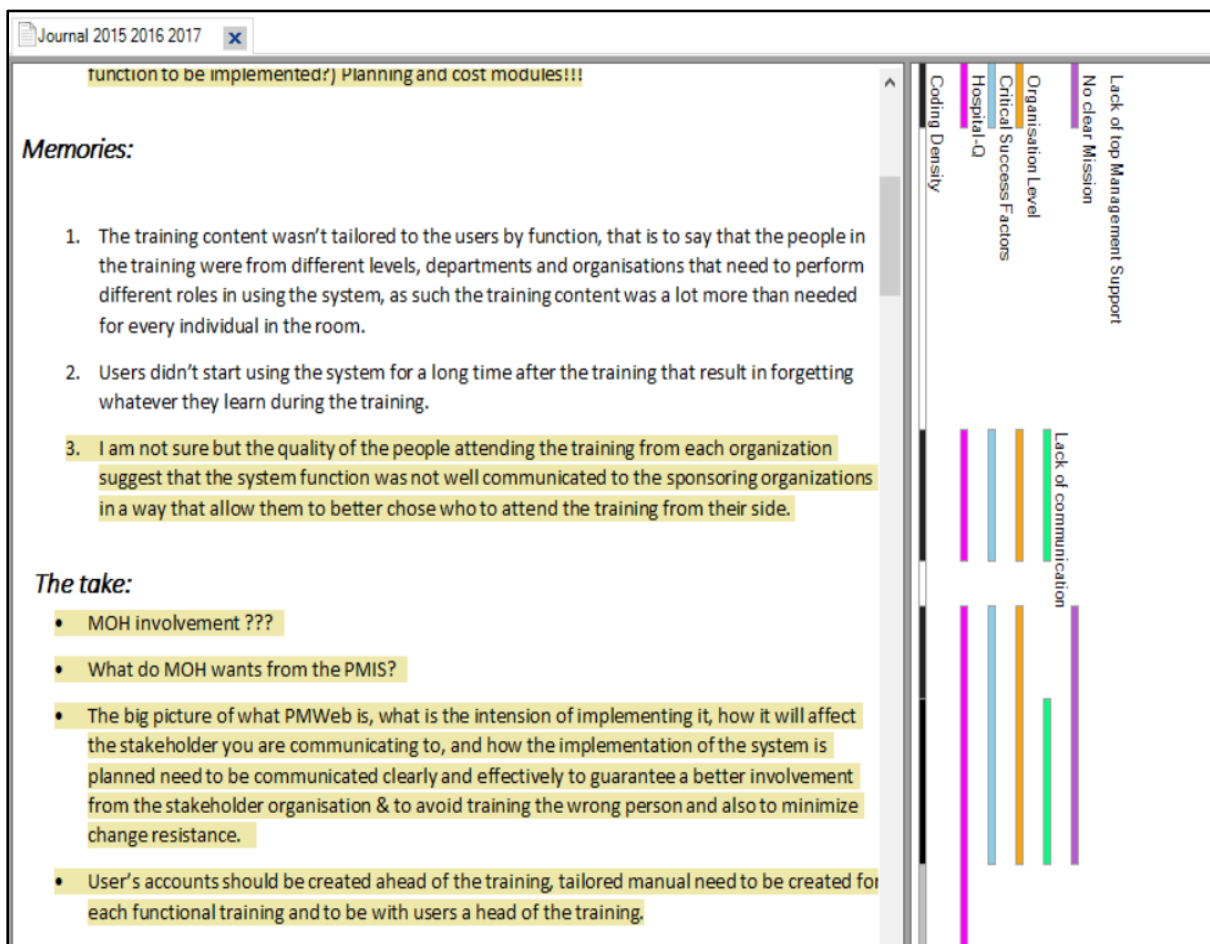me that he is leaving and that another engineer will be in charge. I contacted the new project manager and he promise to prepare an internet connection and a projector or an screen so we can conduct the training on time.

On the training day the internet was there provided by the contractor, the screen was there but no connection cable, the cable delayed the start of the training like 2 hours, finally we started at around 10am and we finished around 2: 30. The consultant PM didn't attend the training, he mentioned to me earlier in the morning that he didn't believe that the internet speed in the site will support the system, he tried to convince me that he can facilitate data communication without the system. I insisted in a polite way that the system should be tried before judging it. I persuaded the consultant project manager to allow me to walk him through his role in the system. After I did that, it looks that he was impressed. He promise that he will put pressure on the contractor although he knows that the contractor is not getting paid, to provide his people with better internet so we can run or trail period.

Amusingly the consultant project manager didn't have a computer at all in his office. The plan by the end of the visit was that, the site will get internet soon and then the system will start.

In a hindsight now, I believe I missed up, I should have established a good relation with the contractor project manager by introducing him to the system in a private session. I now believe I should devote special time for both project manager in each training, I also believe that the training should be done in two days (ABHA was the best example), consultant and contractors shouldn't be trained in the same day. Lastly, having hands on training is very important (ABHA Example again).

Week 2

During this week group 1 disabled all PMWeb account due to dispute regarding payment of support fee to PMWeb. After a series of E-mails on the 7th of March Group 1 promised to re-enable the accounts. I called Buraidah and it seems they didn't get internet yet. They were rumours around that MOH is going to pay all delayed 2015 payment to all stakeholders in group 2. Notifications are not working for the last 5 days or so, no body called me complaining.

Eng Yahya asked me to remove him from the shop drawing approval process, I did so and I also made
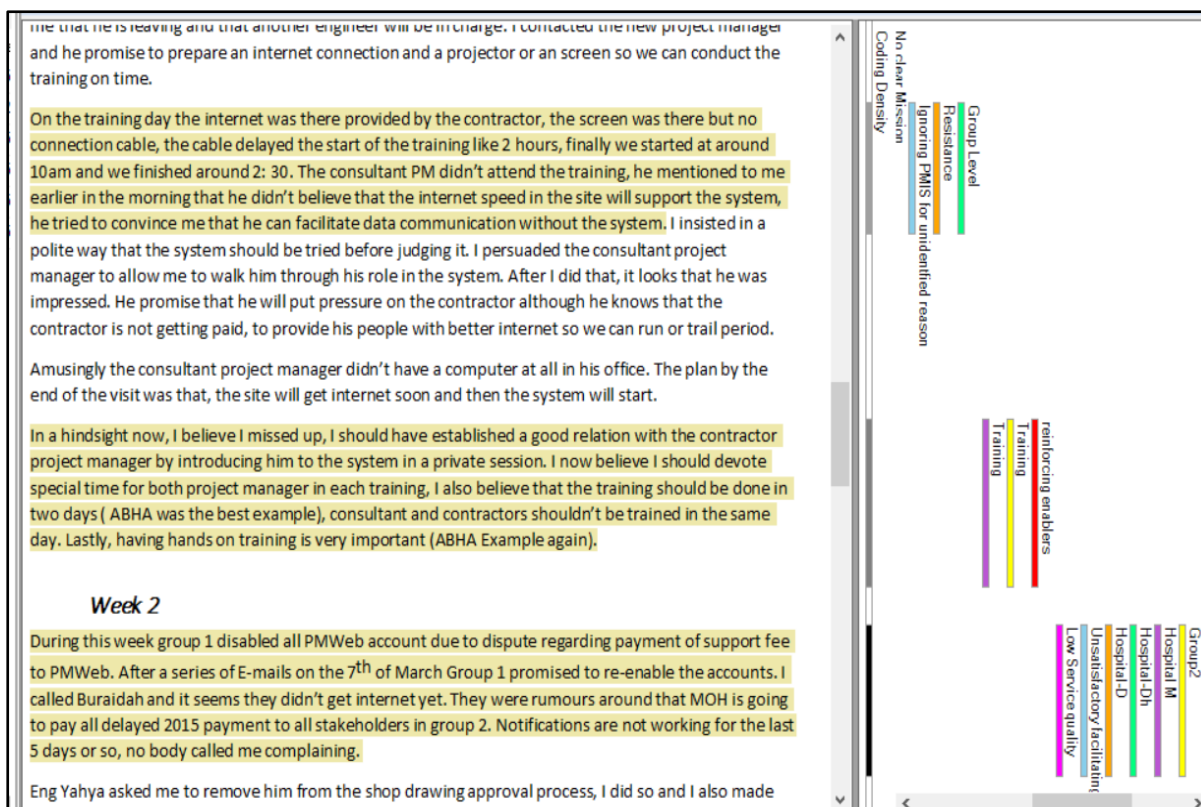
Figure 29: Observation coding

The secondary data (i.e. letters, MOM, and Emails) coding was used as an instrument to validate interviews and observations coding results. The secondary data was also used to resolve any discrepancies between the interview results and my observations. This is because secondary data represents a factual record of the implementation dynamics (secondary data examples are included in appendix H). The coding process followed a cyclical route (Saldaña, 2015); I revisited all coded data several times to improve the results of the coding process.

As demonstrated in table 8 below some of the barriers to the PMIS implementation that participants discussed during interviews were noticed in most of the embedded units of analysis. The top barriers include:

1. Fear of PMIS
2. Lack of technology Skills
3. Negative PU (individuals seeing no value of the PMIS)
4. Lack of Client Support (MOH)

In the following paragraphs, I provided some examples of what the research participants has said about these top barriers. However, since this research was an action research study, it was necessary to understand the barriers founds in light of the theory underpinning this study. To achieve this, I conducted a pattern matching exercise following the identification of the implementation barriers (section 5.1.2). My aim was to understand the barriers in terms of existing theory. This allowed me to determine which theory matches the reality of the PMIS implementation in Group2 and in turn improve my understanding of the PIMS implementation challenges. Importantly, this ensured that actions taken were theoretically informed which increased the likelihood of their success.

Fear of PMIS:

Both the interviews and observations I conducted suggested that some of the consultants and the contractor's staff feared the consequences of utilising the PMIS. This fear caused these users to resist using the system. Human beings hate to be under continuous surveillance; however, transparency in professional matters should not be considered as surveillance. The management in Group2 needed to acquire accurate, timely, and relevant information. This information would significantly increase the quality and speed of decision-making in Group2. Some of the users did not effectively understand that the accrued benefits from PIMS implementation for all stakeholders in Group2 including the consultant, contractor, PMO, and MOH.

When I interviewed participant-14, he suggested that the consultant technical team feared the consequences of implementing and utilizing the PMIS. He believed that was an issue which deserved my team attention. In particular, he said:

> "On site teams are ready and eager to learn, head office is afraid of mistakes and thus fears transparency brought by the system."

Participant-14 was a deputy projects director for Consultant-1. He was overseeing two of the biggest projects in Group2, Hospital-A and Hospital-M. Hospital-A and Hospital-M were among the best performing projects in terms of PMIS implementation.

A PMO senior manager also agreed that fearing the consequences of PMIS implementation was a barrier to its successful adoption, he puts it this way:

"You have to understand the conflict and the fears evoked by the system at consultant head office level."

His view was in line with my observations that the consultant technical team was resisting a successful implementation. In contrast, most consultant site teams were eager to start using the PIMS technology. When I asked participant-10 to comment on the fear of the PMIS in his projects he said:

"They felt threatened by the PMWeb. Eventually, they have discovered that it is not a stick. Individuals are living with it, with the exception of some managers who are still afraid from the system"

He tried to justify by saying:

"There is a problem, the culture of the people here, they will definitely feel afraid of this change"

Most contractors adopted a different view of the system. They saw it as an opportunity to demonstrate their professionalism and to expose the possible delays and errors caused by the consultant teams. As participant-10 put it:

"Management of contractor is a system facilitator. It is advantages for contractors who had good management and are professionals because the transparency through the system will allow them to put the consultant in the corner."

Discussions with many of the end-users revealed they were extremely concerned with blame allocation. They believed that because the PMIS automatically registered submission time, review time, and response time, it would point the finger at individuals who failed to respond appropriately or promptly. I am in support of the view that one of the research participants offered during his interview:

"Fear of the system stemmed from the lack of self-confidence within the staff. Lack of self-confidence was caused by the low level of technological skills, which made the end-user anxious and very sensitive to any possible adverse PMIS impacts on their daily practice."

Lack of Technology Skills

Participant-16, a senior construction manager, suggested that KSA construction industry did not have qualified people to deal with technology:

"But [PMIS] needs qualified people to deal with it. In KSA construction sector most of actors are not qualified to deal with technology."

Interestingly despite being a PMO employee he was suggesting that we should not try to move to paperless PMIS. He did not believe that we would succeed because of the skills gap. He observed:

"My own view is that we should not drop paper process because internet and people are not reliable with technology"

An MOH project manager supported the PMO construction manager view on technology skills being a barrier to the successful PMIS implementation.

"Culture of most workers in KSA is weak in terms of technology and English language. They have no interest in learning anything new. As a client, I am not willing to invest in teaching technology to people who I did hire to build a hospital."

Participant 25 thought that some of the team members lack even basic technological skills. He was a senior document controller working for Hospital-M contractor. He said:

"KSA construction professional in general lack necessary skills in both technology and English language. Some team members lack basic computer skills."

When I asked the deputy director of Consultant-1 why many of the people working on our projects lack technology skills? He stated that:

"In KSA, consultants tend to compromise because they work for very low prices. This is one of the reasons why we do not have quality people to manage the job. [We hire] the cheapest engineer around"

The second deputy director for Consultant-1 implied a similar view regarding his team's technology skills. The director shared that:

"Having a good system is not enough, I need to hire a good team……. When people send wrong information through the system and that show up in reports it shakes the credibility of the system, although it is not the system, it is the people"

Many participants pointed out that many of the PMIS prospective users lacked the necessary skills to deal with the system. Several participants suggested that some of their engineers would not effectively run computers. During the training I conducted at different sites, I noticed some of the users were genuinely struggling to operate the system. The downside of low computer literacy was not only limited to the operating the system. The problem had a broader effect as these users tended to create a narrative that criticised the PMIS itself,

consciously or subconsciously, exemplifying their incompetence. The spread of such negative narratives in Group2 was endangering the successful PIMS implementation. The positive side was that in most cases, with some support, struggling users made considerable effort in overcoming their inadequacies. Overall, in most of the projects, the stakeholders' will to learn was evident.

