Mapping IS Failure Factors on PRINCE2® Stages: An Application of Interpretive Ranking Process (IRP)

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Abstract

The social, political and cultural issues faced by organizations and their senior management team in the delivery and adoption of strategic projects, is highly complex and problematic. Despite a mature body of literature, increasing levels of practitioner certification, application of standards and numerous government initiatives, improvements in success have been minimal. In this study we analyse the key underlying factors surrounding the failure of Information Systems (IS) projects and explore the merits of articulating a narrative that focusses on senior management embracing *practical pessimism*. Specifically, we develop a hypothesis supported by empirical study that leverages expert's views on the dominance and interrelationships between failure factors within PRINCE2® project stages using an Interpretive Ranking Process (IRP). Our findings establish how the concept of dominance between individual failure factors can necessitate senior management to make key informed and timely decisions that could potentially influence project outcomes based on an empirical derived, interpretive predictive framework.

Keywords – Interpretive Ranking Process, Information Systems, project failure, factor dominance.

1. Introduction

The inability of organizations to deliver consistent, successful project outcomes has been an ongoing theme for many years within academic study and practitioner analysis. Studies have synthesized the key facets of Information Systems (IS) project performance, success and failure, and organizational change initiatives (Dwivedi et al., 2013; Hughes et al., 2015; Nudurupati et al., 2015), highlighting many of the underlying contributory factors and root causes (Fenech and Raffaele, 2013). Unfortunately, projects seem to grossly overspend, collapse without realizing benefits (Barker and Frolick, 2003; Conboy, 2010; Standish Group, 2013), are abandoned mid-way through the lifecycle, or are delivered with such low levels of adoption that the project business case becomes fundamentally redundant (Hughes et al., 2015; Pan et al., 2008). Organizations seem unable to learn the lessons of failure (Bakker et al., 2013; Birkinshaw and Haas, 2016; Kerzner, 2015; Verner et al., 2008) demonstrating an inability to align the complexities of different stakeholder perspectives (Bryde, 2005; Heeks, 2006) and deliver consistent positive outcomes. Studies have highlighted and debated many of the key issues facing senior managers involved in project initiatives in the context of benefits realization and return on investment where historically, key project actors have been measured on short term tactical performance rather than longer term strategic objectives (Atkinson, 1999; Bryde, 2005). Researchers have highlighted the key issues surrounding inadequate and late stage benefits definition (Newell et al., 2004) and the inability of senior management to retain a realism perspective on the likelihood of benefits realization within strategic enterprise projects (Barker and Frolick, 2003; Scarbrough et al., 2015; Willcocks and Currie, 1997). However, senior managers are faced with the unenviable predicament of accepting the inevitability of innovative organizational change and the associated projects that bring this about, but at the same time all too aware of the complexities, stakeholder resistance and risks to the organization; and by association - their individual careers if they do not demonstrate effective sponsorship and engagement throughout the lifecycle of project initiatives (Stensaker and Langley, 2010; Wilson et al., 1994).

Researchers have attempted to shed light on these issues with studies presenting various frameworks that contextualize success and failure (DeLone and McLean, 2003; Sauer, 1993) through the lens of explanatory and predictive based models. However, despite a general greater understanding of the underlying concepts surrounding IS project failure together with increased attempts at professionalizing the IS industry with practitioner certification and rigorous standards and methods, the impact on outcomes has frustratingly, been minimal (Standish Group, 2013).

The increased emphasis on: desired value, post launch benefits realization, management of user resistance, top management support and early stage implementation of organizational change management, have all helped to move the industry on from the traditional focus on time, cost and quality, the so called iron triangle (Atkinson, 1999; Kerzner, 2013; Young and Poon, 2013). This stakeholder centric approach is generally credited with improving success rates with relatively recent industry based studies highlighting a mediocre 10% increase in project success compared to 2004 (Standish Group, 2013). However, although any change in outcomes is welcome, organizations still appear to be unable to consistently deliver successful IS initiatives within an industry that seems incapable of learning the lessons of failure. This poses a huge dilemma for senior management, who often recognize the business criticality of technology and change, but are all too aware of the potential risks to the organization and their careers, if projects end in complete failure. Whilst many researchers and practitioners accept the inevitability of failure (Birkinshaw and Haas, 2016; Hughes et al., 2015; Sitkin, 1992), especially in large and complex projects (Scott and Vessey, 2000; Standish Group, 2013), the assessment and predictability of associative and possibly - more critical failure based on assessment of factor interrelationships, together with the positioning of an alternative more realistic pragmatic based narrative, seems to be gap in the literature.

This study attempts to address these issues and focuses on the assessment of the criticality (dominance) of causal links between IS failure factors and their potential impact on project outcomes. Specifically, we align with certain aspects of the literature in embracing the inevitability of project failure, the *practical pessimistic* perspective. This more pragmatic mindset approaches the problem of project failure accepting that failure at some level is highly likely (Cinite et al., 2009; Scott and Vessey, 2000; Wilson et al., 1994) and that organizations should concentrate on mitigating the impacts of catastrophic failure rather than articulating a preventative narrative. We outline an *early warning signs* centric approach underpinned by an empirically derived methodology titled - Interpretive Ranking Process (IRP) that builds a dominance matrix and interpretive ranking model of the key constructs (Haleem et al. 2012, Luthra et al. 2014; Sushil, 2009). This paper examines the key interrelationships of IS failure factors in the context of their inherent influence and dominance over one another mapped to PRINCE2® project stages. The PRINCE2® method was selected due to its wide adoption within organizations and standardization across projects, it is a structured method with a formal project stage structure and is widely understood within the academic and practitioner community. Furthermore, as public sector failure seems to feature highly in the literature (Hughes et al., 2015) where PRINCE2® is extensively used, we assert that the selection of this method is pertinent.

