Does Poor Governance Compromise Value Delivery of ICT Deployments

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1 Introduction

Investment in Information and Communication Technology (ICT) in most organisations (regardless of the industry) forms the most significant capital expenditure component. Moreover, organisations commit considerable funds to the operational expenses of ICT solutions. ICT is seen as a business-enabling tool to facilitate the transformation of how business is conducted and organisations operate. Recent technology advancements in hardware, networks, and applications/software (for instance, state of the art electronics, fast and sophisticated mobile 5G networks, and advanced intelligent software solutions such as artificial intelligence) have pushed the use of tech solutions beyond merely improved business functions. The new and emerging technologies aim at providing a superior user/client experience beyond business functionality. Highly automated processes allow the users of services to be empowered and achieve most of what needs to be done without being onsite or requiring assistance from organisations' staff.

In addition to challenges introduced by rapid advancements and developments in information and communication technologies, recent challenges caused globally due to the global COVID19 pandemic highlighted the value of some automated and/or virtual solutions supported by advanced tech solutions.

At the same time, introducing tech solutions that are based on rapid technological advancements can be associated with risks. Technology deployment requires high-level governance drivers and competency in managing tactical and operational matters. Unfortunately, despite significant technology advancements offering extraordinary opportunities alongside more awareness of technology management principles, over the last decade, there have been increasing cases where the

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deployment of ICT solutions failed to deliver value. In addition, the experiences of some organisations in adopting technologies during the pandemic highlighted gas in preparedness for technology deployment.

The investment (both capital and operational) in ICT continues to grow. But, at the same time, the COVID-19 pandemic since 2020 has to some extent, accelerated technology adoption in less tech-savvy and less willing and prepared organisations.

ICT executives, planners, and strategists are expected to develop and put into practice effective decision-making models that improve processes for the deployment and use of technology in organisations. As a result, there is an expectation that every effort is being made to optimise the investment in IT deployment. Moreover, in addition to optimising IT deployment investment, it is also critical to avoid the many drawbacks and risks associated with the rapid introduction of technological change.

A review of the history of the development and rollout of IT solutions (including recent tech deployment initiatives) reveals several IT projects involving considerable investment in technology did not deliver outcomes. In addition, there have been several high profile cases of colossal IT deployment failures in New Zealand and Australia throughout the last decade. Therefore, rapid deployment of ICT due to the pandemic alongside cases of failed tech deployments in recent times demonstrated a need to revisit ICT or IT governance practices.

The principal aim of this chapter is to determine the effectiveness of Information Technology Governance (ITG) approaches and practices. More specifically, whether or not the failure of IT deployments can be related to poor governance practices and decisions.

The chapter primarily targets an audience with an interest in technology deployment across various sectors of the industry. However, some broad knowledge of Information technology and related tech solutions can facilitate a better understanding of some of the discussions presented in this chapter.

2 Background

Today, Information Technology (IT) solutions play a significant role in enabling businesses. Organisations commit considerable funds to both capital and operational expenses to deploy and operate IT solutions (Lovelock et al., 2016; McLellan, 2014). Deploying technology is often associated with significant organisational change. The change can be associated with significant risks (Davis et al., 1997; EDUCASE centre for applied research, 2008; Gauld & Goldfinch, 2006; Laudon & Laudon, 2014).

There have been significant technological advancements and increased awareness of technology management. Regardless, some IT deployment cases fail to deliver expected organisational outcomes (Gauld & Goldfinch, 2006; Gole & Shinsky, 2013). For instance, some of the recent case studies of challenged IT

deployment initiatives (where the deployment of technology failed to deliver the expected outcomes) include the Queensland Health project (Chesterman, 2013), the WINZ NZ kiosk security failure (Deloitte, 2012) and the NOVOPAY project (NZ Government, 2013).

Increased investment in IT has meant that there is an expectation by organisations that they not only maximise the benefits of adopting IT but also avoid the drawbacks and risks that are often associated with the rapid introduction of technological change (Laudon & Laudon, 2014; Myers, 2012). As a result, IT managers, planners, and strategists have continuously developed and put into practice decision-making models that improve decision-making processes.

Previous studies have shown that IT is expected to add value to the organisation through improved productivity, increased efficiency, profitability, better communication, more effective decision-making, and customer satisfaction (Larcker & Tayan, 2008). Moreover, studies show that to maximise benefits and value gained from investment in IT, it is universally acknowledged that IT must be fully aligned with overall business strategies and direction (Asgarkhani, 2013; Van Grembergen, 2004). Therefore, considerable organisational resources are consumed to manage how IT is acquired and diffused in organisations (Weill & Ross, 2004; Wu et al., 2015).

The term ‘governance‘relates to the establishment of policies, and continuous monitoring of their proper implementation, by the members of the governing body of an organisation. It includes the mechanisms required to balance the powers of the members (with the associated accountability) and their primary duty of enhancing the prosperity and viability of the organisation. Governance determines who has power, makes decisions, how other organisation members (business) make their voices heard and how accountability is justified and established.

Information Technology Governance (ITG) is the responsibility of the board of directors and executives. ITG consists of leadership, organisational structures, and processes that ensure IT sustains and extends its strategies and objectives (ITGI, 2007). ITG frameworks and standards were introduced to organisations in the 1990s (Brown & Magill, 1994; Cater-Steel et al., 2006; De Haes & Van Grembergen, 2006; Van Grembergen & De Haes, 2009).

Recent rapid advancements in IT platforms, such as networking technologies and cloud computing solutions, have introduced increased complexity in IT planning and decision-making processes (Asgarkhani, 2012; Venkata et al., 2012; Wen & Hsu, 2012). The literature on ITG provides advice and recommendations on models and frameworks for ITG implementation (De Haes & Van Grembergen, 2010; Van Grembergen & De Haes, 2009; Weill & Ross, 2004; Weill & Vitale, 2002; Williams, 2012).