Apart from one isolated case in Hospital-B, most engineers that should have dealt with the PMIS had either managed to navigate the system or delegated their role to a colleague who was better at using the system. Although users' "ignorance" was a severe issue, overcoming it represented no substantial challenge. However, it was time-consuming, as it required the implementation team to facilitate struggling users to gain self-confidence and move forward with using the system. Having a trial period in each project whereby it was "safe" for all users to make mistakes was beneficial to facilitate their learning in relation to navigating the system.

My assumption, as well as other participants' assumptions that the low skill base of the users is one of the main reasons for the implementation failure proved fallacious. As pointed out in section 4.7.2, age and computer literacy did not represent a significant challenge to the implementation.

To ensure that the lack of technological skills had a minimal effect on the implementation, the team decided to act in the following manner. To overcome the issue, we institutionalised trial periods in all the later implementations, and made it compulsory to emphasise this period provided a safe trial-and-error learning environment. We identified users who were challenged during the training by ensuring that it included a hands-on portion. The trainer could evaluate the users and identify anyone who needed attention during the trial period. This approach proved successful in enhancing technological skills and promoting PIMS implementation.

Negative Perceived Usefulness (PU)

Many of the research participants pointed out that they did not believe the system had any inherent benefits for them or their organisations. In the early stages of the implementation, I struggled to understand the exact purpose of the PMIS implementation (see section 4.44.4).

Participant-16, the PMO senior construction manager, complained stating the following:

> "Consultants see no value of the system but did it because their top management ordered them to collaborate. Forcing staff to use the system without them understanding the logic behind it will only fail."

The PMO senior manager participant remarked that:

> "My view is that it is not implementable in Saudi Arabia. They [the users] are not willing to learn what they could benefit from the system."

Participant-23, a system provider consultant, suggested:

> "[Users are] Not really for it, they think of it as an extra workload that brings them no benefit"

The PMIS' perceived usefulness (PU) was a very critical factor in the acceptance of the system by the end-users in Group2. Scholars such as Raymond and Bergeron (2008), Chung et al. (2008), and Venkatesh and Bala (2008) considered PU as crucial to MIS acceptance and success. PU is the degree to which a user believes that a specific information system may enhance his performance (Chung et al., 2008). The issue with PU is that it is related to many other factors. For instance, PU is affected by the system's quality, the user's understanding and mastery of the system, and the user's belief that an important individual should or should not use the system, and finally, the relevance of the system to the user's role in the organisation. Two pervasive misconceptions in Group2 were obstructing a positive PU. First, since the end-users were not able to correlate the PMIS objective to their daily practice, most of them believed it created an unjustifiable, extra workload. Second, many users felt that the top management only paid lip service to the PMIS implementation; thus, they believed their managers would not look favourably on their efforts to engage with PMIS.

Lack of Client Support (MOH):

Strong sponsorship in IS introduction was one of the critical success factors that have been present in almost all the CSF studies that I reviewed during this research (section 2.3). Unfortunately, weak support from the client was evident in most of the embedded cases in this study. Participant 16, a senior construction manager who was responsible for Hospitals-A and Hospital-M, raised the issue during my interview with him:

"Client is looking at the implementation project as a mean to get a prestige, client is not willing to put any effort or invest resources in monitoring and controlling the [implementation] process."

Participant-20 supported the senior construction manager's view. He confirmed that:

"The client is the real problem as they want to have the status quo. They do not want transparency, but they also want to be viewed as a modern management".

In addition, a PMO senior manager suggested that although the client would like to have the PMIS up and running, they were not willing to invest any effort in the process:

"They just want it to look right. They are not willing to learn what they could benefit from the system. We [the PMO] manage their expectations to be able to exceed them."

The second deputy director for Consultant-1 who was responsible for Hospital-D, Hospital-R, and Hospital-DH shared a similar view:

"[MOH] is not seriously engaging in the process, they hardly sent a letter or two to support it."

This lack of will from the client was also found evident in official documents that I review. For example, the email I sent below to the Group2 GS received no response despite my follow up and reminders:

"Dear Gentlemen, I would like to know if there is any recent work performed in MOH IT that might affect the [PMIS]. Since yesterday, users in different sites (Hospital-A, Hospital-M, Group2 HQ) complained about a database error as in the below shot screen. Please advise."

The following is another example of an email I sent to Group2 GS deputy when we were about to go live with the system in Hospital-A

"Dear Engineer, we are about to move to live database on Hospital-A project and I think that it is an important milestone for which I need MOH inputs. Thus, I am requesting one hour of your valuable time to review the outcomes of the trail period

at [Hospital-A] project. Attached is a copy of the latest report forwarded to your office earlier this month for your ready reference."

The above pointed issues were interrelated in many ways which made it difficult to address each one of them in isolation. One example of this relation was that client support influenced the amount of attention consultants, contractors, and the PMO management committed to the implementation. Lack of stakeholders' management support increased the negative perceived value of the system. Additionally, because users believed there was no value in the system, it was difficult to convince them to put any effort in improving their technological skills.

Stage 1 results:

The results of the first stage of the analysis are illustrated in Table 8 below. These results suggest that there were a large group of barriers that were inhibiting the PMIS introduction in Group2 projects. Nonetheless, there were also some implementation enablers. Some barriers were strongly present in most of the cases examined. Fear of the PMIS and the lack of client support were barriers that surfaced in almost all the cases. This might lead to the expectation that actions taken by the implementation team should have decreased the amount of challenges in the implementation that followed the first action cycle (refer to section 4.7).

However, it seems that those actions were not enough to overcome most of the barriers as revealed in the story of Hospital-B. This was a paradox that warranted further investigation. Following the triple twins action cycle (section 4.8.4), the implementation team were mindful of most of the challenges that were inhibiting the implementation. According to official implementation reports, the implementation team actions in this first cycle caused significant improvements of the implementation results. However, the results of the following action research cycle were very disappointing. The key questions that emerged were that: was it that the implementation team did not really understand the implementation challenges? Or was it that cycle-2 was faced by a new challenge?

Barrier (Theme)	Hospital-Q	Hospital-A	Hospital-D	Hospital-DH	Hospital-R	Hospital-B
Fear of PMIS (Organizations or individuals)	X	X	X	X	X	X
Internet connectivity	X		X	X		X
Lack of Client Support (MOH)	X	X	X	X	X	X
Lack of Management Support (Group2 organizations)	X		X		X	X
Lack of technology Skills		X	X	X	X	X
Legal Issues (supervision consultant)	X		X	X		X
Negative PU (individuals seeing no value of the PMIS)		X	X	X	X	X
Politics	X		X			X
KSA Culture		X	X	X	X	X
Security Concerns		X				
Seniority Level		X				X
System Issues		X	X	X	X	X
Turn Over	X	X	X	X	X	
X means the barrier existed in the respective embedded unit						

Table 8 Implementation Barriers per Project

The first stage focused on coding for the theme barriers to PIMS implementation. This research agrees with Saldaña (2015) in defining themes as an outcome of coding, categorization, or analytic reflection. The continuous reflection on the data analysis process led to the categorisation of the coded data under two main themes: barriers and enablers. Barriers were what the participant talked about as a factor that was inhibiting the implementation in Group2, which are illustrated in table 8 above.

In contrast, enablers were factors that facilitated the success of the implementation. Enablers were an emergent theme that was a by-product of the coding process. Enablers were the elements that were perceived by the participants and the researcher as success factors to PIMS implementation. They were mostly the opposite of the barriers identified. For example, participant 16 summarises his role in terms of PMIS implementation:

> "In terms of PMIS implementation, I see my role as responsible of making sure both consultant and contractor understood the system and apply it properly"

The passage above was coded as "champions," a term that was used in the literature by many CSFs advocates, such as, Pinto and Millet (1999, 152). A champion is a person who is willing to take risks to enable the success of the implementation (Meredith, 1986).

Other participants' prominent believe was the significance of training to the implementation success. This was a common theme within the literature, which suggests training as a mean of maximising PMIS benefits (McCarty, 2012; Dzudie, 2013). The other enablers were controlling and monitoring, PMIS advantages, and service quality.

5.1.2   Stage2:

During the second stage of the analysis, I conducted pattern matching and then analysed the data through rival explanation (Yin, 2017).

5.1.2.1   Pattern Matching:

The pattern matching focused on connecting the barriers identified in the first stage to the theories discussed in the literature review chapter. The aim of this exercise was to provide an in depth understanding of the challenges that were facing the PMIS implementation in Group2 by connecting them to existing literature.

The barriers identified in stage one of the analyses were subsequently examined each at a time with the aim of categorising them in accordance with the literature analysis template (Table 9 below).

My observations in the field and the literature reviewed (section 2.4) suggests that the challenges faced the PMIS implementation in Group2 operated at several levels. This might had been happening synchronously or asynchronously. Therefore, I employed a multilevel lens while performing the second stage of the data analysis. Pattern matching technique was used to connect the analysis results to existing theory in order to improve the understanding of the implementation challenges. Pattern matching is the process of comparing an observed pattern in a case study data with an expected pattern (a hypotheses). This process is carried out here with the intention of deciding on the extent to which the empirical data matches the predicted pattern (Hak and Dul, 2010; Al Qur'an, 2010).

The pattern matching was carried out following the identification of the challenges as perceived by the participants. This was done through a thematic analysis of the interviews' transcripts which was substantiated by a cross coding of my observations and the secondary data. The theoretical template induced from the literature review in section 2.4 was used as a pattern matching instrument.

For example, the Fear of the PMIS pattern was observed across all the early cases in table 8 above. A revisit to the coded data under this pattern was carried out to enable categorising it in accordance with the literature analysis template.

Figure 30: Example 1 of Coded Data Categorisation

The revisit of the data showed that the "fear of the PMIS" was a group phenomenon. As manifested in the statements of participants 10, 7, and 14 in Figure 30 above; they all talked about groups of people. However, participant 10 statement was too general in comparison to the other participants who clearly mentioned the consultant head office. The transcript of participant 10 interview revealed why he did not specify the consultant head office group. Participant 10 introduced himself as follows:

> "I am a construction deputy project director for [consultant-1] a consultant in charge of supervising the construction works in 7th of the eleven hospitals in Group2. I am personally responsible of [consultant-1] role in hospital-M, hospital-B, hospital-A and hospital-Q"

The statement was rational since it was illogical that Consultant-1 represented by his deputy project director admitted that his team feared the PMIS implementation. This understanding of the "fear of the PMIS" is in line with Lapointe and Rivard (2005) conceptualisation of resistance as a group phenomenon. Therefore, "fear of the PMIS" theme was categorised as a manifestation of the authors' theory in table 9 below.

Figure 31: Example 1 of Coded Data Categorisation

Another example of codes categorisation was the code "negative perceived usefulness". The data showed that this was a pattern across five of the embedded units of analysis. It also represents an individual concern that made most of the people observed and interviewed feel the PMIS is of very limited value and would hardly improve their job performance. Accordingly, this code was associated with both "Lack of perceived usefulness" and "Low performance expectancy". The categorisation under two different constructs was in line with the theoretical definition of the constructs as noted in table 9 below. The same process of

applying the literature template of analysis to the stage one coding results was carried out for each of the codes in table 8 above. The result of the process is illustrated in table 9 below.

Table 9: Pattern Matching

Analysis level	Theory in Use	Lack of A Theory Construct	Definition	Empirical Codes Matching the Construct
The Individual	Information Systems Success Delone and Mclean (2003).	Low Information Quality	System is not assisting users in making business decisions Petter, Delone and Mclean (2013)	--
		Low System Quality	Lack of convenience of access, system functionality, reliability, response time, navigation ease, and flexibility, among others. Petter, Delone and Mclean (2013)	System Issues
		Low Service quality	Lack of IS department services. Petter, Delone and Mclean (2013)	Security Concerns
	TAM 3 Venkatesh and Bala (2008)	Lack of perceived ease of use	The perception that using the PMIS will be difficult (Davis, 1989)	1-Lack of technology Skills 2-Seniority Level
		Lack of perceived usefulness	The perception that using the PMIS will not improve his job performance (Davis, 1989)	Negative PU
		Negative Subjective norms	A person believes that people who are important to him think he should not use the system (Fishbein and Ajzen, 1975)	KSA Culture
	UTAUT Venkatesh et al. (2003)	High effort expectancy	The perception that using the PMIS will be difficult (Venkatesh et al., 2003)	1-Lack of technology Skills 2-Seniority Level
		Low performance expectancy	The degree to which a person believes that using the system will not improve his gains from his job (Venkatesh et al., 2003)	Negative PU
		Negative social influence	Others view them negatively because of using the system (Venkatesh et al., 2003)	KSA Culture
		Unsatisfactory Facilitating conditions	Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. (Venkatesh et al., 2003)	1-Internet connectivity 2- Legal Issues (supervision consultant)

Analysis level	Theory in Use	Lack of A Theory Construct	Definition	Empirical Codes Matching the Construct
The Group	Resistance Lapointe and Rivard (2005)	Users' group perceive PMIS as a threat	Loss of power (Markus, 1983) or loss of equity (Joshi, 1991).	Fear of the PMIS
The Organization	Top Critical Success Factors Hughes et al. (2019)	No clear mission	The absence of a clear and defined business case (Hughes, 2019)	--
		Lack of top management support	The lack of Effective and supportive sponsor fully engaged and committed to the project (Hughes, 2019)	1-Lack of Client Support (MOH) 2-Lack of Management Support
		Lack of project management	Projects is not managed in accordance with a defined methodology (Hughes, 2019)	--
		Lacking user involvement	Users were not included as key stakeholders not at during early project lifecycle nor throughout the project (Hughes, 2019)	--
		Lack of change management	Change management was not considered or was not Integrated with project management with a clear plan and defined dependencies (Hughes, 2019)	--
		Lack of resistance management process	No defined processes for managing user resistance dependencies (Hughes, 2019)	--
		Unskilled project manager	The appointed project manager has not the required blend of skills, experience and style to manage the project effectively (Hughes, 2019)	--
		Lengthy implementation	Implementation project was not structure in short stages (Hughes, 2019)	--
		Undefined roles	The project has no formal established role definitions (Hughes, 2019)	--
		Lacking vendor support	The project has not secured the required tools and infrastructure (Hughes, 2019)	--
Contextual		--	Different stakeholder groups were involved in struggles that affected how they perceive the PMIS (The author)	Politics
		--	Key people to the PMIS implementation left the project in a way that affects the continuity of the PMIS use (The author)	Turn over

Two of the implementation barriers reported in table 8 were not matched to the analysis template. "Politics" and "turn over" were barriers noted by the participants and that I observed; but they were not found in the literature consulted in this research. Both could be categorised as contextual factors that were peculiar to the implementation in Group2.