We position this research as the first study to our knowledge that provides this theoretical contribution to the body of literature. We hypothesize that our research can yield an improved more informed and empirically derived narrative that can drive senior management decision-making at key stages in the project lifecycle in order to mitigate catastrophic project failure.

The remaining content of this paper is structured around the following sections: Theoretical Background and Problem Definition, Research method - IRP Method and Findings, Discussion of Results, Conclusions.

2. Theoretical Background and Problem Definition

The literature has highlighted the intricacies and complexities of attempting to define and classify project failure and the key factors that contribute to poor project outcomes. Studies seem to agree on a consensus that IS projects, especially large complex projects are rarely delivered successfully (Scarbrough et al. 2015; Scott and Vessey, 2000; Standish Group, 2013; Wilson et al. 1994) highlighting the stark reality that failure at some level is inevitable. Researchers have attempted to categorize and interpret failure via a number of separate narratives (Ewusi-Mensah, 2003; Flowers, 1997; Lyytinen and Hirschheim, 1987;

Sauer, 1993; Standish Group, 2013), each articulating key concepts of project failure and how it should be interpreted. In reality, due to the multiplicity of stakeholder influence and perspectives, success and failure cannot be judged solely on one measure, emphasizing the need to assess a number of criteria (Dwivedi et al. 2015; Kerzner, 2015; Pinto and Mantel, 1990). The reality is that the existing research highlights that no: *one size fits all* agreed set of criteria exists within the literature to define project failure, despite the number of frameworks and models that have been developed to contextualize this area (Hughes et al., 2015). Generally, more recent studies seem to align with the actuality perspectives set out in Sauer (1993) and where success and failure are considered from a more strategic narrative in the context of: desired business value, benefit realization and stakeholder support Kerzner (2015), rather than the traditional emphasis on financial, timescale and focus on technical structures (Fincham, 2002).

The body of research to date has generally tended to focus on a number of key themes: i) project failure in the context of listing the key reasons for failure via actual case studies, (Brown and Jones, 1998; Gauld, 2007; McDermott et al. 2013; Mitev, 1996; Newell et al. 2004), ii) studies highlighting of many of the top factors that can contribute to failure based on a broader review of the literature (Dwivedi et al., 2013; Ewusi-Mensah, 2003; Fenech and Raffaele, 2013; Nelson, 2007), iii) specific focus on individual factors as part of a contributory narrative: (Bakker et al. 2013; Cinite et al., 2009) iv) studies that seek to explain and categorize success and failure using models or frameworks to aid understanding of the constituents of project outcomes (Flowers, 1997; Lyytinen and Hirschheim, 1987; Sauer, 1993). The perspectives of success and failure outlined in Fincham, (2002) highlight the significant effort expended in the literature in the normative and rational contexts in an effort to prevent and predict failure. The research highlighted stakeholder experiences from two case studies to articulate different narratives on success and failure highlighting the actualities and critical influence of perspective. Fincham, (2002) aligns with previous studies (Sitkin 1992) concluding that organizations may need to experience failure at some level to drive success. The fear of failure can be a key innovative constraint in many organizations especially those with a track record of failing projects. This can lead to senior management demonstrating reluctance to sponsor new initiatives for fear of reputational damage when problems occur (Birkinshaw and Haas, 2016), resulting in middle ranking management appointed to key governance roles and potentially struggling to deliver successfully (Hughes et al., 2015).

Although the extant literature has developed a narrative for individual cases of project failure based on specific case studies (Barker and Frolick, 2003; Gauld, 2007) and empirical evidenced research (Bartis and Mitev, 2008; Bussen and Myers, 1997), there is no universally accepted diagnosis as to why projects fail (Kerzner, 2015). Organizations have attempted to address project failure by investment in standards, effective governance and project management certification. However these initiatives seem to have collectively yielded minimal results (Standish Group, 2013). Current projects seem to fail for more or less the same reasons as historical failures, despite decades of academic research (Dwivedi et al., 2015; Lyytinen and Robey, 1999), highlighting either the potential of misdirected academic focus (Fincham, 2002; Young, 2005) or the reality that many organizations seem to be an unable or unwilling to learn the lessons of failure (Kerzner, 2015).

Accepting the evidence-based narrative implicit from the literature, that significant numbers of projects will inevitably experience failure at some level (Scott and Vessey, 2000; Standish Group 2013), some researchers have explored this topic from an early warning signs perspective (Kappelman et al. 2006; Park et al., 2009). The net effect of this approach is an emphasis on *practical pessimism* rather than one exhibiting over-optimism (Kerzner, 2013; Hughes et al., 2015) requiring perhaps an embracing of failure or certainly a reassessment of some of the negative connotations of failure (Birkinshaw and Haas, 2016; Sitkin 1992) from senior management. The emphasis within the literature on citing the key reasons for project failure, either from the case study or empirical research perspective, although providing valuable further insight, does not present a clear road-map to avoiding catastrophic failure. Which Failure Factors (FFs) are most relevant in terms of project impact? Is organizational project maturity a mitigating factor? Are FFs interrelated and are certain factors likely to lead to further more critical failure? Are certain FF more critical in terms of impact on the project depending on where in the project

lifecycle they occur? The extant literature - whilst succeeding at some level on providing an informed narrative on many of these questions, generally fails to provide a deeper universalistic debate on factor interrelationships and predictivity of IS project failure at key points in the project lifecycle. These facts contextualize the predicament in many organizations where risk averse senior managers actively avoid failure, rather than seeing managed failure as a direct consequence of innovation and creativity (Birkinshaw and Haas, 2016).