The literature outlined in this section suggests that previous studies on ITG tend to assume that recommended models and practices lead to effective governance. However, we could find no empirical evidence to support this assumption. More specifically, despite the number of prescriptive models and ‘best practice frameworks‘available and increased uptake of ITG in organisations, achieving key

ITG outcomes is consistently ranked as one of the top concerns of management (Gartner, 2016).

The research problem that motivated this study can determine why, despite numerous recommended 'best practice frameworks and models of effective ITG, many IT deployment projects fail to deliver value.

The review of previous ITG research indicates two prominent theories are applied to provide a theoretical foundation: Agency Theory and Stewardship Theory. Most ITG practices and approaches are grounded in Agency Theory (Bonazzi & Islam, 2007; Jensen & Meckling, 1976; Jensen & Meckling, 1994; Licker, 2007; McColgan, 2001). Agency Theory suggests that the interests of owners and managers are inherently conflicting.

Consequently, the theory motivates monitoring and control mechanisms by owners to protect interests. The second theory, Stewardship Theory, debates that assumptions made under Agency Theory do not always hold. In conjunction with ideas on best practices in ITG from Weill and Ross (2004), Stewardship Theory offers a variety of effective governance models. However, the theoretical foundations of Agency Theory, with a strong focus on control, predominantly underpin the current ITG practices.

Both models of governance discussed above are based on strict controls and lack agility (reference). At the same time, the rapid advancements in technology require a more agile approach to the governance of technology deployment. The timelines (often years) risk that the planned technologies at the start can become obsolete and may not deliver planned outcomes. The recent worldwide pandemic due to COVID19 also highlighted the need for revised tech deployment governance.

To explore the role of effective governance in technology deployment, this study concentrates on three broad questions:

1. What influences or constitutes the effectiveness of ITG practices?
2. How do poor ITG practices contribute to the failure of IT deployment initiatives?
3. Do poor ITG practices align with the absence of the effectiveness factors (question 1).

The approach to seeking an answer to the first question was conducting a systematic literature review while case study analysis (failed It deployment projects) determined the answer to question two. The case study analysis results were mapped to the outcome of the systematic literature review to answer question three.

Therefore, this chapter presents the results of a systematic literature review to determine influencers (or indicators) of ITG effectiveness. The proposed model of ITG effectiveness is followed by the results of multiple case study analysis of six IT deployment initiatives. Finally, based on the outcomes of the research, the chapter examines the connection between poor ITG and failed IT deployment projects to broaden the preliminary results reported in 2017 (Asgarkhani et al., 2017).

The next section of the chapter outlines the approach (methodology) for the study. Next, the systematic literature review discusses the outcomes of the review of existing research from various practitioners with views on the effectiveness of

ITG – including both the views of systems-focused practitioners alongside business-alignment focused strategists. Following the literature review discussions, the case study analysis results are discussed. Finally, the chapter brings together the outcome of the literature review and the analysis of case studies to establish a connection between failed IT initiatives and poor ITG practices. Finally, the chapter conclusion summarises and discusses the contribution, limitations and future planned research.

3 Phases of the Study – The Methodology

Two approaches were adopted to explore answers to the three questions that formulated this study. Therefore, the research methodology constituted a systematic literature review followed by a case study analysis. Both approaches were based on qualitative or thematic analysis of identified resources.

3.1 Systematic Literature Review

A Systematic Literature Review was conducted to establish a theoretical model of parameters likely to influence effective ITG. (Ardito, Messeni Petruzelli & Albino, 2015; Bakker, 2010; Baumeister & Leary, 1997; Bem, 1995; Okoli, 2015).

The first step of the systematic review involved the selection of eligible articles. It included scoping, planning, identifying resources, screening, and determining the eligibility of resources in the study (Ardito, Messeni Petruzelli & Albino, 2015; Okoli, 2015; Moher et al., 2009). The screening process, the inclusion criteria, and the exclusion criteria used to determine the final pool of eligible articles are discussed in detail later in this section.

The preliminary search for resources included journals and quality assured conference proceedings repositories (such as Science Direct, Springer Link, IEEE Xplore Digital Library, Emerald, Taylor & Francis), books, reports by IT sector professional bodies (for instance, ITP NZ, ACS, and BCS), government-commissioned reports, google scholar, and universities'investigative reports.

Key phrases used for the initial search included: (1) Information Technology Governance, (2) IT governance, (3) IT solutions deployment, (4) IT deployment success, (5) IT Deployment failure, (6) IT Governance Effectiveness, (7), IT Governance Practices, (8) IT Governance Standards/Models, (9) IT Governance Success Factors, (10) IT Governance Mechanisms, (11) IT solutions success/failure, (12) IT Governance theory, (13) IT development, (14) IT platforms changes, (15) Technology changes, and (16) Technology solutions.

The systematic literature review process and the results are outlined in the 'systematic literature review' section.

3.2 Case Study Analysis

Multiple case studies were considered to assess if IT initiatives fail due to poor ITG. Case study analysis has been recommended as a suitable methodology for qualitative studies where contextual analysis adds value to the study (Baxter & Jack, 2008; Ritchie & Lewis, 2003; Stake, 2006; Yin, 2011). Sources for the selection of the case studies included MIS Quarterly, Gartner Research (www.gartner.com), publications by the British Computer Society, Australian Computer Society, Institute of IT Professionals NZ, New Zealand and Australian Government (IT projects publications), and the CIOIndex (www.cioindex.com). The selection criteria included:

1. The complexity of the project: assessed by the impact of the project on both significant strategic and operational functions (for instance, financial systems, human resources management functions, data and information management functions for strategic decision making);
2. The cost of the project is at least $50 M (Australian): reflecting on complexity and financial implications of deployment failures;
3. Geographic location: projects from various English speaking countries to be able to observe the possible impact of cultures in managing and adopting ITG (New Zealand, Australia, Europe, and North America);
4. Failed projects were identified as missing targets (timelines, cost, and functionality) by approximately 20%.