5.1.2.2   Rival Explanation

The results of matching the theoretical constructs to the empirical data in table 9 above were then used to analyse the finding. Using several theoretical lenses as reported in the section below helped provide a better understanding of the challenges that faced the PIMS implementation. As discussed in the literature, there are several perspectives on explaining technology introduction outcomes. Many theories argued that technology introduction is mainly influenced by constructs operating at the individual level such as TAM, UTAUT, and technology success model. In comparison, Lapointe and Rivard (2005) suggested a group conceptualisation of technology introduction barriers. Critical success factors theory advocates argued for an organisational standpoint. In the following paragraph an analysis based on comparing these theoretical potential rival explanations is provided.

5.1.2.2.1   Individual Level

Three different theories were suggested to perform a pattern matching analysis of the coded data at the individual level. The theories discussed in the literature chapter and used below are: Information Systems Success, TAM3, and UTAUT. The result of matching the analysis with the challenges suggested by the three different theories is presented below:

Level	Theory in Use	Construct	Embedded Case Vs Construct Presence					
			Hospital-Q	Hospital-A	Hospital-D	Hospital-Dh	Hospital-R	Hospital-B
Individual Level	Information Systems Success	Low Information Quality	No	No	No	No	No	No
		Low Service quality	No	Yes	Yes	Yes	Yes	Yes
		Low System Quality	No	Yes	No	No	No	No
	TAM 3	Lack of Perceived Ease of Use	No	Yes	Yes	Yes	Yes	Yes
		Lack of Perceived Usefulness	No	Yes	Yes	Yes	Yes	Yes
		Negative Subjective Norms	No	Yes	Yes	Yes	Yes	Yes
	UTAUT	High Effort Expectancy	No	Yes	Yes	Yes	Yes	Yes
		Low Performance Expectancy	No	Yes	Yes	Yes	Yes	Yes
		Negative Social Influence	No	Yes	Yes	Yes	Yes	Yes
		Unsatisfactory Facilitating Conditions	Yes	No	Yes	Yes	No	Yes

Table 10: Individual Level Pattern Matching

IS Success Perspective:

Information Systems (IS) Success Model proposed by Delone and McLean (2003) shows that the low information quality challenge was absent in all the 6 embedded units of analysis. However, low service quality was noticed in all the cases except in Hospital-Q. This was surprising since the implementation was deemed unsuccessful in Hospital-Q, but successful in Hospital-A. While investigating this pattern that manifested across Group2' projects, it turned out that the manifestation of the pattern was due to an isolated occurrence as proven from the Email coded in Figure 31 below. Despite being a onetime event, its consequences were evident across all active projects. This suggested the importance of performing a longitudinal analysis as the interviews data reflects the reality of the implementation at the specific time of its capturing. This was further confirmed in the second round of interviews and validation carried out recently.
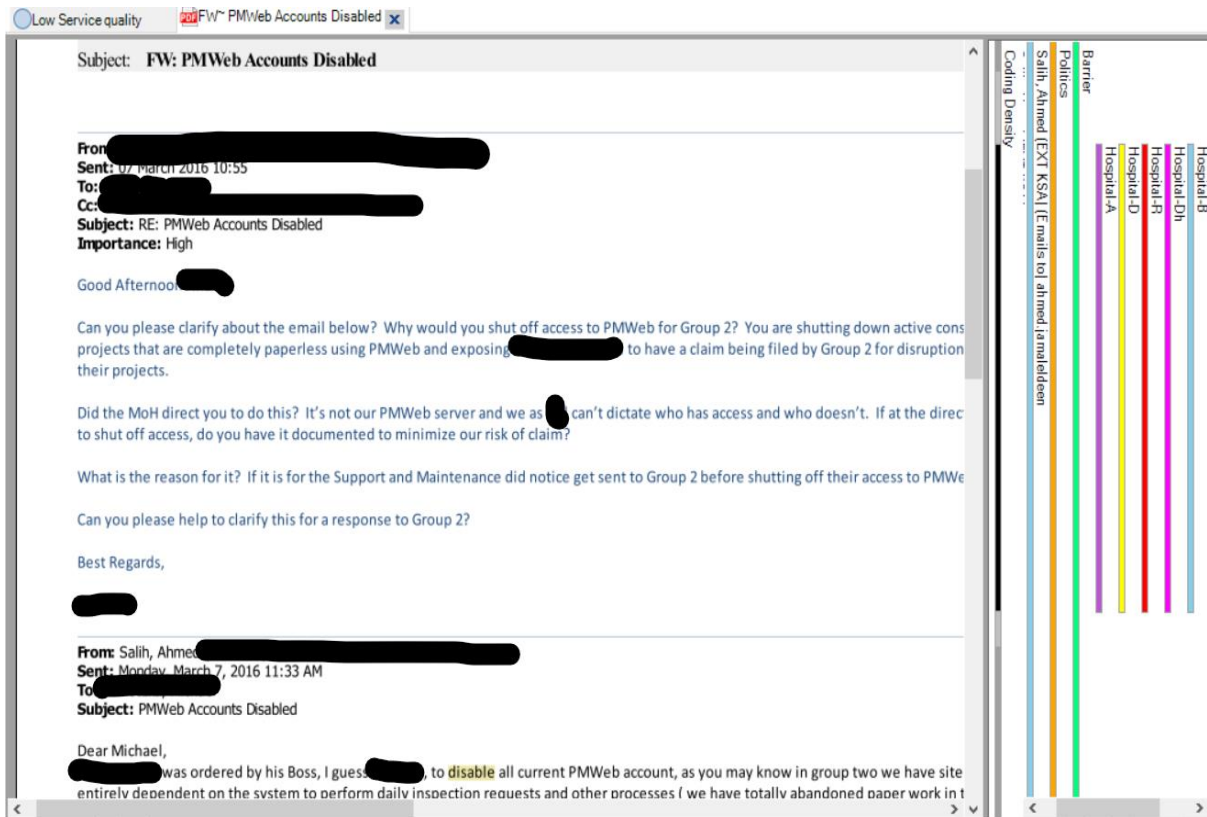
Figure 32: Secondary data coding example

Moreover, the perception of a low system quality was unnoticed in any of the cases except in Hospital-A. This was also interesting since implementation was considered a success in Hospital-A. The participants who were concerned with the system's quality observed that:

> "…the downside is in comparison to paper process. [PMIS] online format requires only one person from the contractor to sign, while in paper many can sign."

and

> "Some of the forms that we need in our work are not in the system meaning that we are compelled to use two systems paper and online (casting request, go ahead request)."

The above are some of the genuine concerns that were voiced by participants who engaged with the system. However, these concerns did not stop the use of the PMIS in Hospital-A. The concerns did not surface in later PMIS implementation because the execution team acted on them. The system was customised to included necessary forms and workflows were amended to ensure the quality of the process. Deficiencies emerging from the system's characteristics were not individually enough to fail the PMIS implementation in Group2.

Overall, the IS success model advanced by Delone and McLean (2003) failed to accurately predict and explain the results of the implementation in most of the embedded units of analysis. For instance, the challenges theoretically considered critical to the PMIS success did not stop the success in Hospital-A. Similarly, examining the failed implementations in Hospital-Q, Hospital-D, and Hospital-B reveals that PMIS implementations did not appear to have faced challenges of higher magnitude than Hospital-R and Hospital-DH. Notwithstanding, the later hospitals achieved a partial magnitude of success.

A TAM3 Perspective:

According to Venkatesh and Bala (2008), the perceived ease of use, perceived usefulness, and subjective norms are the constructs that affect the users' decision regarding whether to use or not use an information system. Matching these constructs to the pattern noticed in each of the embedded units resulted in an unexpected picture. The lack of the three constructs were evident in all the cases except Hospital-Q. Examining Hospital-Q case further revealed that Hospital-Q users received training on the system, but had never commenced using the system. This indicates that users' perception might have changed in the event they started using the system for some time. This again signifies the importance of longitudinal research in the study of IS success.

Another interesting finding is that all the negative forms of the constructs were manifested in Hospital-A, which is a successful implementation and Hospital-R and Hospital-Dh, which were partially successful. This suggest that even if all the factors that influence system use in accordance with TAM3 were managed in favour of the system use, it is still possible that users may not engage with the system. This was not very surprising since the testing of TAM3 in Venkatesh and Bala (2008) resulted in an explanative power that ranges between 40 to 53 percent.

A UTAUT Perspective:

Since effort expectancy, performance expectancy, and social influence are respectively inclusive of perceived ease of use, perceived usefulness, and subjective norms constructs, the matching results would be the same. However, UTAUT includes an additional construct, which is facilitating conditions. Unsatisfactory facilitating conditions provided a possible explanation of the PMIS implementation failure in Hospital-Q despite the absence of any negative

influence from IS success model, TAM3, and UTAUT constructs. The importance of facilitating conditions influence is further exemplified in Hospital-A case. Except facilitating conditions, all the other constructs exhibited a negative influence; but the PMIS implementation was yet again deemed successful. An exception was the information quality construct from IS success model. It is most likely that information quality was of no significance because its positive influence did not help any of the failed cases. Hospital-Dh brought some uncertainty to this conclusion since during examination it was noticed that no reliable internet was available in the project area. This explains the partial success of the PMIS implementation in this hospital as the system usage was fluctuating in accordance with internet availability.

The relation between the three theories that were selected to investigate the challenges faced during the implementation at the individual level was interesting. The pattern noticed shows that neither DeLone and Mclean (2003) information success model nor Venkatesh and Bala (2008) TAM3 was individually enough to explain the success or failure of the implementation at the several embedded units of analysis. In comparison, UTAUT Venkatesh et al. (2003) has provided a more comprehensive albeit uncomplete conceptualization of the individuals' response to the implementation. However, neither UTAUT nor TAM3 connects "Use behaviour" to the success or failure of the system, which limits their value in practical settings. The two models also lack self-correction mechanism. They explain the users' attitude towards system use at a single point of time. This correcting mechanism is clearly considered in DeLone and Mclean (2003) information success model. The combination of this limitation with the results of the analysis above supports the significance of Mardiana et al. (2015) call for extending DeLone and Mclean (2003) model by integrating TAM and UTAUT. However, the results above suggest that explaining the "Use behaviour" was better covered by UTAUT when compared with TAM3. This was expected since according to the construct's definition from both theories, UTAUT's constructs fully incorporate TAM's constructs. In addition, UTAUT facilitating conditions construct (which has no equivalent in TAM3) was found to play a critical role in explaining changes in individuals' behaviour towards the PMIS.

Mardiana et al. (2015) call for extending IS success model in order to increase its explanatory power was a prudent move. However, in this research context, extending IS success model by incorporating UTAUT constructs rather than TAM3 provided a better understanding of the implementation barriers at the individual level. Also, it was more important to understand

the issues inhibiting the success of the PMIS implementation rather than the user's decision to use or not use the system. The system success dependent variable exists only in Delone and Mclean (2003) model. Therefore, this research suggests that the model in Figure 33 is the most appropriate extension to existing theory that explains the challenges to the PMIS implementation in Group2's context at the individual level:
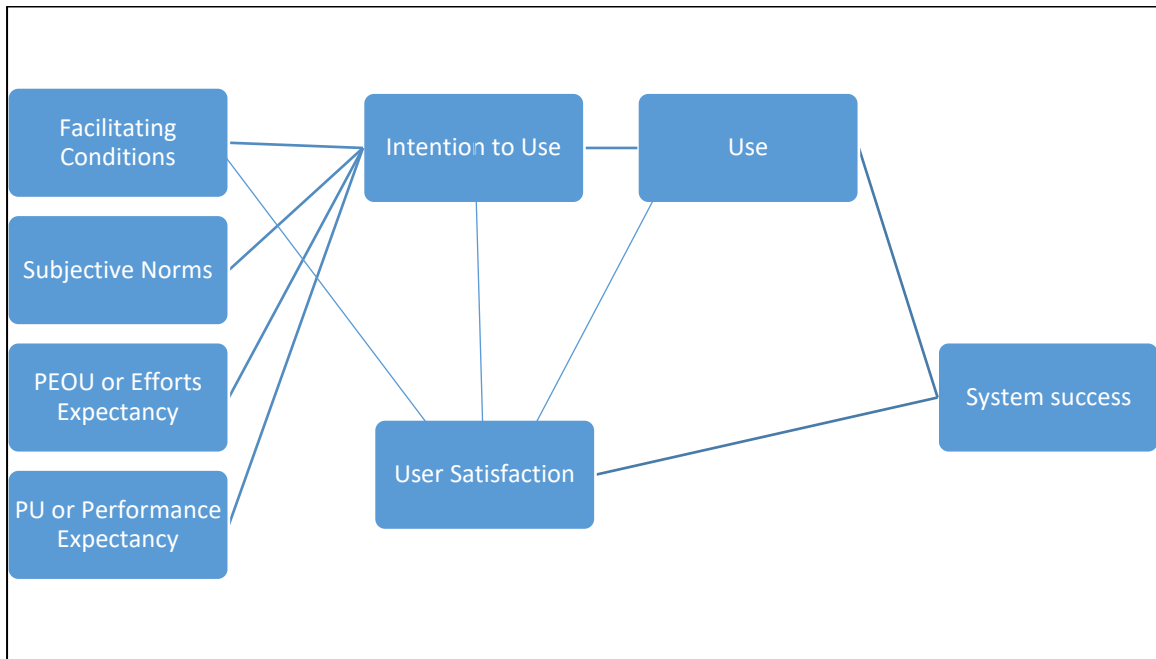

Figure 33: Constructs Influencing PMIS Implementation Success in Group2 at the Individual Level (source: the author)

Table 10 below follows Figure 33 (above) in explaining the PMIS implementation results. The suggested model was better suited to explain the implementation than any of the theoretical lenses employed individually. The model suggests that extending IS success model by integrating UTAUT constructs would help to better understand the dynamics of the PMIS implementation at the individuals' level. The IS original construct that was found to be relevant to this implementation was "Service Quality", which is considered as incorporated in the facilitating conditions construct in the above model. System quality is considered as an influencer of effort expectancy and performance expectancy with no direct effect on the intention to use or not to use the system. Lastly, information quality is similarly an influencer of the performance expectancy, but with no direct effect on user satisfaction or the intention to use the system.