In an attempt to address these issues, this study aims to further our understanding of FF interrelationships, specifically, the dominance between individual FFs and addressing the issues of criticality between factors. Furthermore, we approach this topic from the project lifecycle perspective recognizing that the risk to the project can vary depending on when the FF materializes (Fincham, 2002) and the potential impact on the project as a whole, at that stage in the lifecycle. Our approach builds on the research outlined in Hughes et al. (2016) where the interrelationships between IS project FFs are explored using an Interpretive Structural Modelling (ISM) methodology, but is limited by its inability to identify dominance between factors and provide any project stage specific context. We assert that the identification of project stage specific, failure factor dominance, has the potential to guide and inform senior management on the impact and consequences of early stage failure, thereby, enabling action to be taken to mitigate complete project failure further on in the project lifecycle. These observations provide the contextual background for our research question: *Accepting the practical pessimistic viewpoint that failure at some level is inevitable - can the ranking of dominant relationships between individual FFs demonstrate an appropriate mechanism to effect a hierarchy of factors specific to key stages in the PRINCE2® project lifecycle, thereby providing senior management with a mechanism to identify and potentially mitigate further and potentially more catastrophic project failure?*

We position this research as the first study (to our knowledge) to apply the IRP method in the context of IS projects and the also the first to explore the impact of FF dominance within individual PRINCE2® project stages.

3. IRP Method and Findings

IRP is a structured method for identifying dominance between variables building on the strengths and limitations of the intuitive and rational choice methods using a structured step-by-step matrix driven approach (Sushil, 2009). The key steps in the IRP method are outlined in figure 1.

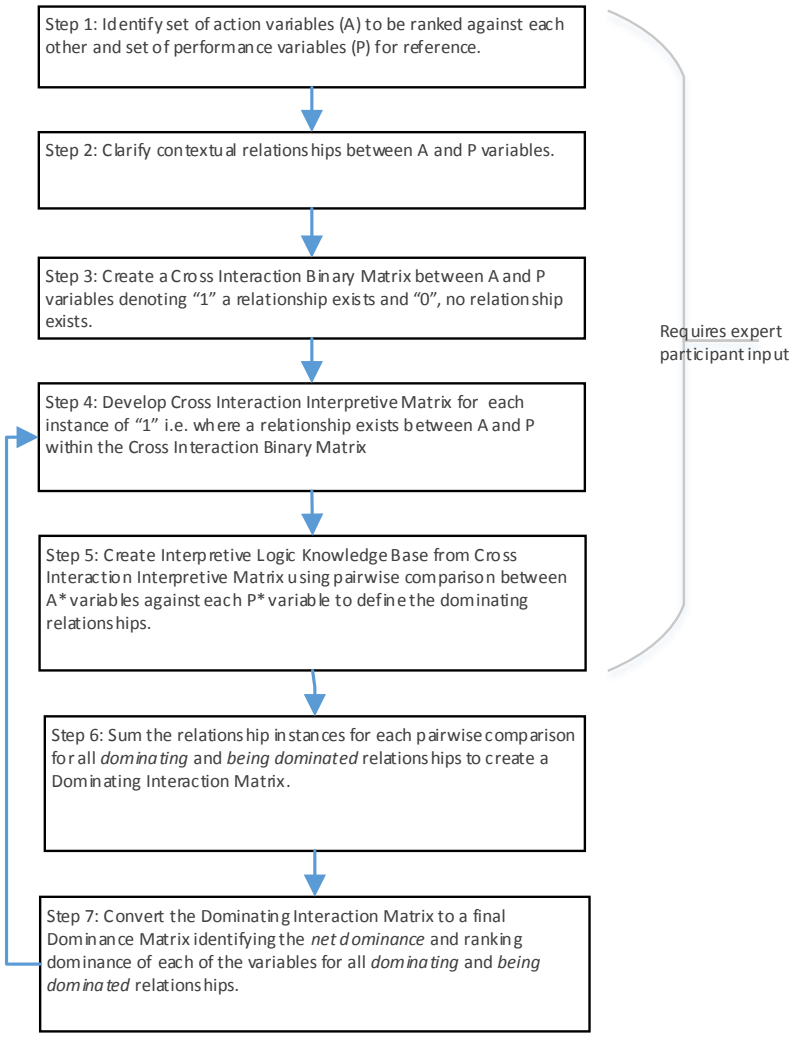


Figure 1: IRP method

The central tenant of IRP is its ability to provide a structured approach to identifying dominance between a set of action variables (A) with reference to a set of performance variables (P). IRP relies upon *expert* participant judgment to interpret the dominant relationships and associated logic between the selected variables as an integral part of the process. In practice IRP does not require the *expert* participants to articulate the extent of the dominance between the factors, but relies on them to develop the narrative of the interpretive logic of dominance for each paired comparison (Haleem et al., 2012, Luthra et al., 2014; Sushil, 2009). This study utilizes IRP as the method to identify the dominating relationships between project failure factors to yield new insight into the interrelationships and interdependencies between factors specific to each project stage.

3.1 *IS Failure Factors (FF)*

Previous studies within the IS failure literature have synthesized the underlying causes surrounding project failure, with many developing a taxonomy of key factors based on extensive review of case studies and industry wide reports (Dwivedi, 2013; Hughes et al., 2015; Kappelman et al., 2006; Standish Group, 2013; Verner and Abdullah, 2012). Whilst no formal agreed consensus exists within the literature on a definitive list of failure factors, many researchers implicitly agree on a number of the commonly cited reasons for projects failing. Projects may fail due to a number of factors and the occurrence as well as potential impact of specific factors may be influenced by other related factors (Gauld, 2007; Standing

et al., 2006; Williams, 2006). The list of factors itemized in table 1 and described further in this section - represents a synthesized list of many of the common distinct factors cited in the literature.