The reason for considering the criteria outlined above was to ensure projects present sufficient complexity and size (financial resources, functionality and requirements) for a more likely observation of challenges beyond tactical and operational matters.

A cloud-based qualitative analysis tool (Dedoose) was used to analyse and identify themes that contributed to a lack of successful delivery of outcomes in IT projects represented in the six selected case studies. Compared with traditional qualitative tools installed on individual computers and storing data on local storage devices, Dedoose uses cloud technology to deliver the application and data storage in cloud space. Moreover, Deddose allows for mixed-method data analysis, which can significantly benefit the continuation of this study in the future. Selected sources (documentation) representing the case studies were uploaded to Deddose. The tool allows for qualitative/thematic analysis performed by recording themes/codes plus keeping track of valuable data such as themes dependencies and frequencies of observations. The tool was also used to determine theme/code applications across the resources.

4 Systematic Literature Review

The overwhelming majority of the proposed practices, standards, approaches, and measures of ITG effectiveness observed in the selected literature for this study seem to be based on principles of ‘monitoring and control.’ It appears that the theoretical

foundations of Agency Theory (Bonazzi & Islam, 2007; McColgan, 2001), with a strong focus on control, predominantly underpin the current ITG practices. The selected literature on ITG in this study suggests that effective ITG via monitoring and control is more likely to secure value delivery of IT deployment (Weill & Ross, 2004). At the same time, despite a general agreement that effective ITG ensures value from IT, there are different schools of thought regarding how the effectiveness of ITG can be established. The review of the selected literature in this study demonstrates that evidence of effective governance can be sought, taking into consideration two different views:

- ITG's effectiveness is evident from the success of deployed information solutions and applications;
- ITG's effectiveness is evident from the use and application of recommended strategies, frameworks, processes, and standards.

Information Systems (IS) academics and practitioners have previously developed models to measure the success of IS solutions. However, these models are designed to assess the success (effectiveness) of the specific solution, and their direct applicability to assessing strategic ITG practices is questionable. Led by DeLone and McLean (1992, 2003), a group of researchers (Delone & McLean, 2003; Esteves & Joseph, 2008; Halonen et al., 2009) argued that successfully deployed information systems and applications could indicate effective strategic management of technology deployment. They focussed on operational and tactical issues and recommended models to measure the success of information systems to reflect effective ITG.

The initial search of qualifying publications and articles resulted in 171 articles. After screening the resources and applying inclusion and exclusion criteria, eligible articles were reduced to 71. Table 1 demonstrates the inclusion and exclusion criteria considered during the screening process. The breakdown of the categories of the eligible publications is outlined in Table 2.

The approach for the analysis of the selected articles involved a concept-centric qualitative analysis performed in two stages (Webster & Watson, 2002; Okoli, 2015):

- The first stage involved the analysis of a subset of 10 selected articles. The criteria for determining the subset of 10 articles included: representing the views of both practitioners and strategists, published within the last 5 years, published within Information Systems discipline journals and quality assured conferences, title and section headings showed a direct connection with the topic of this chapter. The concept-centric qualitative analysis of the selected ten articles identified factors seen as influencers and indicators of effective ITG. The influencers were sorted into two categories of internal and external influencers.
- Next, the remaining articles (61) underwent a similar qualitative analysis to validate, reduce, enhance (identify factors that were not included in data from step 1 of the research) and categorise the data (indicators and influencers). The set of factors (indicators and influencers) identified in the first phase of analysis seemed to cover most of the identified factors in the remaining papers. However, in the second phase, a small number of new factors were observed and considered.

Table 1 Inclusion and exclusion criteria for the selection of the final set of literature resources

Inclusion criteria	Description	Exclusion criteria	Description
Research focus	Studies that seem relevant to the scope of the review. They represent the main interest of the review by identifying the various factors that seem to help answer the research questions outlined earlier in this section.	Structure of contents presented	Publications that were not sufficiently structured in arguments to allow for a systematic analysis of contents.
Methodology and focus	Articles that clearly outline the research methodology. Both quantitative and qualitative studies were taken into consideration.	Information available	Publications that did not provide sufficient information relevant to the topic of the study.
Publication recognition, quality, and type	Articles were considered if they were quality assured articles. More specifically, papers had been formally reviewed or commissioned by international agencies and governments.		
Language	Only publications in English were considered.		
Currency	Only publications within the last decade were considered – unless articles discussed relevant theoretical models that do not age.		

Table 2 Final breakdown of eligible publications/resources

Sources	Number of selected studies
Government-commissioned reports and reports from recognised professional bodies	14
Journals	18
Books and book chapters	23
Conference proceedings	13
Universities'publications	3

In general, the analysis of the literature suggested that:

- The theoretical foundations of Agency Theory (Bonazzi & Islam, 2007; McColgan, 2001), with a strong focus on control, predominantly underpin the current ITG practices.
- Effective ITG practices are more likely to secure value delivery of IT deployment (Weill & Ross, 2004). Led by DeLone and McLean (1992, 2003), a group of researchers (Delone & McLean, 2003; Esteves & Joseph, 2008; Halonen et al., 2009) argued that successfully deployed information systems and applications could indicate effective strategic management of technology deployment. They focussed on operational and tactical issues and recommended models to measure the success of information systems to reflect effective ITG.

Another group of researchers led by Van Grembergen, Weill, and Ross (Van Grembergen, 2004; Van Grembergen & De Haes, 2009; Weill & Ross, 2004) argue that factors that can be examined to assess ITG effectiveness are related to strategic approaches, relational mechanisms, and use of standards and frameworks that are expected to lead to ITG effectiveness. Accordingly, they examined and recommended strategic factors that could influence the effectiveness of ITG.