However, the suggested model still falls short of providing a conclusive finding that justifies the partial success in Hospital-Dh and Hospital-R and explains the reasons that led to it. This to some extent, proves the need to consider the PMIS implementation from a multi-level perspective.

Construct	Hospital-Q	Hospital-A	Hospital-D	Hospital-Dh	Hospital-R	Hospital-B
Lack of perceived ease of use	No	Yes	Yes	Yes	Yes	Yes
Lack of perceived usefulness	No	Yes	Yes	Yes	Yes	Yes
Negative Subjective norms	No	Yes	Yes	Yes	Yes	Yes
Unsatisfactory facilitating conditions	Yes	No	Yes	Yes	No	Yes
Implementation results	Failure	Success	Failure	partial success	partial success	Failure
Explanation of implementation result based on the suggested Model	Unsatisfactory facilitating conditions represented by lack of adequate internet on the construction site resulted in a limited use of the system which with time stopped totally	It appears the existence of a satisfactory facilitating condition in the absence of any positive influence from the other constructs is not always enough to fail the PMIS implementation	The absence of any positive influence at the individual level appears to produce a nonavoidable implementation failure	Surprisingly, in this case, the system was deemed partially successful despite the complete replication of Hospital-D	It appears the existence of a satisfactory facilitating condition in the absence of any positive influence from the other constructs is not always enough to for a fully successful PMIS	The absence of any positive influence at the individual level appears to produce a nonavoidable implementation failure

Table 11: Explaining Individual Level Based on the Author's Suggested Model

This research employed Lapointe and Rivard (2005) theoretical framework to facilitate an in-depth understanding of the implementation challenges at the group level.   The theory suggests that when a group of users believe that the system represents a threat, they may exhibit resistance behaviour. Interestingly, in most of the cases, the fear of PMIS was coded as an implementation barrier. However, the fear of the PMIS which is assumed as equivalent to a threat is a temporal perception that may or may not change with time. As suggested in Lapointe and Rivard (2005), initial conditions, system characteristics, and the resistance objects are the factors that influence the perception of the system as a threat. If a group of users perceived the system as a threat, they would resist the PIMS implementation based on this perception. The embedded assumption drawn from this lens is that a group of peoples who share common characteristics such as being from similar demographic or professional group would collectively accept or resist the PMIS. The key users' group in Group2 include two main categories: consultants' engineers and contractor's engineers. Those main categories could be subdivided to document controllers, cost engineers, planning engineers, site engineer, and, technical teams.

The fear of the PMIS was noticed mostly at the technical team group of users. A follow-up question to participant-5 during the recent round of data collection was answered as follows:

"Why did you think technical teams have failed to engage with the [PMIS]?

> The technical teams feared that full information would be availed to all. This problem was manifested by the technical team as follows:

- They feared that someone could replace them as their control of information was part of their power,
- They feared being exposed on either the number of iterations and add on comments on drawings/submittals or exactly what was the item holding a submittal/drawing and that item being viewed as minor or insignificant,
- Organisational culture,
- If management has access to all the information, it negated the need to bring them to endless meetings to understand the problem/holdups, thus reducing their perceived status."

The picture drawn by participant-5 was very convincing when compared to my observations during Hospital-A implementation. The technical teams were trying to preserve their power

status within Group2 and avoiding possible exposure. This was demonstrated by the surges of system resistance that reached its first peak during the implementation of Hospital-A. Interestingly, although there were four different consultants in Group2, the fear and subsequent resistance was significant only at Consultant-1's projects. This might be attributed to the fact that the PMIS was introduced in Consultant-1's projects before the other consultants. The participant's observations played a seminal role in understanding the dynamics of the technical team's resistance. Their resistance level fluctuated in response to changes from the PIMS implementation context. For example, Participant-10 assignment helped in overcoming the resistance in Hospital-A. His departure later triggered another wave of resistance to use. The economic austerities and its ramifications at Group2 had led to a weakening of the resistance in Group2. This can be understood from the realms of Lapointe and Rivard's (2005) theory. The reasons for resistance never disappeared, but changes to the initial conditions continued to take place during the implementation and after it. The fear of power loss and exposure were genuine concerns to the consultant technical staff (Markus, 1983; Joshi, 1991; Lapointe and Rivard, 2005).

This theory (outlined in table 12 below) outperformed the explanation offered by the individual models discussed above in explaining the actions of the technical team as a group. However, it still falls short of explaining the entire picture. The PMIS implementation was successful in 3 of the 5 hospitals where group resistance was noticed. Lapointe and Rivard (2005) resistance model offers a sensible explanation of the partial success in Hospital-Dh. The model suggests that the change of initial conditions overtime could change the resistance behaviour. In this case, changes in initial conditions such as the change of top management made the technical teams in those cases re-evaluate the PMIS and adjust their behaviour towards it.

The resistance behaviour was thus a temporal threat to the PMIS implementation that may or may not result in its failure. It could be managed by understanding the initial conditions that led to its occurrence and then adjusting those conditions.

	Hospital-Q	Hospital-A	Hospital-D	Hospital-Dh	Hospital-R	Hospital-B
Fear of PMIS	No	Yes	Yes	Yes	Yes	Yes
Implementation results	Failure	Success	Failure	partial success	partial success	Failure
Resistance over time	The implementation failed at very early stages before allowing for interactions between the users and the PMIS	Fear of the PMIS was voiced by several participants and I observed. However, this was only at the technical teams' level. The technical team resistance was not significant enough to inhibit the implementation as the implementation conditions were generally on favour of the implementer.	Fear of the PMIS was voiced by several participants, and I observed. This was evident at the technical teams' and the consultant and contractor engineers on site. The implementation coincided with a period of a weak management support and in this site internet connectivity was an issue. Resistance played a role in the failure but wasn't the only reason of it.	Fear of the PMIS was voiced by several participants, and I observed. However, this was only at the technical teams' level. The implementation coincided with a period of a weak management support. Technical team resistance was not the only reason for the partial failure. Internet connectivity was also an issue in this site.	Fear of the PMIS was voiced by several participants, and I observed. However, this was only at the technical teams' level. The implementation coincided with a period of weak management support. Technical team resistance was the only reason for the partial failure.	Fear of the PMIS was voiced by several participants, and I observed. However, this was only at the technical teams' level. On-site the implementation failure was due to the lack of facilitating conditions and the absence of management support.

Table 12: Pattern Matching Group Level

5.1.2.2.3 Organisational Level

Reviewing the pattern matching result in Table 13 below reveals that only one critical organisational challenge was noticed across all the cases: Lack of management support.

Management support is a factor that is universally regarded as vital to the success of an IS implementation. Scholars such as Markus (1983) and Ali et al. (2016) suggested that lack of management support evokes resistance. Others regarded management support as one of the implementation's Critical Success Factors (CSF) (K. Pinto and Millet, 1999; Hartman and Ashrafi 2002; SHAUL and TAUBER, 2013; Shatat, 2015). Nevertheless, some have argued that management support is not well defined in the literature. Therefore, they call for further research in this area (Venkatesh and Bala, 2008; Dong et al., 2009; Trkman and Trkman, 2014).

Critical Success Factor based challenge	Hospital-Q	Hospital-A	Hospital-D	Hospital-Dh	Hospital-R	Hospital-B
No clear mission	No	No	No	No	No	No
Lack of top management support	Yes	Yes	Yes	Yes	Yes	Yes
Lack of project management	No	No	No	No	No	No
Lacking user involvement	No	No	No	No	No	No
Lack of change management	No	No	No	No	No	No
Lack of resistance management process	Yes	Yes	Yes	Yes	Yes	Yes
Unskilled project manager	No	No	No	No	No	No
Lengthy implementation	No	No	No	No	No	No
Undefined roles	Yes	No	No	No	No	No
Lacking vendor support	Yes	No	No	No	No	No
Implementation Result	Failure	Success	Failure	partial success	partial success	Failure

Table 13: Pattern Matching Organisational Level

Management support is viewed in this research as the participation of top or middle management in the process of IS implementation with the objective of convincing end users that management is keenly interested in successful system implementation. This definition is in line with the management role reported in Markus (1981); "sustained attention and managerial action" guaranteed the successful implementation of their production planning and profit analysis system.

The perception that Group2 management was not genuinely interested in the success of the PMIS implementation was widely adopted by the research participants. For example, participant-16 who was a PMO construction manager responsible for Hospital-A and Hospital-M stated:

"The Client looks at it [the PMIS] as a prestige, the client is the real problem because they want to have the status quo."

Participant-23, a system provider consultant put it this way:

"Good question, in general, the greater the number of the stakeholder the more challenging is the implementation. Group2 is too messy, many stakeholders and uninterested sponsors. MOH was not involved in the implementation like they wanted

it done that is all. It comes to a point where there was no support from the client at all."

Participant-6 appears to share a similar view:

"I think unless the MOH dedicates someone with appropriate authority the implementation will never succeed."

However, despite these views, the review of the observation journal and the secondary documents suggests that management from MOH, the PMO and the consultants, has sporadically expressed support for the PMIS implementation. This was evident in the official letters beside my notes. This again indicates that interviews alone were not enough to provide an in-depth understanding of the implementation phenomena overtime. This is particularly true when studying a process where several contextual factors are expected to change over time. In this research, my observations in combination with the secondary data were instrumental in completing the picture of the events.

Top management support is temporary by its nature since top managers have busy schedules. They continuously have to compromise between devoting their limited attention to the worthiest subjects and completing their duties. In line with Pinto and Millet (1999), the top management support in Group2 was vital to the success of the implementation, particularly, during the early stage of the implementation in each of Group2's projects. Implementation that was initiated during periods of top management changes or when the management was distracted by other critical issues, suffered significantly. Implementation managers should understand that time never stands still; if senior management is enthusiastic today, there is no guarantee they will be tomorrow.

Comparing the level of success achieved over time with the perceived level of management support suggests that lack of management support has decreased the likelihood of the PMIS implementation success in Group2. The assumption is in line with the CSF literature reviewed in section 2.3.1. However, this was not enough to fail every implementation that suffered the lack of management support as evident in the case of Hospital-A.

5.1.2.3   *Unmatched Barriers (Contextual Perspective)*
Two of the barriers identified by the participants and substantiated by both the participant observations and the secondary data were not matched to any of the theory predictions in

the analysis framework. These barriers are politics and turnover. The code of politics symbolised the struggles between the different stakeholders' groups in Group2 that affected the PIMS implementation. The effect of political behaviour on information system implementation is acknowledged in the literature (Tromp and Homan, 2015; Pinto and Millet, 1999). Apparently, the political behaviour of Group2 stakeholders was a result of the conflict of interests brought by the PMS implementation. For example, participant-7 a senior manager in the PMO, reckoned that with additional 10% effort the PMIS implementation may improve substantially. The respondent observed: "The conflict is that the more the PMO invest on it cost more, while in fact the client doesn't care". Participant-23 a consultant from the system supplier complained that the role his company is playing in the system creates a conflict of interest and risks the entire implementation process: "They didn't understand that delegating the administrator role to [my company] is creating a conflict of interest. [My company] administering the system jeopardizes the credibility of the system data." My observation during Hospital-D implementation suggested that the conflicts between the consultant and the contractor in Hospital-D was a principal reason for the PMIS implementation failure in that site.

Turnover was the second barrier that was noted, but not explained by the analysis template. In this context, turnover meant the departure of key persons from the PMIS implementation. The issue was that the implementation team had no control on the handover process when someone such as a contractor or a consultant left their organisation. This was apparent in the frustrations voiced by Participant-14: "Turnover of staff and replacing them on the system, the contractor mostly performs no hand over or knowledge transfer. Most of the time we have to ask to discover that someone has left the project"

It is most likely that the conflicts that led to the noted implementation-hindering political behaviour and the high turnover were both rooted in the organisational context of the implementation. Group2 was a temporary organisation whereby the boundaries of a temporary organization such as the Group2 cross multiple permanent organisations borders. Group2 was constructed by temporally borrowing parts of these permanent organisations to make up Group2. Although temporary structures bring many benefits to their creators, they also bring challenges. The PMIS implementation across Group2 projects was profoundly affected by the temporary nature of the organisation. Some of the member organisations

have their own PMISs and thus although the PMIS may have brought value to Group2, it represented an excessive, unnecessary workload for such member organisations. The resistance by contractors' in Hospitals Q and M to the PMIS implementation was partially driven by the fact that the contractors have their own PMIS.

Another issue that was peculiar to the temporary nature of Group2 was the diverse culture brought by the different member organisations. In addition to cultural diversity, the member organizations' professional capacity varied widely. This diversity in culture and professionalism made the anticipation of member organisation responses to the system introduction a challenging task. Actions that have proved of significance in Hospital Q and A, for example, were not enough to address the implementation issues in Hospital-B. The shortcoming was mainly due to the Hospital-B contractor's unprofessional responses to the client's direction.

At the individual user level, the absence of a common culture within Group2 created a spread in the individuals' responses to the implementation. Moreover, because of the temporary nature, individuals' motives to learn and use a new system proved limited. Temporary organisations employ individuals because of the expertise they possess, and they assume that their performance will be judged based on these merits. Above all, the individuals' main objectives were to excel in areas that will help their progress within their permanent organisation rather than their temporary one. As such, they could hardly be blamed for lacking the enthusiasm towards learning and using the Group2's PMIS.