Table 1: List of project failure factors

Failure Factor	**Reference**
A1. Breakdown in relationship between external contractor and organization	Brown and Jones, 1998, Nawi et al. 2011; Verner and Abdullah, 2012; Yeo, 2002; Warne and Hart,1997
A2. Inadequate project sponsorship	Avison and Wilson, 2002; Busssen and Myers, 1997; El Emam and Koru, 2008; Gauld, 2007; Hughes et al. 2015; Keil et al. 1998; Lemon et al. 2002; Nixon et al. 2012; Pan et al. 2008; Prosci, 2012; Schmidt et al. 2001; Standing et al. 2006; Young, 2005.
A3. Poor business case and weak financial management	Conboy, 2010;Sauer et al. 1997; Standing et al. 2006; Ward and Elvin, 1999.
A4. Poor staff Performance	Bussen and Myers, 1997; Conway and Limayem, 2011; Michie and West, 2004; Newman and Sabherwal, 1996; Rob, 2003.
A5. Insufficient audit and post mortem process	Ewusi-Mensah and Przasnyski, 1995; Kerzner, 2015; Verner et al. 2008.
A6. Size and complexity of project	Gauld, 2007; Hughes et al. 2016; Jones, 2004; Jones, 2006; Kerzner, 2013; Mitev, 1996; Nawi et al. 2011; Scott and Vessey, 2000; Standish Group, 2013; Verner and Abdullah 2012.
A7. Poor project management	Avison and Wilson, 2002; El Emam and Koru, 2008; Keil et al. 1998; Nawi et al. 2011; Philip et al. 2009; Scott and Vessey, 2000; Standing et al. 2006; Verner et al. 2008.
A8. Poor requirements and scope management	Brown and Jones, 1998; Bussen and Myers, 1997; El Emam and Koru, 2008; Hughes et al. 2015; Keil et al. 1998; Nawi et al. 2011; Pan et al. 2008; Schmidt et al. 2001.
A9. Poor communication	Barker and Frolick, 2003; Gauld, 2007; Monteiro de Carvalho, 2014; Philip et al. 2009.
A10. Poor change management	Barker and Frolick 2003; Beynon-Davies 1995; Hughes et al. 2016; McGrath 2002; Mitev 1996; Buchanan et al. 2005; Burnes 2005; Pettigrew and Whipp 1993

3.1.1. *Breakdown in relationship between external contractor and organization:*
Studies have highlighted that project failure was directly attributable to a deteriorated working relationship between the parties, citing the lack of experience and skillsets of the contractor (Nawi et al. 2011; Verner and Abdullah, 2012; Yeo, 2002). Many service based organizations and government agencies have either outsourced IS support and development, or have retained a core technology group that deals with *business as usual* operations. The net effect of these strategic decisions is a greater reliance on the skills, quality and experience of third party organizations and a potential increased risk to the project where a sole supplier is responsible for key deliverables (Willcocks and Currie, 1997). Inexperience in dealing with suppliers together with an underestimation of the complexities involved in large-scale IS outsourcing can increase risks related to the relationship and directly contribute to project failure (Brown and Jones, 1998; Le Roy and Fernandez, 2015; Warne and Hart, 1997). Anchoring strategic relationships at the organizational level and leveraging inter company collaborations is key (Chapman and Corso, 2005; Wiegel and Bamford, 2015), however, organizations seem to fall foul of contract interpretation issues leading to expensive legal argument as each party attempts to allocate blame and seeks redress when projects fail.

3.1.2. *Inadequate project sponsorship*

Projects can go awry and be severely impacted in instances where senior management do not support or engage effectively with the project, or appoint inadequate and inexperienced individuals that fail to gain the commitment of the stakeholder base (El Emam and Koru, 2008; Keil et al. 1998; Lemon et al. 2002, Schmidt et al. 2001; Standing et al. 2006). The literature has highlighted the significant influence that committed senior management support and good sponsorship can have on project outcomes (Nixon et al. 2012; Young, 2005; Young and Poon, 2013) with industry based studies positioning the sponsor role as a key predictor for project success or failure (Prosci, 2012). Studies have indicated that instances of inadequate management structures, poor exec support and ineffective project sponsorship have been significant contributors to poor project outcomes (Avison and Wilson, 2002; Busssen and Myers, 1997; Gauld, 2007; Pan et al. 2008; Wilson et al. 1994). Organizations that appoint a project sponsor that is either too inexperienced, viewed by stakeholders as too low in the management hierarchy or too busy to devote adequate time to drive the project forward, are likely to experience significant issues (Hughes et al., 2015).

3.1.3. *Poor business case and weak financial management*

Projects are handicapped from the onset if either the business case is not well defined or events change during the project lifecycle that jeopardize ongoing business justification. Instances where project budgets have been poorly developed or have not followed a formal estimating and management process can force senior management to abandon the project or drastically restrict scope, ultimately negating many of the benefits that were defined at the onset. Studies have highlighted instances where a business case was poorly defined and project benefits could not be realized (Sauer et al., 1997; Standing et al., 2006; Ward and Elvin, 1999) and subsequent issues with budget deviations and cost management have resulted in failure (Conboy, 2010).