Throughout this chapter, the term 'practitioner' applies to those who take a deployed system (solution) view when examining effectiveness. 'Strategists' discuss the future direction of an organisation concerning IT deployment and the role and impact of ITG in securing value from future IT deployments.

The analysis of the selected articles (related to both practitioners' and strategists' views) identified eight key themes that could be used to determine the effectiveness of ITG, including: (1) Decision-Making Structure, (2) Formalised systems and processes, (3) Effective communication, (4) Business outcome orientated IT, (5) Alignment of organisational quality-orientated strategies with strategies for the use of IT solutions, (6) The history and the current state of IT deployment, (7) Awareness of organisations financial performance supported by IT solutions, and (8) Operational excellence influenced by the deployment of IT.

Table 3 demonstrates the themes of influencers of ITG effectiveness and summarises the analysis of the selected articles bringing together both practitioners' and 'strategists' views.

The purpose of the literature review is to identify factors that influence ITG. The emphasis is on governance. As outlined in the introduction, governance is mainly concerned with establishing policies and monitoring that policies are adhered to. Governance has a strategic focus.

Despite the focus on governance, the study does not lose sight of tactical and operational matters. For example, in addition to ITG effectiveness influencers outlined in Table 3, project management practitioners and professional bodies (such as the project management institute – PMI, www.pmi.org) advocate for a specific body of knowledge that contributes to IT deployment projects' success. The Project Management Body of Knowledge (PMBOK) highlights the project management processes that could impact IT projects (PMI, 2013).

PMBOK recognises five primary process groups and ten knowledge areas related to almost every project. The basic concepts apply to projects, programmes and operations. The five primary process groups are: (1) initiating, (2) planning, (3) executing, (4) monitoring and (5) controlling & closing.

PMBOK is mainly concerned with tactical and operational matters focusing on individual IT projects. On the other hand, ITG is concerned with strategic technology deployment issues and not necessarily with specific IT projects (Van Grembergen & De Haes, 2009; Weill & Ross, 2004).

The inclusion of PMBOK and consideration of tactical and operational matters assisted with the triangulation of data to determine dependencies between governance level decisions and tactical and operational processes. For instance, at the operational level, poor resource management could be connected with a specific governance domain such as *risk management* (Asgarkhani et al., 2018). Moreover,

Table 3 Themes of the influencers/indicators of ITG effectiveness (A theoretical model)

Themes	Influencers/Indicators of ITG effectiveness	References
Group A – ITG maturity: The experience and rigour in implementing ITG best practice		
Decision-making support structure	IT steering committee	De Haes and Van Grembergen (2010), DeLone and McLean (1992), Delone and McLean (2003), Van Grembergen (2004), Weill and Ross (2004), Weill and Vitale (2002)
	Strategic information systems planning steering committee	
	Reporting structure (IT directors to CEO)	
	Monitoring and the assessing value returned from decisions made on deploying IT	
Formalised ITG systems and process	ITG standards and framework	
	Business and IT partnership in decision making	
	Formalised portfolio management	
	Formalised information strategy planning	
	A formal process for strategic information systems planning	
	Formalised IT deployment project governance	
Effective communication of strategic issues	IT director or CIO involved in executive decision-making and represented on the executive committees.	
	IT strategy committee (or similar) tasked with reporting and discussing IT issues.	
	A CIO or a similar role is to raise awareness and articulate a vision for IT's role.	
Group B – strategic Alignment of IT and business: The connection and coherence between fulfilling business strategy and the IT strategy.		
Business outcome-orientated alignment of IT and business	IT strategies recognise and support new business outputs (products and services) Technology support for business outcome diversification strategies Technology and service support for business outcome differentiation.	De Haes & Van Grembergen (2010), Kaplan (2010), Kaplan & Norton (2004), Myers (2012), Prasad et al. (2008), Ramgovind et al. (2015), Van Grembergen (2004), Van Grembergen & De Haes (2009), Weill (2004)

(continued)

Table 3 (continued)

Themes	Influencers/Indicators of ITG effectiveness	References
Alignment of organisational quality-orientated strategies with strategies for the use of IT solutions.	Adoption of IT solutions supports business outcomes (products and services quality), including production and marketing.	
Group C – Organisational performance influenced by technology deployment: Organization's overall performance and delivery of outcomes supported by IT relative to its competition		
The history and the current state of IT deployment within an organisation	The current level of process automation via IT	DeLone & McLean (1992), Delone & McLean (2003), Esteves & Joseph (2008), Halonen et al. (2009), Hellsten & Karkove (2006), Zaied (2012)
	User acceptance of technology solutions	
	Support mechanisms for IT solutions	
	Timely delivery of relevant information for effective decision making	
	Effective service management of IT solutions	
Awareness of the organisation's financial performance supported by IT solutions	Processes for monitoring an organisation's performance	
	Metrics such as return on investment are used to assess the value delivery of IT	
The deployment of IT influences operational excellence	The existence of processes and metrics for operational performance	
	Seeking ongoing productivity improvements via the deployment of technology solutions	
	Service level agreements and the timeline for service delivery	

some of the five primary process groups (for instance, initiation and monitoring) directly align with IT Governance domains outlined in COBIT version 4 – mainly resource management and *strategic alignment* (Asgarkhani, 2013; Asgarkhani et al., 2017).

5 Analysis of Case Studies

As outlined earlier, the case study analysis comprised the analysis of six reported cases of IT deployment as secondary data. This section of the chapter elaborates on the process and discusses the results.

5.1 Thematic Analysis

Thematic analysis was applied to establish the dominant contributing factors to IT deployment success or failure. The study's broad methodological aspects were outlined earlier in the 'methodology section'. In addition, this section outlines more specific elements of the methodology related to the case study analysis.