The pattern of individuals responses to the PMIS implementation discussed here was observed across most, if not all, Group2's hospital projects. For instance, the implementation team noted the fierce resistance of Consultant-1 technical team to the PMIS implementation in all the seven hospitals that were supervised by Consultant-1. The technical team showed no interest in the PMIS implementation. It appeared that the individuals within the team believed that the skills they possessed already were the only reason for them to be hired in the first place and thus learning to use the PMIS was unnecessary. As one of the technical team members put it:

> "I am a paper man; I need to feel the touch of the paper; I need to write my notes on an A0 drawing sheet and see my handwriting there, I cannot trust your system."

Thus, it is critical to consider the organisational context in order to understand the challenges that faced the PIMS implementation in Group2. Specifically, the fact that Group2 was a temporary organisation.

5.1.2.4   A multi-level Perspective:

The above discussion of the challenges that the PMIS implementation faced suggests that these obstacles occur at all the levels including the individual person level, group (or team) level, and the organisational level. A cross-level influence was also evident such as the unsatisfactory facilitating conditions influence, which affected the individuals' intention to use the PMIS and have a direct relation to the lack of management support at the organizational levels. Similarly, the organisational failure to restructure its teams in most of the cases created conditions for group resistance to emerge and strengthen. At the individual level, negative subjective norms were strengthened by the group resistance, which is one of the possible factors that instigated the partial failure in Hospital-R.

In this respect, it is evident that the challenges to the PMIS implementation were of a multi-level nature. This suggests that addressing the challenges in one level could have not guaranteed successful implementation. As noted by MacVaugh and Schiavone (2010), non-adoption of technology is a result of dynamics that operates at the micro, the meso, and the macro levels. This conclusion is supported by the fact that the implementation team actions to improve the PMIS implementation reported at the story chapter were focused on a separate level at first and second action research cycles. In both cycles, the single-level approach failed to achieve a complete success.

The implications of this inference were considered in deriving an action plan to improve the PMIS implementation success in the third action research cycle. As demonstrated in the next section of the analysis, the implementation team perception of the challenges they were facing was adjusted to account for a multi-level depiction of the implementation. This was a result of the engagement with the results of the case study.

5.2 Stage3: How to improve the PMIS implementation success?

This analysis stage was carried out to find an answer to the second research question: **How to improve the PMIS implementation success?**

Sagor (2000) suggested that finding action in an action research projects is a step that follows the analysis of the collected data, which should be analysed by structuring the story of what the data told the researcher. After that, the generic question: *Why did the story play itself out this way?* should be answered. The answer to this question in conjunction with the data-driven story usually results in a better understanding of the situation, which in turn informs action.

In this study, an iterative process that was carried out in parallel to each of the action research cycles reported in the "Story" chapter. The literature has also played a seminal role in understanding the research problem and selecting the appropriate action. At some stage of the continuous coding and analysis process, I decided that even though the research prominently resided within the management of information system literature, change management represented the guiding philosophy of the action to be implemented. In particular, I borrowed the central themes for which both the literature and the data were coded from Lewin's change in three steps model "CATs" (Schein, 2010). The unfreezing-change-refreezing of the CAT's process suggests that, for any change in a social setting, both barriers and enablers exist.

Change agents must analyse the social setting to identify and understand the barriers and the enablers and then improve the likelihood of a successful change by reinforcing enablers and removing, avoiding, or accepting barriers. It is hoped that this disruption of the status quo will lead to the realisation of the sought change. As a result, although the coding process started with no prior codes, later during the research process, I decided to organise the coded data around the two emergent themes, which were implementation barriers and enablers. At a later stage, I discovered that two additional themes had to be considered, which were stakeholders and interventions. Figure 34 below illustrates the final aggregated structure of the coded data. The match that I found between the reality of the implementation and the four themes informed by the literature review helped me to envisage an action framework at the last cycle reported in this study in section 4.12.
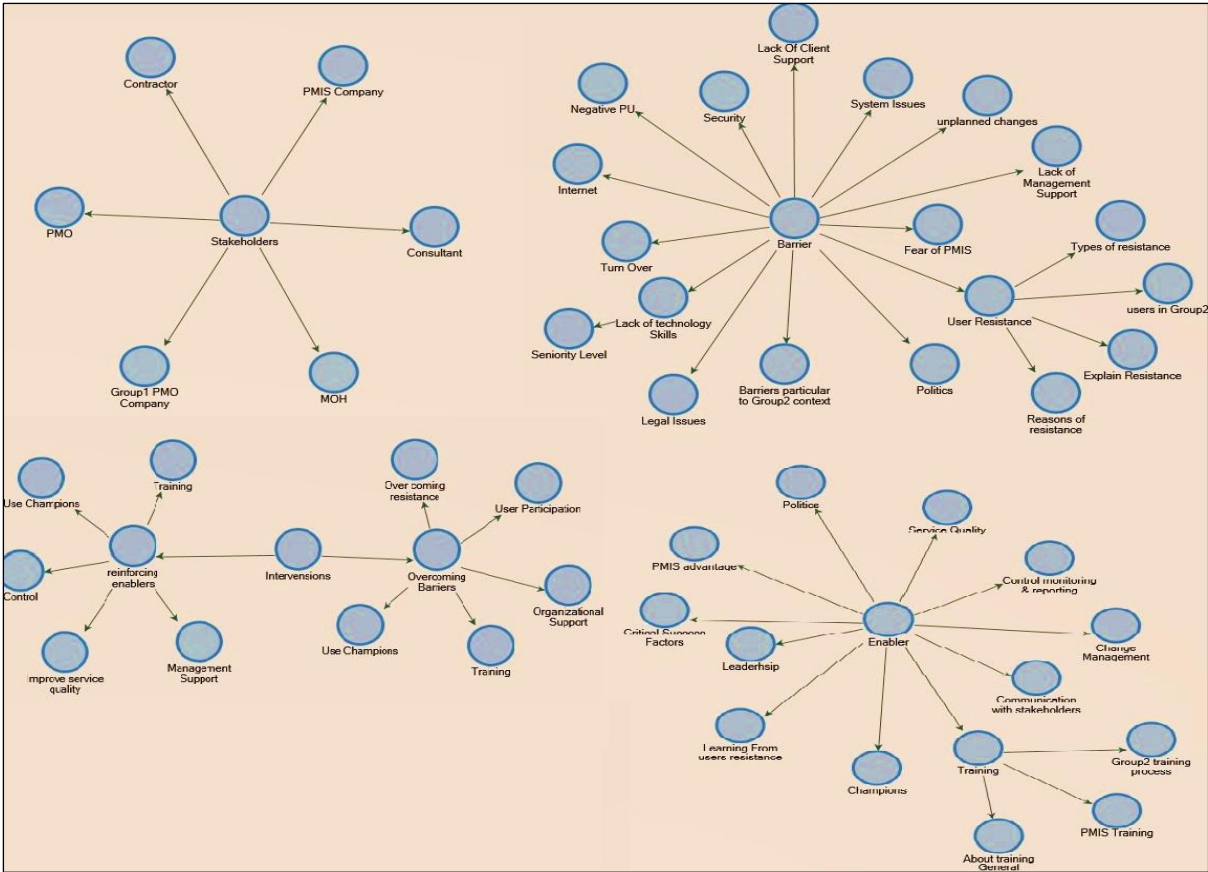
Figure 34: Code Structure and Themes (Stage 3)

The data coding process itself brought to me awareness of new possibilities. For example, the process helped me to establish an understanding of a possible relationship between the different implementation barriers discussed during the interviews and found in the literature. The coding also revealed a possible relationship between the interventions some authors suggested in the literature and the different barrier identified in this research. Further, the coding and analysis of data allowed me to establish a connection between the theories espoused during different research cycles such as the relationship between IS success models and the change management models considering the research contextual reality. This process led to the ultimate contribution of the data analysis, which was the facilitation of the creation of the intervention framework discussed below.

Learning in action research is a result of a knowledge accumulation process. The several actions carried out by me, and the implementation team that are described in the story chapter is thus summarised in Table 14 below in chronological order.

Cycle	Barrier	Action	Theory
Triple twins (dealing with nonsense)	Lack of PU	Training customization to make the system more relevant to end users	Connect to the case study analysis, the coding and the story
	Fear of the PMIS	Trial period	
	Lack of PU and Fear of the PMIS	Communicating a new discourse, the emphasized: • Safe trial period • Identified benefits specific for each user group	
	Resistance	Organizational restructuring: Remove the influence of resisting group	
Hospital-B	Lack of PU	Training customization to make the system more relevant to end users	
	Fear of the PMIS	Trial period	
	Lack of PU and Fear of the PMIS	Communicating a new discourse, the emphasized: • Safe trial period • Identified benefits specific for each user group	
	Turn over	None	
	politics	None	
	Unsatisfactory facilitating conditions	None	
Cycle three	General cross level challenges	Analyse implementation landscape prior to PMIS introduction and perform necessary customisation and communication planning	
	Lack of management support	Secure management support through continuous communication and realignment of PMIS objective to organizational objective	
	Lack of management support	Secure management support through continuous communication and realignment of PMIS objective to organizational objective	
	Lack of PU	Training customization to make the system more relevant to end users	
	Fear of the PMIS	Trial period	
	Turn over	Closely monitor performance and retrain if necessary	
	politics	Understand the land scape and the interests of each	

		stakeholder group then act accordingly	
	Unsatisfactory facilitating conditions	Resolve facilitating conditions in advance to implementation and continuously monitor its status and act if necessary	

Table 14: Attending to Action

Reflecting on the above actions and re-consulting the literature and the research notes enabled me to develop this accumulated knowledge into an implementation framework that is discussed below.

The finding of this study suggests that PMIS implementation in a temporary construction context is best managed by employing a multi-level perspective. As discussed in the Story, individual level, group level and organisational level theories have failed to individually anticipate the complex dynamics encountered during the implementation. This is further supported by the results of the data analysis discussed above. This finding is in line with the argument of Nguyen et. al. (2016) who criticised IS adoption, IS success, and project success theories for their failure to incorporate a multi-level approach that accounts simultaneously for the individual, the team, and the organisation levels. Venkatesh et. al. (2016) albeit being more concerned with users use pattern recommended researching these patterns from a multi-level perspective.

Notwithstanding the above, IT adoption, IS success, CSFs and resistance literature provided essential theoretical background to a successful implementation. Implementers must get cognizant of those theories to better identify and deal with the PMIS implementation barriers and enablers in their implementation context.

This study concludes that a multi-level implementation approach such as the one followed at Hospital-S and Hospital-H reported in section 4.12 is the most promising PMIS implementation strategy in this research context. The Hospital—S and Hospital-H implementation results suggested that the multi-level perspective was the most effective way to improve the PMIS implementation results in Group2. The refined strategy is illustrated in Figure 35 below. The implementation strategy suggested is based on the Lewin's classical three phases change management framework (Cummings et al., 2016). The three phases are the unfreeze phase, the change phase, and the refreeze phase.

The unfreeze phase is concerned with arming the implementer with an in-depth understanding of the implementation terrain. This study advocates the use of stakeholders' analysis beside the Information Systems models to inform the terrain understanding process. As a result of this phase stakeholders, barriers and enablers of the implementation are defined and the relation between them is revealed. The codebook in appendix G includes a full list of the enablers and barriers identified during this study, which could be used as a starting checklist for implementers in similar contexts.

Armed with an in-depth understanding of both the macro-dynamics and the micro-dynamics of the implementation terrain, an implementer could select single or multiple interventions to improve the likelihood of a successful implementation. G G also contains a list of possible improvement

Figure 35 Actionable Knowledge: A framework for PMIS implementation from a multi-level perspective

interventions, some of which has been used in this study. This list could provide initial guidance for implementers operating in a similar context. This study suggests that interventions are most effective when directed towards either reinforcing identified enablers or mitigating existing implementation barriers.

The final stage of the strategy deals with sustaining achieved success through continuous monitoring and adjustment to the implementation terrain dynamics. This stage is of critical importance in the construction industry when a temporary organisation is the field of the implementation. As reported in this study, the implementation in the construction context is prone to challenges peculiar to its temporary nature. High turnover, changes in policies, and politically charged context are to be expected and managed carefully by realigning the implementation objectives to the organisational objectives.

It is worth noting that the second research question was intended primarily to benefit the researched organisation. Thus, any generalisation that might be drawn from the above summary of the findings should be treated with great cautiousness.

6 Conclusion

This action research project examined the challenges faced during a PMIS implementation within a temporary organisation in the Kingdom of Saudi Arabia. The objective of the research was to improve the PIMS implementation outcomes. In order to achieve this objective, the research set out to answer two questions:

1- **What were the challenges encountered in successfully implementing the PMIS in Group2?**

2- **What were the remedies to overcome these challenges?**

Conducting a single case study with embedded units of analysis enabled me to answer the first research question. Drawing upon the first research question answers, I used multi-site action research to answer the second research question.   The main conclusion drawn from the case study and the multi-action research cycles observed and implemented in this study has both theoretical and practical implications that are summarised below.

6.1 Theoretical Implications

The literature discussed in Chapter 2 supports Mardiana et al.'s (2015) theoretical proposition for an extension to the Delone and Mclean (2003) model. My analysis of the research results reported in Chapter 5 further substantiated Mardiana et al.'s (2015) arguments. However, the result of this research showed that the model I suggested in Figure 33 in section 5.1.2.2.1 provided a better frame to explain the individuals' acceptance of the PMIS across the embedded units of analysis examined. Neither of the TRA-based models discussed in the literature review (including Mardiana et al., 2015) was able to surpass the suggested model in explaining the end-user's reluctance to accept the PMIS.