3.1.4. *Poor staff Performance*

Project outcomes can be impacted by: poor team dynamics and cohesion, leadership issues, lack of motivation, coopetition issues, team collaboration, inadequate individual performance and commitment (Bakker et al., 2013; Le Roy and Fernandez, 2015; Michie and West, 2004; Newman and Sabherwal, 1996; Rob, 2003). Beyond the initial honeymoon period after project commencement, projects can be long and drawn out, even when punctuated by key milestones and distinct stages. Retaining key staff and energizing the team over long periods of time is problematic (Bussen and Myers, 1997) with an increased likelihood of a more pessimistic team narrative as staff are expected to cope with aggressive timescales and tight budgets (Conway and Limayem, 2011).

3.1.5. *Insufficient audit and post mortem process*

Organizations generally fail to undertake a formal lessons learned or post mortem (Ewusi-Mensah and Przasnyski, 1995; Verner et al., 2008). Many organizations conduct post mortems for successful projects only, thereby setting in motion a culture of repeating past mistakes and further failure. Project management mature organizations are generally more likely to undertake lessons learned activities as part of a formal post mortem process (Williams, 2006). Organizations generally omit to undertake formal independent project audit or health checks at key stages in the lifecycle missing significant opportunities to highlight issues early in the project (Birkinshaw and Haas, 2016; Hughes et al., 2015). Organizations that choose to initiate audits operated independently from the project and reporting to senior management, offer the greatest chance of addressing instances of early failure thereby, potentially saving the project from complete failure (Kerzner, 2015).

3.1.6. *Size and complexity of project*

Large projects generally are associated with high levels of complexity, timescales often measured in years rather than months with disparate multi-disciplined teams and big budgets. These types of project

are inherently risky in the context of scope, cost estimation and controls, planning, team management and benefit realization (Hughes et al., 2016). Researchers have identified many of the classic large project failings namely: poor governance, lack of focus on adoption, issues relating to users understanding the system complexities, integration issues (Gauld, 2007; Jones, 2004; Jones, 2006; Mitev, 1996; Nawi et al. 2011; Scarbrough et al., 2015; Verner and Abdullah, 2012; Wiers, 2002), with studies questioning whether large projects should ever be attempted due to their dismal track record and inevitability of failure at some level (Scott and Vessey, 2000; Standish Group, 2013). Senior management often exhibit over-optimism that projects will result in positive outcomes, as the organization has invested significant amounts of time, money and resource (Kerzner, 2013; Hughes et al., 2015).

3.1.7. *Poor project management*

Failure due to poor project management is a recurrently cited factor in the literature (El Emam and Koru, 2008; Keil et al., 1998; Verner et al., 2008). Traits such as: inappropriate management style, project management immaturity, poor implementation of methodology, inability to effectively control the project, are referenced as key factors (Avison and Wilson, 2002; Philip et al., 2009; Scott and Vessey, 2000; Standing et al., 2006). Large project failures especially those in the public and health related sectors, often cite poor project management as one of the key reason for the projects demise (Nawi et al., 2011; Philip et al., 2009).

3.1.8. *Poor requirements and scope management*

Projects can suffer due to poor requirements definition or changing scope further along the project lifecycle. Organizations with poor or inadequate processes in place to manage changes to scope or effectively track requirements are likely to experience failure at some stage in the project. Failure as a result of poor requirements definition and has been referenced in a number of studies (Brown and Jones, 1998; Bussen and Myers, 1997; El Emam and Koru, 2008; Keil et al., 1998; Nawi et al., 2011; Pan et al., 2008; Schmidt et al., 2001). The complexities inherent within large and complex projects in the context of accurately defining requirements early in the lifecycle, is problematic (Hughes et al., 2015; Pan et al., 2008).

3.1.9. *Poor communication*:

Organizations that have poor stakeholder communication mechanisms in place, immature information communication practices (Mutch, 1999) or do not invest targeted resources or effort to ensure this factor is sufficiently covered, are likely to suffer the consequences of failure. These issues can be magnified on large projects with geographically dispersed teams comprising of a number of separate organizations. Communication issues between vendor and organization, poor outcomes resulting from poor staff and stakeholder communication, communication barriers, management failings in the mechanisms and process of communicating with front line staff; have all been referenced as key factors on failed projects (Barker and Frolick, 2003; Gauld, 2007; Monteiro de Carvalho, 2014; Philip et al., 2009).

3.1.10. *Poor change management*.

Organizations have historically underestimated the stakeholder impact from changes to working practices and interaction with new systems, focusing too much attention on the technical aspects of the project (Stensaker and Langley, 2010). Numerous project failures have highlighted that the many facets of both individual and organizational change have not been managed successfully, resulting in dire consequences for the affected organizations (Barker and Frolick, 2003; Beynon-Davies, 1995; McGrath, 2002). Studies attest that managing change within an organization is problematic, requiring the adoption of a methodological approach involving stakeholders across the organization to realize consistent successful outcomes (Buchanan et al., 2005; Burnes, 2005; Pettigrew and Whipp, 1993). Organizations have struggled with the cultural aspects of change especially in large government and health related sectors

where projects have suffered from user resistance, poor change agent performance and related political factors (Abubakre et al., 2015; Cinite et al., 2009; McDermott et al., 2013; Sandeep and Ravishankar, 2014; Warne and Hart, 1997).