Thematic analysis is relevant for analysing secondary data (IT deployment reported case studies). The thematic analysis provides this study with a flexible tool through its theoretical freedom, providing an in-depth and detailed yet complex account of data from the case studies (Creswell, 2015; Elliott, 2018).

Thematic analysis is accompanied by a process referred to as coding. According to Creswell, "Coding is the process of analysing qualitative text data by taking them apart to see what they yield before putting the data back together in a meaningful way" (Creswell, 2015). Justifying the need for coding is straightforward: "Text data are dense data, and it takes a long time to go through them and make sense of them" (Creswell, 2015). Coding is essentially indexing data about the contributors to the success or failure of IT deployment. Coding in this study refers to indexing data to highlight significant contributing factors to the success or failure of IT deployment.

Another consideration for the thematic analysis of case studies was the number of codes/themes representing the phenomenon being studied appropriately. The number of codes is a question on which many scholars have a firm opinion. For example, Friese (Friese, 2014; Friese, 2016) warns that the number of codes should not swell into the thousands – a phenomenon potentially due to the context of qualitative analysis software enabling such proliferation. Other figures about the number of codes discussed by other scholars such as Saldana (Saldana, 2016) range between 50–300 codes; for instance:

- 80–100 codes divided into 15–20 categories, eventually grouped into 5–7 significant concepts(Lichtman, 2013); or
- 30–40 codes (MacQueen et al., 2009).

Creswell (Creswell, 2015) has a more modest figure suggesting that he would code all of the text data (whether a small database of a few pages or a large one of thousands of pages) into about 30 to 50 codes. Creswell further suggests that by collapsing overlapping codes into one and eliminating the redundant codes, it should be possible to reduce the number of codes to about twenty. The final twenty or so codes should then be grouped into five to seven categories to shape the write up of the

results of the qualitative analysis. The coding process for this study and the number of themes seem consistent with Creswell's approach. The final analysis included twenty two factors (codes) in eight categories.

5.2 The Process of Coding

A continuum of designs can be considered to determine the process of coding. At one end of the continuum, we have prespecified codes. At the other end, we may start coding for thematic analysis with no prespecified codes, thus letting the data suggest the initial codes. The decision on the coding style was directed by the research question and the epistemology of the design. For example, a design related to testing theory against empirical data fits well with preset codes.

On the other hand, researchers with a deeply held philosophical view of qualitative research are likely to favour emergent or priori codes. Creswell (J. W. Creswell, 2014) emphasises that the use of emergent coding opens up the coding to reflect the view of participants in a traditional qualitative way. Furthermore, he encourages the researchers to be open to additional codes even if a 'prefigured' coding scheme is used. According to Creswell (J. W. Creswell, 2014), the most pragmatic researchers typically use both approaches in a single research project.

The case study analysis (secondary data) utilised emergent coding for a start – Phase I – initial two case studies. The method is consistent with the research design and the expectation of a deeper understanding of contributing factors to IT deployment failure, considering practitioners' views in a traditional qualitative way.

5.3 Stages of Data Analysis

Guided by the approach recommended/prescribed by Braun and Clarke (Braun & Clarke, 2006), the thematic analysis of the case studies followed six stages – including:

- Familiarisation with the data – This involved actively engaging with the data to develop an in-depth understanding of the data. Case studies were read several times, and the initial thoughts about the influencers of IT deployment success or failure were noted. This step also included examining how data can be analysed using Deddose, the qualitative analysis tool used by this research. The first step provided the foundation for the subsequent analysis.
- Generating initial codes/themes – The second step had two purposes. Firstly, it involved identifying preliminary features of the data that seemed interesting and meaningful. Considering that the approach to analysis was emergent coding, it was essential to practice a certain degree of scrutiny and validity check of the emerging concepts before launching into a complete analysis of all the cases.

The process was not necessarily intended at the wording of themes but to ensure the process, logic, and reasons for selecting data from the text and indexing the data to certain concepts. Two case studies were used as test cases, and the identified themes were considered in alignment with broad themes identified in the systematic literature review for relevance.

- Searching for themes and completing the qualitative analysis – The interpretive data analysis from all six case studies was conducted.
- Reviewing themes – once the thematic analysis was completed, a deeper review of identified themes was conducted to determine whether to combine, refine, separate, or discard initial themes (J. Creswell, 2015). At the end of this step, data within themes connected meaningfully, while there were clear and identifiable distinctions between themes.
- Refining the terminology and categories of themes – This step involved 'refining and defining' the themes and potential subthemes within the data. First, subthemes were identified and grouped into broad categories of themes. The outcome of this step was eight categories of themes outlining a unified story of the data derived from the case studies.

5.4 Case Studies: Data Analysis

This study aimed to analyse six cases of IT deployment. The purpose of the study was to fine-tune perceived influencers of ITG effectiveness for future studies and to validate the preliminary alignment of literature review analysis with the outcomes of actual IT deployment initiatives that had been established previously in 2018 (Asgarkhani et al., 2018).

An initial search for case studies of IT deployment resulted in identifying eighteen projects. The investigation was further refined to select six case studies based on:

- The timeframe for the project within the last decade: cases that took place in 2007 or later;
- The case study provides sufficient data to be suitable to identify ITG influencers;
- The six cases represent New Zealand, Australia, Europe (UK), and North America (Canada).

The analysis of case studies was carried out in three steps:

- Two case studies were analysed in step I to identify a preliminary list of factors that contributed to project failures.
- In step II, the remaining four cases underwent similar analysis to validate and enhance the outcome of step I. At the end of step II, it was confirmed that twenty-six factors had contributed to the failure of IT deployment projects in the case studies.