The model I suggested in this research is a modification to Mardiana et al.'s (2015) model. It replaces TAM constructs by UTAUT constructs because the later constructs are more conclusive. Also, it was more important to understand the issues inhibiting the success of the PMIS implementation rather than the user's decision to use or not use the system. Therefore, system success dependent variable which exists only in Delone and Mclean (2003) model was used as the dependent variable in the model. The model suggests that extending IS success model by integrating UTAUT constructs would help to better understand the dynamics of the PMIS implementation at the individuals' level. The Delone and Mclean (2003) IS success

original constructs that were found to be relevant to Group2 implementation was "Service Quality", which is considered as incorporated in the facilitating conditions construct in the suggested model. System quality is considered as an influencer of effort expectancy and performance expectancy with no direct effect on the intention to use or not to use the system. Lastly, information quality is similarly an influencer of the performance expectancy, but with no direct effect on user satisfaction or the intention to use the system.

The analysis proved that the suggested model was better suited to explain the implementation in Group2 than any of the theoretical lenses employed to explain the challenges at the individual level. Extending the IS success model did provide a better understanding of the implementation challenges. However, this improved understanding was limited and proved insufficient for understanding the entire dynamics of the implementation in Group2. The limitation noticed in the TRA-based models, including my suggested model, could be attributed to its single level nature. As such, I argued that explaining the challenges to an IS introduction from the individual level solely is limited and insufficient.

The analysis and reflections on the case study results reported in section 5.1 showed that the PMIS implementation faced a multitude of issues. I recommend categorising these issues into three different groups. The first group of challenges were the lack of perceived usefulness, lack of perceived ease of use, negative subjective norms, and unsatisfactory facilitating conditions. The second group is the group resistance to the implementation that was motivated by the fear of status loss. The third group included the absence of sustained management support, high staff turnover, and highly politicised implementation landscape. The results suggested that each of these groups depicts the implementation dynamics in a different level: the individual, the group and the organisational. As such it is critical that implementation is examined as a multi-level phenomenon. This is an important inference since it provides a better explanation of the difficulties faced the implementation of the PMIS in Group2. This inference was examined during the third action research cycle reported in section 4.12. In this cycle, the action plan implemented was based on a multilevel perspective. As confirmed by the participants and the official reports the results of the implementation in this cycle was far better that the previous ones.

Therefore, this study argues in support of MacVaugh and Schiavone (2010), Nguyen et al. (2016) and Venkatesh et al. (2016) for the employment of a multi-level perspective when

managing a PMIS implementation. This perspective in a context like Group2 context will enable gaining in depth understanding of the implementation challenges, which will consequently increase the likelihood of the PMIS introduction success.

6.2   Practical Implications

This study has suggested an implementation strategy model based on a multi-level conceptualisation of the implementation phenomenon (see Figure 35). In brief, the model suggests that the implementation should start with a thorough analysis of its landscape from a multi-level perspective. This analysis is connected to the literature through suggested checklists that are common instrument in business management today. The checklists are based on both the literature reviewed in this research and the findings resulting from it. Based on the landscape analysis results the implementer should then select a feasible set of actions to enable a successful PMIS implementation. The results of this research suggested that most effective interventions are achieved through customised training and communication. In addition, continuous monitoring and realignment of the implementation communicated discourse proved integral to its success sustainability.

The key stakeholders who benefited from this study are the Saudi MOH represented by Group2 and the PMO in addition to me (the researcher). Practically, the MOH has benefited from the study in identifying the challenges to the PMIS implementation in several hospital construction projects. The MOH also benefited from the solutions that were envisaged and implemented during this study in overcoming some of these challenges.

The PMO was the organisation that I was working for and that gave me the green light to conduct this research. Since the study aimed at improving the outcomes of the PMIS implementation in several projects, it helped the PMO in fulfilling its contractual obligations. Also, the PMO's owners received a copy of the implementation strategy, which in future similar business will represent an invaluable asset in IS implementation.

I benefited from this study in several ways. The action research process which I had gone through in this study taught the researcher how to enter a research field with almost zero knowledge of the discipline and to quickly acquire an understanding of relevant theories in the field. The researcher has built a capacity to lead an in-depth investigation of a problematic

social phenomenon and to plan viable interventions to enhance or resolve the issue of concern to the immediate research stakeholders.

In addition to the stakeholders who have already profited from this action research project, practitioners in similar contexts may benefit from the actionable knowledge produced during this research and presented in the implementation framework illustrated in section 5.2.

6.3 Limitations

Baskerville and Wood-Harper (1996) discussed the difficulty of identifying the cause of success/failure in AR interventions. The issue is that since AR is contextual and in real time, changes that are not initiated or accounted for by the researcher may disturb the intervention and blur the causal assumptions embedded in the action theory. In this AR study, many unexpected events occurred during the attempts to improve the PMIS implementation, which muddled the results of the AR cycles. For instance, some of the critical stakeholders left the Group2 in the middle of the implementation of the PMIS which, to say the least, disturbed the planned actions. Other significant changes, such the unexpected events reported in section 4.10, significantly altered the implementation terrain. Any conclusions drawn following those unexpected disturbances were tentative at best at the cycle level. Because action research studies are carried out in real-life situations, I was not able to execute a second action research cycle at the same site in most of the cases. The model I advanced in this research (see Figure 33) is based on qualitative analysis. As such it could not be used in other contexts before being tested quantitatively. This because the conclusions drawn here are based on analysis and comparisons across sites that are similar, but not identical.

Notwithstanding the above, I argue in support to Fuller-Rowell (2009) that multi-site action research such as the one carried out in this research is a promising methodological innovation. Multi-site action research enabled the refinement and reconstruction of the research questions and insights while moving between different researches sites in response to the reality of the research context. Thus, multi-site action research compensated for the deficiencies pointed by Baskerville and Wood-Harper (1996) to some extent. Despite the promise that multi-site action research holds as proved in this study, it does not attract enough attention from the researcher in the field yet. Data analysis in multi-action research is a possible venue for a further research that might help novice researchers employing this research methodology.

7   Reflection

In this section, a reflection is provided regarding how this research journey has affected me. I discuss my reflections under two headings. Firstly, I reflect on my reflections during the research in an endeavour to understand the impact of those reflections. Secondly, I reflect on the research process I have embarked upon with the aim of distilling any learning experience that might result from having undergone through this research process.

7.1   Self-awareness and Reflectivity

The journey of action research I have conducted for the last two years at Group2 premises has profoundly changed the understanding of myself. Getting used to critical reflections as an indispensable mechanism to voice my unconscious knowledge changed the way I tend to business and research. As reported earlier in this study, I consider myself a pragmatist. Nonetheless, after this research, I still consider myself a pragmatist, but with a different understanding of the terminology itself. Earlier, my focus was action and results; however reflective practice has added a learning focus. To illustrate what this means I consider the following example from my reflections during this research.

> *"I now acknowledge that on many occasions, I was one of the factors that hindered progress in the PIMS implementation project. I did sometimes turn down propositions from stakeholders that might improve the implementation, not for any other reason than the fact that it was not my proposition."*

Action research in this journey played an indispensable role in teaching me that the value of practical, pragmatic solutions is not limited to their immediate results. Rather, their real value lay at the learning potential they embody for the actor and the research community as well. My experience suggests that those learning experiences are often buried under layers of arrogance and fear. To unleash the potential of such learning, my reflective practice during this study taught me that I should both be courageous to face one's fear of uncovering self-bias and be humble enough to admit one's ignorance. That is to assert the importance of reflexivity as learning vehicle in action research studies.

7.2   Reflections on the Research Process

While action research has been praised by many, in practice I found that implementing action research is far from being a straightforward process. I acknowledge that action research is a

broad term that covers several research types. However, most of action research types agree that any action research study should result in both a practical and a theoretical contribution (Zuber-Skerritt & Perry, 2002).

In hindsight, I can see today that the double commitment that an action researcher must honour is not aligned well with the formal DBA program. I am arguing this because of two reasons. First, as action research is implemented in real life situation, the problem that the DBA candidate has selected for research might change while the candidate is going through the formal DBA research process. The formal process contains important milestones such as accepting research proposal, assigning a thesis supervisor and getting ethical approval to name but a few. Reflecting on this process today, I would say that I was a lucky person. My research problem involved multiple sites, which allowed the researcher to catch up with the research problem. The second issue concerns the expected theoretical contribution. Action research is about discovering several unknown. When I started this research process, I did not imagine that I will end up looking at the validation of an information system acceptance model as my possible contribution to theory. My first literature engagement was with organizational development literature. I was interested in doing something in change management research.

However, the unfolding reality of the action research project led me to a different direction. My reflection and review of several action research theses such as Cook (2015), Birkeland (2015), Chukwu (2015), Menzel (2015) and Gross (2016) led me to conclude that the problem of the unknown is a general issue in most of the action research thesis' I came upon. In my opinion, the scholar-practitioner embarking on an action research thesis does not start with enough knowledge of the field to enable an early focus on a specific theoretical discipline. For instance, even if I decided to employ a grounded theory approach, I must wait for what unfolds from the data, which may change during the course of the research. This uncertainty may result in the research project taking longer than expected or in claiming a weak contribution to knowledge or worst in the researcher abandoning the research project. All these possibilities are frustrating and devastating. In my opinion, these unfair and crisis-prone requirements are the result of action research advocates' misled efforts to measure action research results using conventional standards. Ironically, Susman and Evered (1978) decades ago warned that action research is doomed to fail if evaluated using positivist standards.

In this regard, I argue that action research contribution to theory is the illumination of the theory in use in the specific action research context. This illumination could be embodied in a confirmation that an established theory could or couldn't hold true in a specific context. Such conclusions I argue are contributions to knowledge because if research results are disseminated properly, they may lead to the re-conceptualisation of the theory, or in guiding future research to a specific theory that represents a promising research venue in similar contexts.

7.3   Reflection on my Personal Development

Lastly, I would like to conclude this chapter by answering the question: how did this research study contribute to my personal development? Comparing myself before embarking on this journey and now, I must say that the way I manage and conduct both my life and practice has changed in several facets. First, I tended earlier to avoid thinking about what has happened because I was convinced that regrets and consideration given to sunk costs are some of the chief biases a successful manager must avoid. During this action research study, I often reflected on past experiences with a critical eye, and I found that in many occasions, reflections led to invaluable learning. This is the reason behind changing my view and how I manage my practice with concern to reflexivity.

Secondly, this action research project taught me how to connect theory to practice. During this project, I learnt to dive into literature to find out if any relevant theories exist, I learnt further to syntheses diverse viewpoints that different scholars often hold on a subject and to use the distilled understanding in improving my practice situation. Those two skills that I developed and honed during this research project are precious because they are transferable to almost every possible scenario in my management practice in any industry.

7.4   Ethical Considerations

Traditionally, in research involving human subjects, researchers are required to deal with ethical issues, such as anonymity, confidentiality, not doing harm, informed consent, honesty, and the right to withdraw to ensure research quality (Coghlan and Brannick, 2009). Concerns arise regarding other matters such as the conflicting needs of different stakeholders during insider action research and the guarantee that the informed consents were supplied. Those

additional concerns are the results of the insider action research nature. AR is about discovering the unknown, which makes traditional informed consent less informed. Also, for an insider action researcher who is working on a study with dual academic and professional goals, conflicts between the two roles occur more than often. Williamson and Prosser (2002) summarised those unique ethical concerns in AR into the three following questions:

- If the researcher and participants collaborate closely, how can confidentiality and anonymity be guaranteed?
- If an AR study is a 'journey' and 'evolves', how can informed consent be meaningful?
- As AR can have political consequences, how can the researcher avoid doing harm to the participants?

In this study, I was aware of these possible ethical issues before starting the research. Importantly, they had been brought to my attention during a learning set discussion at the University of Liverpool DBA program around September 2013. Thus, I took into consideration the problems mentioned while designing the research. Two precautions were included in this research approach to avoid and mitigate these issues. Reflective planning was the primary tool I utilised to lower the possible impact of the political nature of AR to the participants. While planning any action, I consciously considered any possible injustice that may result from planned actions by any of the research stakeholders, whether a research participant or not. The frequent meetings with the research supervisor played a pivotal role in keeping the research focused while balancing the imperatives of the researcher-practitioner duality role. Those discussions with the research supervisor also helped me to reflect openly and consciously on ethical concerns.

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Appendices

A. Typical Participation Invitation E-mail

Research Project Title: Project Management Information Systems: An empirical study of the challenges of implementation in a portfolio of governmental construction projects in Saudi Arabia

I am inviting you to participate in a research study that I am carrying out as a part of the requirements for the award of a Doctorate of Business Administration from the University of Liverpool. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the attached information carefully and feel free to ask me if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with any person you wish. I would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

After reviewing the attached information if you decided to accept this invitation please reply to this E-mail by the sentence "I agree to participate".

Thank you for reading this.

Ahmed Salih

B. Information Sheet and Interview Schedule

Information Sheet

Research Project Title: Project Management Information Systems: An empirical study of the challenges of implementation in a portfolio of governmental construction projects in Saudi Arabia

What is the purpose of this research project?

This study is carried out to allow a better understanding of the challenges we all faced in implementing the new project management information system ▮▮▮▮▮. If possible, the study will suggest actions to be implemented to improve the success of the system implementation, the study will also observe the implementation of PMWeb and evaluate the possible enhancement to the implementation.

As such the study objectives are:

1. Understanding the challenges to ▮▮▮▮ implementation.
2. Suggest actions to enhance the implementation success.
3. Observe the improvement actions while implemented.
4. Report to the local stakeholders and the University of Liverpool the results of the study and the implementation.

Do you have to take part?

You are totally free to accept or reject to participate in this study. If you decide to participate, you are still free to withdraw at any time without any need to justify your withdrawal. I would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

What will you do in the project?

If you decide to participate you expect that I will conduct between two to four semi structured interviewed with you to collect your opinion regarding the implementation of PMWeb. The interviews will be conducted during the next three months. A semi structured interview is an interview that doesn't include a pre-set question but still abide to a pre-set direction. Each interview will last around 30 minutes. I will use a diary to record the interview, no video or audio records will be used. All the information and ideas you shared during the research will be kept anonymous.

Why have you been invited to take part?