3.2 *Implementation of IRP*

IRP requires the use of an *expert* participant group to interpret the pairwise interactions between the variables. The interpretive method literature (ISM, IRP) varies in its approach to the use of *expert* participants. Many studies reference the fact that an *expert group* was used often stating that they were recruited from academia and industry but omitting to identify the size or makeup of the group (George and Pramod, 2014; Haleem et al., 2012; Luthra et al., 2014; Shahabadkar et al., 2012; Shyur and Shih, 2006; Thakkar et al., 2007). Other interpretive based studies state the composition of the *expert* participants and the quantify the composition in the context of academia and industry based experts (Agarwal et al., 2007; Bevilacqua et al., 2006; Faisal, 2010; Luthra et al., 2011; Singh et al., 2007). The number of participants generally varies between three and six with studies highlighting the limitations of exceeding groups of eight due to deteriorating quality of debate and difficulty in gaining consensus (Janes, 1998). The five *expert* participants selected for this study are a group of practitioners drawn from: public sector health authority, government agency and finance industries. All have extensive experience within their respective industry sectors exhibiting a tacit knowledge of IS projects within structured environments and industrial sectors. All of the expert group have experience of PRINCE2®. The method of data collection was predominantly a mix of lead researcher led - facilitated focus group and semi structured interviews split across two sessions with additional follow-up interviews to clarify disparities. In adherence to the IRP method, the role of the lead researcher as facilitator was to ensure commonality of understanding, elicitation of views from the *experts* and consensus amongst the group. Participants were initially requested to review the list of factors (table 1) and their descriptions and agree on a set of performance factors that would be used as a reference point, these are listed in table 2 (P1 – P10). In the context of this study the performance variables should be viewed as a list of factors that could be aligned with successful project outcomes that the FFs are measured against within the IRP process.

Table 2: List of performance factors

Performance Factors (p)	**Description**
P1. Full engagement and committed project sponsorship from executive.	Senior management are fully committed to the project and are able to drive the initiative forward.
P2. Adequate user involvement throughout the project.	Users are an integral part of the project team from the onset and continue to be closely coupled with the project throughout the lifecycle.
P3. Suitable Skills, experience and style of project manager.	The appointed project manger possesses the required experience, capability and management style for the project and the organization.
P4. Optimized project scope.	The project and organization has a formal process in place that ensures risk, timescales, business case and benefits are all factored into scope changes.
P5. Clear business objectives.	The project justification is structured around clear business benefits to the organization.
P6. Effective project maturity and established processes	The organization has established structures and processes to engender a suitable project culture and delivery framework.
P7. Short stage duration (< 1 yr) year.	Project plans are structured to organize the project deliverables within short duration stages to ensure adequate control is exercised by the senior management team.

P8. Effective benefits management process.	Project benefits are clearly identified within the business case and formally managed through to realization.
P9. Integrated change and project management.	Change and project management are integrated early in the project lifecycle and fully supported by senior management.
P10. Established project Audit & post mortem process.	Lessons learned from previous projects is a formalized process and periodic audits are undertaken throughout key stages of the project reporting to senior management.

As our emphasis is directed toward applying IRP to the PRINCE2® methodology, the pairwise comparison between the factors is applied for each stage in the method, namely: Pre-project, Initiation, Delivery, and Final delivery stage necessitating the interpretation of a 10x10 matrix at each stage in the process. It is accepted that projects may have a number of delivery stages depending on the type of project, but for the purposed of this study we have restricted this phase of the project to a single stage. The net effect of this approach, is a need to apply the IRP methodology four times, once for each of the PRINCE2® stages as set out in figure 2.

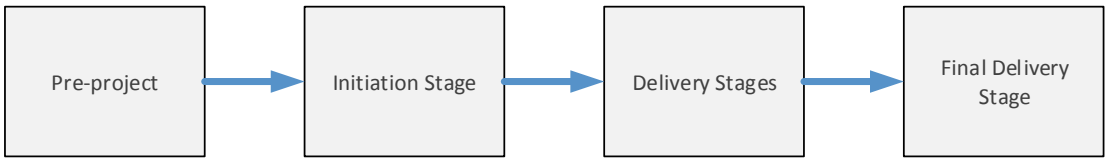


Figure 2: PRINCE2® stages

The rational for this approach is a requirement to validate the hypotheses that FFs and the dependencies therein, can have greater or lesser relevance and risk to the project depending on the specific stage in the project lifecycle. The implementation of IRP in this study is outlined in figure 3, here the steps in the methodology are setout as applied specifically for ascertaining the dominance between FFs within PRINCE2® project stages.