- In step III, the identified contributors to project failures were mapped against the outcome of the literature review (influencers of ITG effectiveness) to establish a connection to the conceptual model and secondly group the twenty-six contributors to failure into eight groups or themes.

A concept-centric thematic analysis was performed (Webster & Watson, 2002; Okoli, 2015) to analyse the main contributors to IT deployment projects' failure. The main contributing factors were developed as the six cases underwent analysis. There were no assumptions before the coding process started – the 'emergent' coding approach when the study began (Fereday & Muir-Cochrane, 2016).

The six case studies that were selected for analysis included:

- New Zealand's NovoPay (NZ Government, 2013)
- Victoria's (Australia) HealthSMART (Brouwer, 2011)
- UK's IT in NHS (Campion-Awwad et al. 2014)
- Canada's Phoenix project (Barnhart et al. 2013)
- HP's ERP Implementation (Chaluverdi & Gupta, 2005)

Two case studies (UK's IT in NHS and HP's ERP implementation) were selected to preliminary analyse the contributors to IT projects failures. In addition, events and developments contributing to the project's outcome were extracted and added as excerpts into Dedoose (a web-based qualitative analysis tool).

The excerpts were further analysed and coded into factors that contributed to the failure of projects. The prelimanry analysis of the two projects resulted in identifying the initial set of 19 factors or contributors: (1) lack of sufficient training or inadequate IT skills, (2) inadequate test planning and testing, (3) data migration failure, (4) poor technology governance and executive oversight, (5) lack of role clarity and confused roles accountability, (6) lack of stakeholder involvement, (7) poor users' understanding of technology, (8) poor day to day tactical and operational project management, (9) conflicting or dysfunctional leadership, (10) poor risk and contingency planning, (11) poor IT and Business alignment (business case) for the technology deployment concerned, (12) unrealistic goals and expectations, (13) poor scope definition and scope creep, (14) poor relationship management of parties involved (including external parties), (15) unprofessional, poor processes and practices, (16) lack of flexibility of models or frameworks applied, and (17) complexity of design and functionality – possibly ending with poor design of functionality & usability.

As discussed earlier, Phase I (the first two case studies) was completed without assuming any preset coding (themes) – applying the 'emergent' coding (Creswell, 2014).

In Phase II, the remaining four case studies (NovoPay, HealthSMART, Phoenix, and JetSmart) were analysed to validate further and enhance the identified factors in Phase I. The thematic analysis and coding approach in Phase II was a '*hybrid'* (Creswell, 2014) approach – started with the factors identified in Phase I during the emergent coding and identified new themes plus fine-tune codes/themes.

In the end, the analysis of all six case studies resulted in identifying 22 factors that contributed to IT deployment failure – including: (1) lack of adequate implementation and rollout planning (resulting in implementation difficulties), (2) lack of sufficient training for IT personnel (inadequate technical know-how), (3) inadequate test planning and poor testing processes, (4) lack of sufficient technology and people resource, (5) data migration failures (prior to implementation and rollout), (6) poor or slow adoption of technology by the organisation (including the user community), (7) poor technology governance and executive oversight, (8) lack of role clarity and confused roles accountability, (9) lack of stakeholder involvement, (10) complexity of design and functionality – possibly ending with poor design of functionality & usability, (11) poor day to day tactical and operational project management, (12) conflicting or dysfunctional leadership, (13) poor IT and Business alignment (business case) for the technology deployment concerned, (14) unrealistic goals and expectations, (15) poor scope definition and scope creep, (16) poor risk and contingency assessment/planning, (17) poor relationship management of parties involved (including external parties), (18) poor business processes and practices, (19) ineffective communication, (20) lack of flexibility of models or frameworks applied, (21) unrealistic and unnecessary pressure on project teams, and (22) inadequate change management.

At the end of the case study analysis stage, the study provided two outcomes. First, a theoretical framework/model for ITG effectiveness (Table 3) via the review of the previous studies. And second, 22 themes/factors that led to IT deployment projects' failure.

This study's second broad research question is concerned with the connection between IT deployment failures and poor IT governance. The case study analysis results were mapped with the theoretical framework of ITG effectiveness developed via the systematic literature review to answer this question. The details of the extended analysis are covered in the following section.

6 Concluding Analysis and Discussions

This section considers the systematic literature review results (Table 3) and the case study analysis (twenty two contributors to IT deployment failure) to investigate a possible connection between poor IT governance and IT deployment failures.

The first step of the extended analysis of the case studies involved the establishment of broader categories of factors/contributors to IT project failures (J. Creswell, 2015). The establishment of more general themes/factors is expected to ease the establishment of high-level connections between IT failure and poor IT governance (J. Creswell, 2015). The grouping resulted in identifying eight broader categories that embodied the 22 factors which contributed to IT deployment failure: (1) Implementation and rollout factors, (2) resource management issues, (3) Accountability and role clarity matters, (4) IT and business alignment considerations, (5) IT leadership factors, (6) Design and functionality issues, (7) Risk and

change management contributors, and (8) the existence and the utilisation of standardised frameworks and processes.

The eight categories of factors (contributors to failure) seemed consistent with the identified critical domains of IT governance or known key stages of project development and rollout (Allassani, 2013; Fahrenkrog et al., 2004; ITGI, 2007; Von Solms, 2005). For instance, the five ITG domains as considered by COBIT 4 (ITGI, 2007) show connection/relevance with the eight broad categories of IT deployment failure contributors – Table 4.

Next, the connection between the identified categories of eight contributors to IT deployment failure (the results of case study analysis) and the theoretical model of influencers/indicators of effective ITG (the results of the systematic literature review – Table 3) are investigated and mapped. The method for indicating a connection between a category of failure contributors (case studies) and a specific group of influencers/indicators of effective IT government was as follows:

If any contributor to IT deployment failure (Table 5 – the middle column) is likely to be influenced by any indicator in Table 3 (either the first or the centre column), then the research establishes a connection between the broad theme (Table 4 – the left column) and the general (heading) category of indicators of Table 3.