I am inviting you Mr .... to participate because you are one of the main stakeholders in the PMWeb implementation. I believe your insights will greatly help in achieving the study objective stated above.

What are the potential risks to you in taking part?

There are no known risks associated with participating in this research. We are not attempting to uncover any criminal activity or inappropriate behaviour, but exploring the measures put in place to assure a successful implementation of the project management information system in Group2 projects.

What happens to the information in the project?

I want to reassure that any information you shared with me as a researcher including the researcher's observations will be anonymized. The data will be held by me in my personal computer which is password protected. The data will be held for five years as per the university policy and then will be destroyed. The research report (the Thesis) will include no information that could allow identifying any of the research participants.

What if I am unhappy or if there is a problem?

"If you feel unhappy during the research, or if there is a problem, please feel free to let the research supervisor know by contacting: ███████████
The research supervisor will try to help. If you remain unhappy or have a complaint which you feel you cannot come to me or the research supervisor with, then, you should contact the Research Governance Officer at ethics@liv.ac.uk. When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

Please also be informed that you can withdraw at any time before research submittal to the university, without explanation. Results up to the period of withdrawal may be used, if you are happy for this to be done. Otherwise you may request that they are destroyed and no further use is made of them. The research report is planned to be submitted to the university by June 2016.

If you have any questions that you feel I can't answer satisfactorily, please feel free to contact the research supervisor:

Title:	Doctor	**Staff number:**	
Forename/Initials:	████	**Surname:**	████
Post:	████████	**Department:**	████████████████ ████████
Telephone:	████████████	**E-mail:**	████████████████ ████

Thank you for reading this.

Ahmed Salih

████████████

Interview Schedule

My intention is to conduct two rounds of in-depth, semi-structured interviews during each action research cycle. Here below are my proposed guiding questions for the first interview round during the first cycle:

- What is your organizational role in Group2 project? Tell me about your previous experience in construction?

- Have you ever used a project management information system before? How you describe this experience?

- What is your view of the new project management information system (PMIS) called (████████)?

- Does the move from the paper-based procedure to the ██████ affected your daily work? How?

- What are the challenges brought by the PMIS to your daily practice?

- How do you think the ██████ could better contribute to the success of your project?

- What would you do differently if you were responsible for the PMWeb implementation? Why?

The purpose of the first in-depth interview round is to allow me to understand better the issues of the PMWeb implementation, and if possible, to identify proposition for improvement.

Below are the suggested guiding questions for second in-depth interview round that I will be conducting after implementing first cycle's action plan:

- What is your view on (██████) today?

- Do the recent changes to ██████ affect your daily work? How?

- How do you think the ██████ could better contribute to the success of your project?

- What would you do differently if you were responsible for the ██████ implementation's improvement? Why?

C. Sample Letter Cycl-3 Actions

Dear Contractor,

With reference to the MOH attached circular and to the training your staff attended, we would like to inform you that your responsibilities as a contractor concerning the usage of the PMIS in your project are as follows:

1. Issuing all inspection requests (IRs) through PMIS.
2. Responding to all NCRs raised by the consultant through PMIS in timely manner.
3. Issuing all material inspection requests (MIRs) through PMIS.
4. Submitting all shop drawings & material submittals through the PMIS prior to its paper submission.
5. Uploading all approved shop drawings to the relevant document control folder in PMIS by the contractor and insuring that they represent the latest approved version.
6. Uploading all approved Material submittals to the relevant document control folder in PMIS and confirm that they represent the latest approved version.
7. Insuring that the correct version of all key project documents is uploaded to the relevant document control folder.

If you have any issues fulfilling the above-mentioned requirements, please highlight them and we will work with you to resolve them.

السلام عليكم،

بالإشارة إلى تعميم مقام الوزارة المرفق، و إلى الورشة التدريبية لاستخدام نظام ال PMIS التي حضرها فريقكم، نود تذكيركم بأن مسؤولياتكم كمقاول في ما يخص تطبيق النظام تتضمن الآتي:

1. تقديم كل طلبيات التفتيش على الأعمال عبر نظام ال PMIS .
2. الرد على كل تقارير عدم المطابقة NCR عبر النظام.
3. تقديم كل طلبيات التفتيش على المواد عبر نظام ال PMIS.
4. تقديم كل المخططات التنفيذية و اعتمادات المواد عبر النظام قبل تقديمها ورقياً.
5. القيام بتحميل كل المخططات المعتمدة بمجلداتها المناسبة في نظام التحكم بالوثائق في ال PMIS و التأكد أن المخططات تمثل الإصدار الأحدث المعتمد.
6. القيام بتحميل كل اعتمادات المواد إلى المجلد المناسب بنظام التحكم بالوثائق في ال PMIS و التأكد أن الاعتمادات تمثل الإصدار الأحدث المعتمد.
7. القيام بتحميل وثائق المشروع الرئيسة إلى المجلد المناسب بنظام التحكم بالوثائق في ال PMIS.

إن واجهتم أي تحديات في ما يخص الوفاء بالمتطلبات المذكورة أعلاه، الرجاء إعلامنا ، و سنقوم بالعمل معكم لتجاوز هذه المصاعب.

D. Participants List

Project Name	Project Sobriquet	position	Participant unique Number	Role of Potential Participant in the PMIS implementation	Response to interview invitation
D & DH & R	triple twins	Contractor's Site project Manager	1	Actor	No Response
D & DH & R	triple twins	Consultant's Site Project Manager	2	Actor	No Response
D & DH & R	triple twins	Consultant's Technical Manager	3	Supporter	Accepted
D & DH & R	triple twins	Contractor's Technical Manager	4	Supporter	No Response
D & DH & R	triple twins	Project Management Office (PMO) Construction Manager	5	Supporter	Accepted
D & DH & R	triple twins	PMO's Technical Manager	6	Actor	Accepted
D & DH & R	triple twins	PMO's senior monitoring and control manager	7	Owner	Accepted
K		Contractor's Site Project Manager	8	Actor	No Response
K		Consultant's Site Project Manager	9	Actor	No Response
K		Consultant's Technical Manager	100	Supporter	No Response
K		Contractor's Technical Manager	11	Supporter	No Response
K		Project Management Office (PMO) Construction Manager	12	Supporter	Accepted
M		Contractor's Site Quality Manager	13	Actor	Accepted
M		Consultant's Site Project Manager	14	Actor	Accepted

M		Consultant's Technical Manager & Deputy Project Director	10	Supporter	Accepted
M		Contractor's Technical Manager	15	Supporter	Rejected
M		Document Controller	20	Actor	Accepted
M & A & K		Project Management Office (PMO) Construction Manager	16	Supporter	Accepted
B		Contractor's Site project Manager	17	Actor	No Response
B		Consultant's Site Project Manager	18	Actor	No Response
B		Consultant's Technical Manager	24	Supporter	Accepted
B		Contractor's Technical Manager	19	Supporter	No Response
A		Site Manager	21	Supporter	No Response
Group1		Group1 PMWeb Implementation Lead	22	Supporter	accepted
PMIS supplier		PMIS Company Director in the middle east region	23	Supporter	accepted
H & S	Un-identical twins	Project Management Office (PMO) Construction Manager	24	Supporter	Accepted

E. Appendix E example of participant observation record

May 2015

Steering:

Training status:

25 user trained last week

Input forms customization (NCR, Drawing Submittals, Material Submittals, RFI, IR, MIR)

Next steps:

1. Visit pilot project Qateef, start working on the system with people.
2. Start using workflows on the test project.

Issues:

1. MOH staff didn't show up in the training session.
2. Contractual relation with PMWeb inc.
3. What is the ultimate objective of implementing PMWeb to MOH? (This is the issue with what function to be implemented?) Planning and cost modules!!!

Memories:

In a hindsight I can now today judge that the training done in May was not effective for the following reasons:

1. The training content wasn't tailored to the users by function, that is to say that the people in the training were from different levels, departments and organisations that need to perform different roles in using the system, as such the training content was a lot more than needed for every individual in the room.
2. Users didn't start using the system for a long time after the training that result in forgetting whatever they learn during the training.
3. I am not sure but the quality of the people attending the training from each organization suggest that the system function was not well communicated to the sponsoring organizations

Week 2

During this week group 1 disabled all PMWeb account due to dispute regarding payment of support fee to PMWeb. After a series of E-mails on the 7th of March Group 1 promised to re-enable the accounts. I called Buraidah and it seems they didn't get internet yet. They were rumours around that MOH is going to pay all delayed 2015 payment to all stakeholders in group 2. Notifications are not working for the last 5 days or so, no body called me complaining.

Eng ███ asked me to remove him from the shop drawing approval process, I did so and I also made him cognizant of the fact that submittals already submitted before this action still need his attention.

December 2016

Week 2-3-4

Around the beginning of this week a new general project manager for MOH general directory of project management was appointed. ████████ the new GM engaged in a serious of meetings with his MOH team that includes Ibrahim the General Supervisor of Group2. Ibrahim was given the task of producing KPIs to measure the performance of different departments in the general directory and he has passed this task to us in the PMO. Bothe the PMO director Donal and myself have worked on this task which open for me an opportunity to work clodsely with the GS. And guess what, he came with

F. Appendix F Examples of the data analysis

1. Coding Emergent Themes

a. Barriers

Identify existing barriers in the Implementation Contex
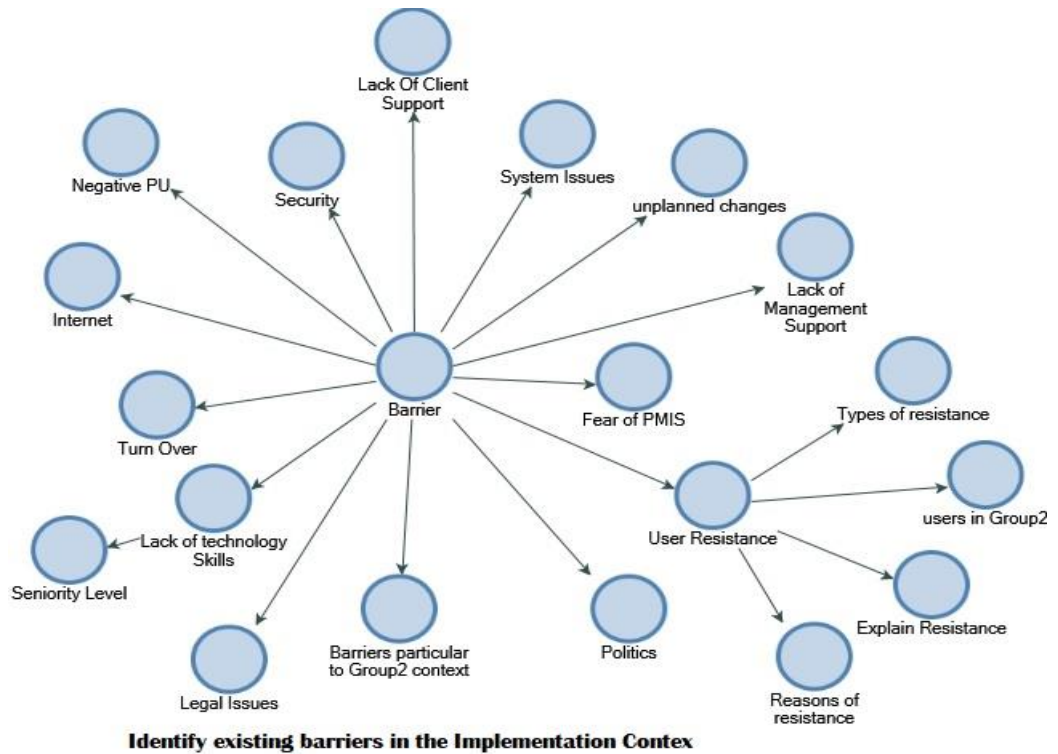
b. PMIS Implementation Enablers

Identify Existing Enablers in the Implementation Contex
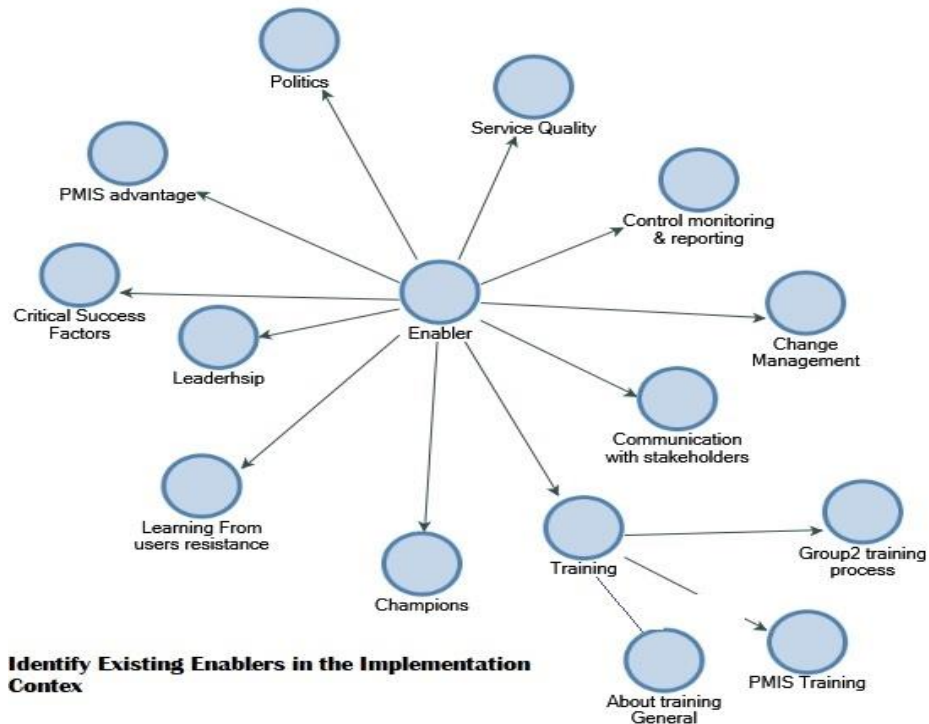
c. Viable PMIS Implementation Improvement Interventions
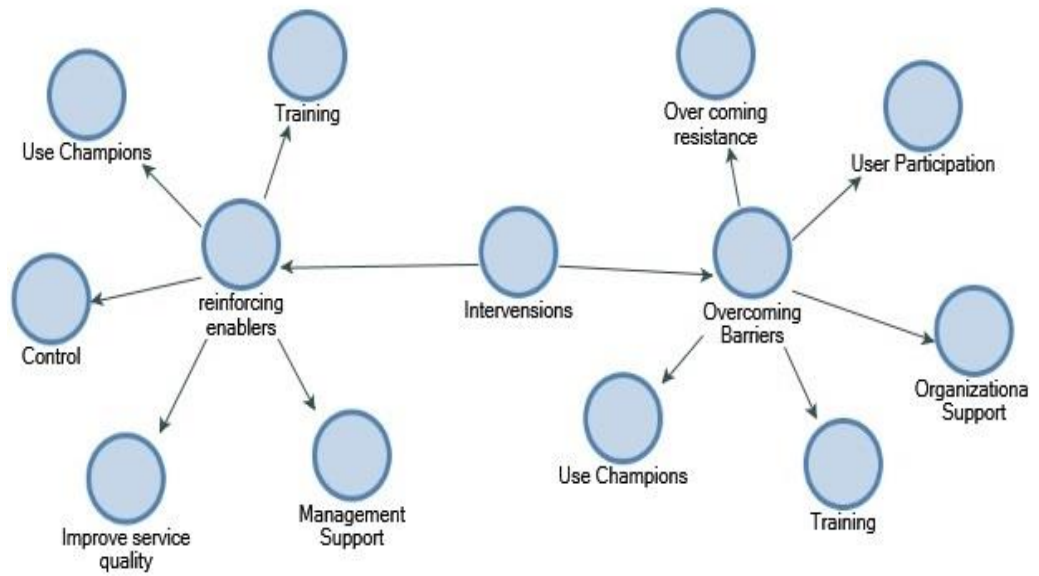
Select appropriate Intervention (s) to implement