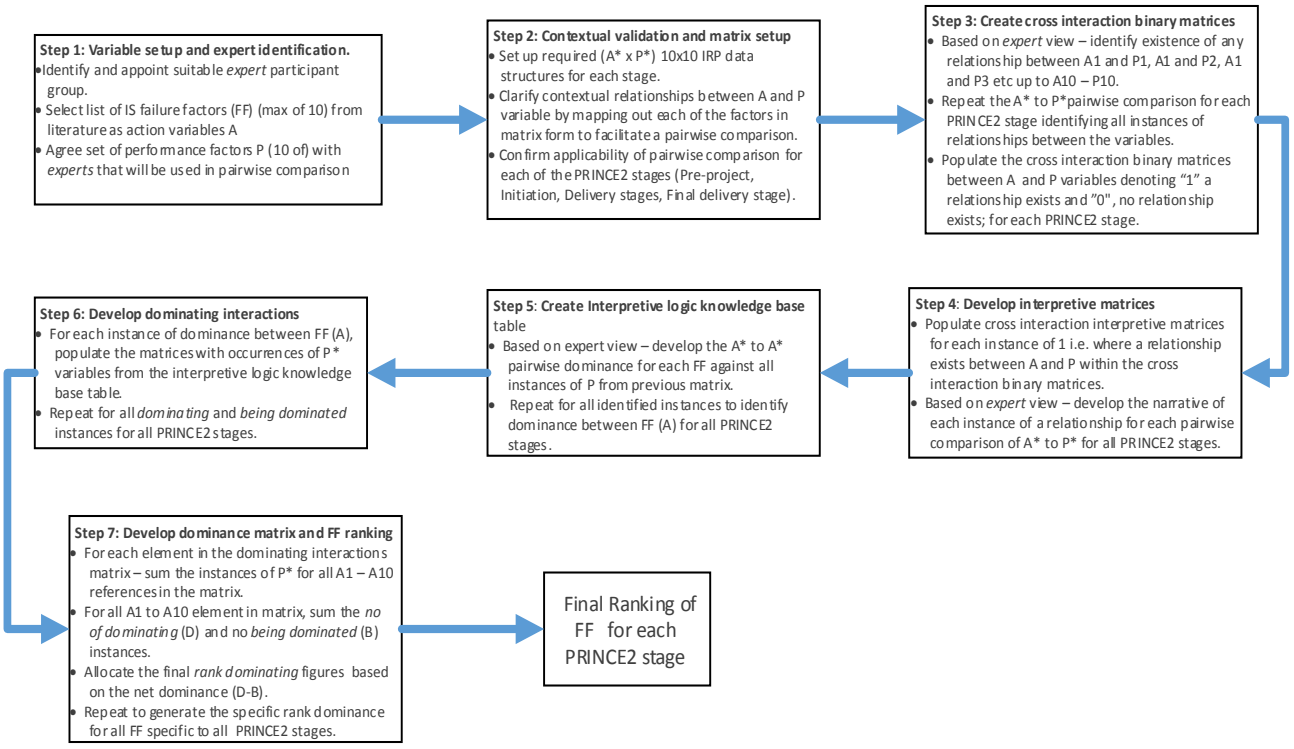


Figure 3: IRP Implementation for FF ranking

Each of the FFs listed A1-A10 were analyzed by the *expert* participants against the relevant P1 – P10 performance factors using a pairwise comparison to populate the initial matrices where a contextual relationship was deemed to exist. The interpretive logic was then extended to populate the knowledge base table and dominating interactions matrix based on the dominance of each FF (A1-A10), against each instance of the performance factors (P1-P10). The process was repeated for each of the PRINCE2® stages as set out in figure 2 where the variances in dominance specific to each stage are explored. The final dominance matrices produced within step 7 in the IRP process (figure 3) highlights the ranking of each of the FFs. The output of this step is highlighted in tables 3 – 6 where each of the dominance matrices are populated from the summation of the dominance interactions from the interpretive knowledge base matrix. The rank dominance of the FF specific to each stage is listed. The final ranking is developed from the net instances of *no. of dominating* (D) and *no. being dominated* (B) using the equation:- Rank = D-B.

Table 3: Dominance matrix – Pre-project stage

Pre-Project (Startup) Stage

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	# Dominating (D)	Net dominance (D-B)	Rank Dominating
A1		0	0	0	0	0	0	0	0	0	0	-11	VI
A2	2		2	2	1	2	2	2	2	2	17	16	I
A3	0	0		0	0	0	0	0	0	0	0	-11	VI
A4	0	0	–		0	0	0	0	0	0	0	-11	VI
A5	3	0	3	3		2	3	3	1	2	20	15	II
A6	1	0	1	1	1		1	1	1	1	8	1	IV
A7	0	0	0	0	0	0		–	0	0	0	-9	V
A8	0	0	0	0	0	0	0		0	0	0	-9	V
A9	2	0	2	2	2	1	0	0		0	9	4	III
A10	3	1	3	3	1	2	3	3	1		20	15	II
# Dominated (B)	11	1	11	11	5	7	9	9	5	5	74		
											Total Interactions		

Table 4: Dominance matrix – Initiation stage

Initiation Stage

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	# Dominating (D)	Net dominance (D-B)	Rank Dominating
A1		–	–	–	–	–	–	–	–	–	0	-30	X
A2	2		1	2	–	2	2	2	2	2	15	-8	VI
A3	5	5		5	5	5	5	5	5	5	45	35	I
A4	2	1	–		1	–	–	1	2	–	7	-31	IX
A5	3	3	1	3		–	–	1	3	–	14	-9	VII
A6	6	5	2	6	6		2	2	6	6	41	21	IV
A7	5	3	2	5	3	5		5	5	5	38	24	II
A8	7	6	4	7	5	6	3		5	2	45	22	III
A9	–	–	–	4	–	–	1	1		–	6	-28	VIII
A10	–	–	–	6	3	2	1	6	6		24	4	V
# Dominated (B)	30	23	10	38	23	20	14	23	34	20	235		
											Total Interactions		

Table 5: Dominance matrix – Delivery stage(s)

Delivery Stage(s)

	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	# Dominating (D)	Net dominance (D-B)	Rank Dominating
A1		3	1	2	1	–	–	–	3	–	10	-32	IX
A2	1		4	4	1	–	–	1	–	–	11	-31	VIII
A3	5	2		5	5	5	2	5	5	5	39	12	V
A4	2	–	–		1	–	–	1	1	–	5	-41	X
A5	3	3	1	3		–	–	1	3	–	14	-25	VII
A6	7	7	3	7	7		1	7	7	–	46	27	III
A7	7	7	7	7	7	7		7	7	7	63	56	I
A8	8	8	5	8	8	3	2		8	8	58	35	II
A9	3	6	3	4	3	2	1	–		–	22	-18	VI
A10	6	6	3	6	6	2	1	1	6		37	17	IV
# Dominated (B)	42	42	27	46	39	19	7	23	40	20	305		
											Total Interactions		