Table 4 ITG Domains considered by COBIT aligned with the groups of contributors to IT deployment failure

ITG Domains (COBIT 4 Manual)	Categories of contributors to failure (Case Study Analysis)
Strategic alignment	IT and business alignment considerations
	The existence and the utilisation of standardised frameworks and processes.
Value delivery	Accountability and role clarity matters
	IT and business alignment considerations
	IT leadership factors
	Design and functionality issues
Risk management	Implementation and rollout factors
	Accountability and role clarity matters
	IT and business alignment considerations
	IT leadership factors
	Risk and change management contributors, and the existence and the utilisation of standardised frameworks and processes
Performance management	Implementation and rollout factors
	Resource management issues
	Accountability and role clarity matters
	IT leadership factors
	Design and functionality issues
	The existence and the utilisation of standardised frameworks and processes
Resource management	Resource management issues
	IT leadership factors
	Risk and change management contributors

Table 5 Mapping the outcome of the case study analysis to the results of the literature review

Identified categories of themes (eight broad contexts for failure – from six analysed cases)	Relevant or connected contributors to failure (the original list of twenty-two factors)	Corresponding category of indicators/contributors to effective ITG (Table 3 – literature review)
Implementation and rollout factors	Lack of adequate implementation and rollout planning (resulting in implementation difficulties)	*ITG – Organisational maturity*
	Inadequate test planning and poor testing processes	
	Lack of sufficient training for IT personnel (inadequate technical know-how)	
	Data migration failures (prior to implementation and rollout)	
	Unrealistic and unnecessary pressure on project teams	
	Inadequate change management	
Resource management issues (including people)	Lack of sufficient training for IT personnel (inadequate technical know-how)	*ITG – Organisational performance*
	Lack of sufficient technology and people resources	
	Unrealistic and unnecessary pressure on project teams	
	Poor or slow adoption of technology by the organisation (including the user community)	
Accountability and role clarity matters	Lack of role clarity and confused roles accountability	*ITG – Organisational maturity* *ITG – Business alignment*
	Poor technology governance and executive oversight	
	Poor relationship management of parties involved (including external parties)	
IT and business alignment considerations	Slow adoption of technology by the organisation (including the user community)	*ITG – Business alignment* *ITG – Organisational maturity*
	Poor technology governance and executive oversight	
	Lack of role clarity and confused roles accountability	
	Conflicting or dysfunctional leadership	
	Lack of stakeholder involvement	
	Poor risk and contingency assessment/planning	

(continued)

Table 5 (continued)

Identified categories of themes (eight broad contexts for failure – from six analysed cases)	Relevant or connected contributors to failure (the original list of twenty-two factors)	Corresponding category of indicators/contributors to effective ITG (Table 3 – literature review)
	Poor business processes and practices	
	Lack of flexibility of models or frameworks applied	
	Unrealistic and unnecessary pressure on project teams	
	Poor relationship management of parties involved (including external parties)	
IT leadership factors	Poor technology governance and executive oversight	I*TG – Organisational maturity* *ITG – Organisational performance*
	Poor or slow adoption of technology by the organisation (including the user community)	
	Lack of sufficient technology and people resources	
	Lack of adequate implementation and rollout planning (resulting in implementation difficulties)	
	Poor IT and business alignment (business case) for the technology deployment concerned	
	Lack of flexibility of models or frameworks applied	
	Lack of role clarity and confused roles accountability	
	Poor business processes and practices	
	Conflicting or dysfunctional leadership	
	Poor day to day tactical and operational project management	
Design and functionality issues	Data migration failures (prior to implementation and rollout)	*ITG – Organisational maturity* *ITG – Organisational performance*
	Lack of stakeholder involvement	
	Poor or slow adoption of technology by the organisation (including the user community)	
	Unrealistic goals and expectations	
	Poor scope definition and scope creep	
	Ineffective communication	
	The complexity of design and functionality – Possibly ending with poor design of functionality & usability	

(continued)

Table 5 (continued)

Identified categories of themes (eight broad contexts for failure – from six analysed cases)	Relevant or connected contributors to failure (the original list of twenty-two factors)	Corresponding category of indicators/contributors to effective ITG (Table 3 – literature review)
Risk and change management contributors	Lack of adequate implementation and rollout planning (resulting in implementation difficulties)	*ITG – Organisational maturity* *ITG – IT and business alignment* *ITG – Organisational performance*
	Inadequate test planning and poor testing processes	
	Ineffective communication	
	Poor scope definition and scope creep	
	Unrealistic goals and expectations	
	The complexity of design and functionality – Possibly ending with poor design of functionality & usability	
	Lack of stakeholder involvement	
	Poor IT and business alignment (business case) for the technology deployment concerned	
	Poor day to day tactical and operational project management	
The existence and the utilisation of standardised frameworks and processes	Inadequate test planning and poor testing processes	*ITG – Organisational maturity* *ITG – Organisational performance*
	Slow adoption of technology by the organisation (including the user community)	
	Data migration failures (prior to implementation and rollout)	
	Poor technology governance and executive oversight	
	Lack of flexibility of models or frameworks applied	
	Inadequate change management	
	Poor risk and contingency assessment/planning	
	Poor day to day tactical and operational project management	

For instance, one of the contributors in the category of *resources management issues* is the *lack of sufficient training for IT personnel (inadequate technical know-how)* – Table 5. This factor could be influenced by the lack of *formalised information strategy planning* (including resources) and a *formalised IT deployment project*

governance (Table 3). Therefore, the category of *resource management issues* from case studies could be influenced by ITG organisational maturity (Table 3 – literature review).

The finalised investigation of possible connections between case study analysis and literature review is mapped out in Table 5.