d. Improve Contextual Understanding Through Stakeholders Identification and Analysis
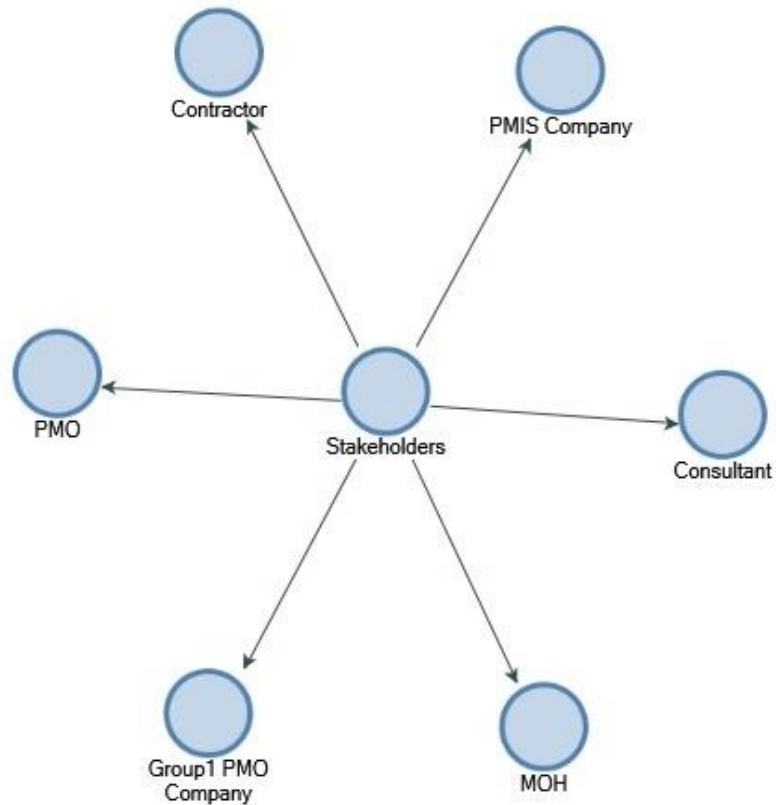
Analyse Stakeholders to Inform Intervention selection

2. Examples of coded interviews

Screenshot of NVivo Plus showing "NVIVO PMIS Implementation October Copy.nvp - NVivo Plus" with coded interview text:

will provide a system professional to support the implementation in each project at least for some time. I should also have the power to ask consultants and contractors to change some of their staff if there were not up to the task. Since I am not an end user I will not be commenting on the functionality. For example, I may add more functions such as correspondence. Some people are x type some are Y type.

In my view, in KSA generally most of organizations are not systematic and that why key persons are not willing to adopt systematics like PMWeb and as such they resist its implementation.

Stakeholder	Mekkah	Abha
Consultant Site	PM consultant is willing to collaborate (DAMCE)	Site consultant see no value of the system but did it because his top management ordered him to collaborate. (DAMCE)
Consultant Mean office (technical)	They feel it is instructions so they wait the contractor to fail but if he did not they will do as less as possible while showing collaboration.	They feel it is instructions so they wait the contractor to fail but if h did not they will do as less as possible while showing collaboration.
Contractor	Top management decided they will do it and site and technical teams abide	Top management did not devote attention to the implementation process, they resist some what in the technical side but collaborated in site level
MOH		The Client look at it as a prestige, client is the real problem cause they want to have the status quo.

G. Appendix G Codebook

Name	Description
Barrier	Factors that limit the possibility of a successful PMIS implementation
Barriers particular to Group2 context	Problems that are not common in similar context like the several changes of the top management of Group2
Fear of PMIS	End users perceiving PMIS as a threat
Internet	Internet was used as a scape goat in some project while it was a real issue in others
Lack of Client Support	The lack of the Owner of the PMIS support to its implementation
Lack of Management Support	A search identified all places where Management Support was mentioned in my data
Lack of technology Skills	End users do not have the necessary skills to work with a web-based PMIS, or are not confident that they have such skills
Seniority Level	The age of the end users some time represents a challenge due to lack of technology playfulness
Legal Issues	Some consultants believed that the replacement of paper-based processes by the PMIS represents a risk to them as they must have documentation that provides evidence of their work
Negative PU	Some stakeholders may believe that the system is unreliable, untrustworthy, a threat or unworthy
Politics	The objective of different stakeholders often conflicts with the implementation objective, it also conflicts with each other which led them to use the PMIS as a political tool in their struggle with each other
Security	Some consultants express concerned with the security of the data processed through the PMIS
System Issues	Issues that are pointed out and are specific to the PMIS used in this study
Turn Over	People leaving the organisation
unplanned changes	Changes that was not envisaged by the implementer which somehow affected the implementation
User Resistance	End-user resistance to the PMIS acceptance and use; it could manifest in many ways as discussed in the literature

Name	Description
Explain Resistance	the manifestation and ramifications of the resistance
Reasons for resistance	Explaining the possible reasons for the resistance could help in handling it.
Types of resistance	Identifying resistance type could also help handling it
Enabler	Actions, people and constructs that facilitate a successful implementation
Champions	People who are willing and did go the extra mile to make the implementation happens
Change Management	The management of change in the business environment
Communication with stakeholders	Designing and delivering tailored messages to the stakeholders to promote the implementation
Control monitoring & reporting	Reviewing and evaluating the PMIS implementation and use
Critical Success Factors	Factors that are reported by different scholars that are argued to be critical to the success of the technology introduction.
Leadership	Providing leadership to the implementation team and stakeholders are important to a successful implementation
Learning From users' resistance	Understanding user resistance may lead to insights to improve the implementation, that is to acknowledge that resistance is not always a terrible thing
PMIS advantage	Identifying the advantages of the PMIS implemented and use them in its promotion
Politics	Using politics in favour of the implementation
Service Quality	Ensuring timely and complete support services to end users
Training	Using training as an intervention to improve PMIS success and how to improve it
About training General	Understanding the theory of an effective training
Group2 training process	Understanding and refining training practices in their context

Name	Description
PMIS Training	How to make the training an intervention
Interventions	Initiative to improve the implementation success likelihood
Overcoming Barriers	Those are actions that are initiated to either remove a barrier or to mitigate its effect over the project
Organizational Support	Harnessing organizational support
Overcoming resistance	Dealing with resistance
Training	Using training to improve PU and to decrease resistance
Use Champions	Use Champions to support the implementation
User Participation	Involve end users in the interventions to improve the PMIS success
Reinforcing enablers	those are the suggestions that will lead to increase the forces that work in favour of successful change or to sustain achieved change
Control	Controlling the implementation process
Improve service quality	Respond to service problems and improve it
Management Support	Acquire management and client support which are critical to the success of the implementation
Training	Use training to deliver a positive message
Use Champions	Use champions to enhance the positive image of the implementation
Stakeholders	
Consultant	How stakeholders perceive the position of the Consultant in the PMIS implementation Matter
Contractor	How stakeholders perceive the position of the Contractor in the PMIS implementation Matter
Group1 PMO Company	How stakeholders perceive the position of the Group1 PMO Company in the PMIS implementation Matter
MOH	How stakeholders perceive the position of the client in the PMIS implementation Matter

Name	Description
PMIS Company	How stakeholders perceive the position of the PMIS supplier in the PMIS implementation Matter
PMO	How stakeholders perceive the position of the PMO in the PMIS implementation Matter

H. Appendix H: Examples of Secondary Data

- It was previously agreed that the ▌▌▌▌system training function would be provided by ▌▌▌▌until such time as the MOH/PMO designated system super user Mr Ahmed Saleh could complete the necessary week-long ▌▌▌▌Train the Trainer" course. This would then enable him to take over this function. However we are now informed that this course will not be held until October 2015

- Initial performance problems effecting the ability to upload existing historical documents such as approved shop drawings and materials and equipment submittals documents to the MOH ▌▌▌▌server have now largely been resolved. However at this time a further problem with the server has been identified which prevents the necessary notifications being sent to the relevant project personnel when documents requiring their attention are uploaded. This feature is a key component of ▌▌▌▌and this problem needs to be resolved as a matter of priority.

- The ▌▌▌▌project document control team do not yet have sufficient broadband connectivity on site to enable them to begin uploading project documents. The Contract Manager had previously committed to arrange installation of the necessary bandwidth by this week, but we are now informed that this has been prevented by industrial action on site. This issue needs to be resolved as a matter of priority.

3   Recommendations

The following is a list of recommendations that the PMO believe are necessary in order to resolve the issues detailed above at the earliest opportunity, and to enable the successful implementation of the PM Web system on the pilot project at ▌▌▌.

- The MOH/PMO team need to conduct a joint review of the contract signed by the MOH and ▌▌▌▌, in order to clarify what after sales services, training and technical support ▌▌▌▌are contracted to provide, and to agree a plan of action to bring pressure on PM Web to perform.

- This review should be followed by a meeting between the MOH, PMO and ▌▌▌▌to agree actions and deadlines for ▌▌▌▌to resolve all outstanding system set up and training issues.

- MOH/PMO to meet with ▌▌▌▌to agree actions and deadlines for ▌▌▌▌to resolve their bandwidth and connectivity issues. In the interim we will explore the possibility of the ▌▌▌▌document control team coming to Riyadh to carry out a direct data transfer of their existing approved shop drawings, materials and equipment submittals etc. onto the MOH server.

- MOH/PMO to meet with the MOH IT Department to see what can be done to resolve the notifications issue detailed above.

02 March 2016

Dear Ahmed,

Upon your request, I hereby confirm that PMGroup & Al Guwaihes Engineering Consultancy Joint Venture agree to you conducting the research activity described in your Information Sheet below:

Information Sheet

Research Project Title: Project Management Information Systems: An empirical study of the challenges of implementation in a portfolio of governmental construction projects in Saudi Arabia

What is the purpose of this research project?
This study is carried out to allow a better understanding of the challenges we all faced in implementing the new project management information system (PMWeb). If possible, the study will suggest actions to be implemented to improve the success of the system implementation, the study will also observe the implementation of PMWeb and evaluate the possible enhancement to the implementation.
As such the study objectives are:
1. Understanding the challenges to PMWeb implementation.
2. Suggest actions to enhance the implementation success.
3. Observe the improvement actions while implemented.
4. Report to the local stakeholders and the University of Liverpool the results of the study and the implementation.

Do you have to take part?
You are totally free to accept or reject to participate in this study. If you decide to participate, you are still free to withdraw at any time without any need to justify your withdrawal. I would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

What will you do in the project?
If you decide to participate you expect that I will conduct between two to four semi structured interviewed with you to collect your opinion regarding the implementation of PMWeb. The interviews will be conducted during the next three month. A semi structured interview is an interview that doesn't include a pre-set questions but still abide to a pre-set direction. Each interview will last around 30 minutes. I will use a diary to record the interview, no video or audio records will be used. All the information and ideas you shared during the research will be kept anonymous.

Why have you been invited to take part?
I am inviting you Mr .... to participate because you are one of the main stakeholders in the PMWeb implementation. I believe your insights will greatly help in achieving the study objective stated above.

What are the potential risks to you in taking part?
There are no known risks associated with participating in this research. We are not attempting to uncover any criminal activity or inappropriate behaviour, but exploring the measures put in place to assure a successful implementation of the project management information system in Group2 projects.

Information Sheet v1.00
January 12 2016

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wish to make.

Please also be informed that you can withdraw at any time before research submittal to the university, without explanation. Results up to the period of withdrawal may be used, if you are happy for this to be done. Otherwise you may request that they are destroyed and no further use is made of them. The research report is planned to be submitted to the university by June 2016.

If you have any questions that you feel I can't answer satisfactorily, please feel free to contact the research supervisor:

Title:	Doctor	Staff number:	
Forename/Initials	Victoria	Surname:	Hanna
Post:	Senior Lecturer	Department:	Operations and Supply Chain Management
Telephone:	0044 (0) 151 795 3000	E-mail:	victoria.hanna@online.liverpool.ac.uk

Thank you for reading this.

Ahmed Salih

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Best regards,

Brian McClinton
Project Director
PMO Group 2 Hospitals