Table 5 indicates that the sample of the projects analysed shows a connection between contributors to failure and the indicators of ITG effectiveness. Therefore, this sample of six projects suggests that the failure of IT deployment had relationships with ineffective or poor governance.

The factors and themes identified to have impacted project failures include strategic and governance issues and operational and management matters. However, even operational problems seem to indicate a connection to poor governance. For instance, poor governance policies related to risk management could influence implementation errors (such as data migration problems). Moreover, poor implementation management (the first main theme of contributors to failure) is mapped to organisational maturity – suggesting that organisational maturity in practising effective ITG (experience in previous deployments of IT) impacts project implementations.

Finally, the research investigated the most crucial contributors to failure related to the sample of case studies studied. The applied approach considered the theme or code presence (related to the eight categories of contributors to failure). For instance, NovoPay had experienced problems related to all eight types of contributors to project failures. Table 6 presents the summary of the analysis of theme/code presence.

The analysis presented in Table 6 suggests that problems associated with four themes were present in all six case studies: (the list). Therefore, this sample indicates that these four groups of contributors played a significant role in IT deployment failures. In addition, at least three of the four groups are concerned with high-level governance matters: (1) IT-Business alignment, (2) risk and change management, and (3) use of standardised processes and practices (Asgarkhani, 2011; Asgarkhani & Sitnikova, 2014; Wu et al., 2015). Consequently, the analysis suggests that ineffective or poor governance played a role in the failure of IT deployment.

To summarise, the analysis presented in Table 5 suggested that the case study analysis results verify the theoretical model of Table 3. Moreover, Table 5 indicates a connection between project failures and ineffective ITG. Furthermore, the analysis presented in Table 6 used a different approach to triangulate the results from Table 5. It looked at the dominant contributors to failure. The dominant contributors were connected to high level strategic and governance practices. Therefore, Table 6 also indicated IT deployment failure due to poor governance.

7 Conclusions

Governance is defined as establishing policies and continuous monitoring of their implementation. Governance determines who has power, who makes decisions, how various business units make their voice heard and how accountability is established. ITG consists of leadership, organisational structures, and processes that ensure that the enterprise's IT sustains and extends the organisation's strategies and objectives. In contrast, management is responsible for the implementation of decisions around strategy. In addition, management establishes operating processes and ensures proper implementation of policies that governance bodies approve. An initial review of the resources indicated that despite previous studies on ITG recommending options and approaches for improved deployment of IT, there is a lack of research on ITG effectiveness. In addition, there seems to be fragmentation in studies focusing on relevant but isolated issues (mechanisms, relationships, and system performance).

A systematic literature review was conducted to determine critical influencers (or indicators) of effective ITG. In general, the analysis of the selected publications indicated a consensus amongst both practitioners and strategists that effective ITG is more likely to secure value from IT deployment. However, the reasons and interpretation of value delivery and effectiveness varied. Further analysis determined that there are two schools of thought concerning the effectiveness of ITG. Information Systems (IS) academics and practitioners argued that successfully deployed information systems and applications could indicate effective strategic management of technology deployment. They focus on operational and tactical matters and recommend models for measuring the success of information systems to reflect effective ITG.

On the other hand, strategists suggest that the effectiveness of ITG can be assessed via strategic approaches, relational mechanisms, and the use of standards and frameworks. Therefore, all the various views of researchers were taken into consideration to develop a theoretical model of ITG effectiveness – Table 3.

The model outlined three broad groups of indicators or influencers – *ITG organisational maturity*, *strategic alignment of IT and business,* and *organisational performance influenced by technology deployment*.

Next, secondary data from six case studies of IT deployment were analysed. The analysis aimed at identifying the factors/contributors that led to IT deployment failure. The thematic analysis of the project case studies determined eight main factors contributing to the failure of the investigated IT deployment projects. The last stage of the study mapped the theoretical model of Table 3 to the identified groups of contributors to project failures. The mapping suggested a connection between IT deployment failure and poor governance (Tables 5 and 6).

This study was initially motivated by the significant failures of IT deployment initiatives. However, the emergence of the COVID pandemic in late 2019 further encouraged the study. The pandemic pushed less tech-savvy and small organisations to use technology to address the limitations caused by the pandemic – for

Table 6 Summary of Case Study Analysis by theme/code presence

Identified categories of themes (Areas of Failure)	NovoPay	JetSmart Project (Qantas)	ERP at HP	HealthSMART	IT in NHS	Phoenix
Implementation management	√	√	√	√	√	√
Resources management (including people)	√	–	√	–	√	√
Accountability and clarity of roles	√	√	–	√	√	–
IT-business alignment	√	√	√	√	√	√
Information technology leadership	√	√	–	–	√	√
Design and functionality	√	√	√	–	√	√
Risk and change management	√	√	√	√	√	√
Use of standardised processes and practices	√	√	√	√	√	√

instance, lockdowns. In addition, the adoption of IT and tech solutions in some cases seemed problematic lacking governance oversight.

This study contributes to the theory of ITG by identifying the influences of ITG effectiveness – as outlined in Table 3.

The proposed models of Tables 3 and 5 can benefit future studies to fine-tune and enhance indicators and influences of effective ITG. Moreover, the model in Table 5 can help practitioners in organisations when assessing ITG practices to determine the role and value of ITG within organisations.

It is recommended that the research be extended to consider the corporate governance and the assessment of IT-based risks alongside the influence of ITG on IT deployment. Moreover, a comprehensive study to use primary data (for instance, interviews) can strengthen the findings of this study. The case study analysis results discussed in this chapter can benefit from including additional case studies in the analysis of deployed IT initiatives – before they can be generalised to apply to all IT deployment scenarios. Future research involving the analysis of a larger number of cases can be beneficial to strengthen the theory and the correlation between poor ITG and technology deployment challenges.

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