Table 6: Dominance matrix – Final delivery stage

Final Delivery Stage

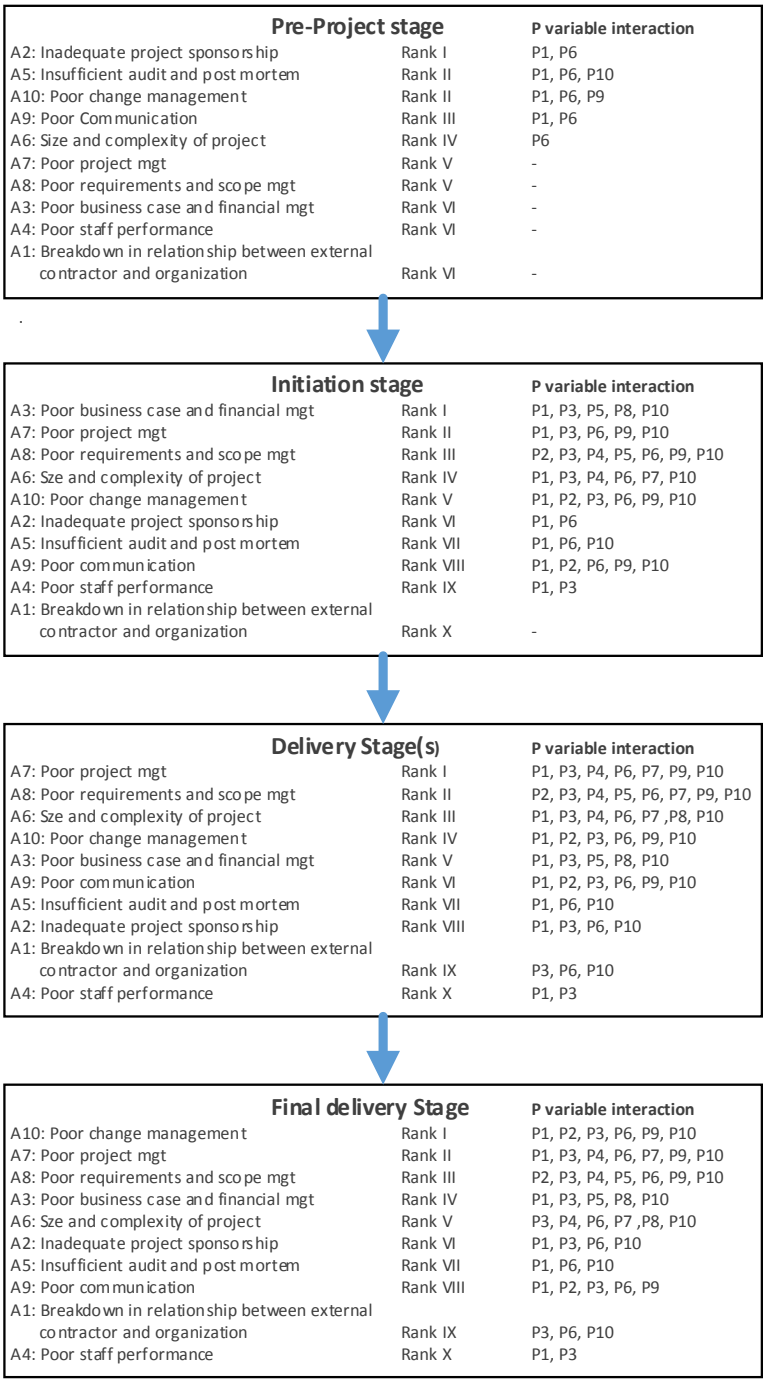
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	# Dominating (D)	Net dominance (D-B)	Rank Dominating
A1		3	1	2	1	–	–	–	3	–	10	-30	IX
A2	1		4	4	1	1	–	1	4	–	16	-20	VI
A3	5	2		5	5	5	2	5	5	2	36	7	IV
A4	2	–	–		1	1	–	–	2	–	6	-38	X
A5	3	3	1	3		1	–	1	3	–	15	-21	VII
A6	6	6	3	6	6		1	–	6	–	34	3	V
A7	7	7	7	7	6	7		7	7	–	55	43	II
A8	7	7	4	7	7	7	2		7	2	50	29	III
A9	3	2	3	4	3	3	1	1		–	20	-23	VIII
A10	6	6	6	6	6	6	6	6	6		54	50	I
# Dominated (B)	40	36	29	44	36	31	12	21	43	4	296		
											Total Interactions		

The rank dominance for each FF is listed in the final column of the matrices highlighted in tables 3 – 6 and denoted in the form I – X. "I" signifies the highest level of ranking and "X" the least significant ranking for the set of FFs.

4. Discussion of Findings

The final ranking of the FFs for each PRINCE2® project stage is listed in figure 4. The individual rankings highlight the perceived dominance of certain FFs within each of the stages. In other words, the

level of importance that senior management should attach to key FFs as they arise during each stage of the project. The results highlight the variance in ranking between FFs within separate stages demonstrating the perceived changing impact of each FF as the project progresses through the lifecycle. This specific point is key, in that the literature has generally identified FFs in the overall project context (Fenech and Raffaele, 2013) rather than any specific focus on individual project stages and the potential impact at each stage.



Pre-Project stage		P variable interaction
A2: Inadequate project sponsorship	Rank I	P1, P6
A5: Insufficient audit and post mortem	Rank II	P1, P6, P10
A10: Poor change management	Rank II	P1, P6, P9
A9: Poor Communication	Rank III	P1, P6
A6: Size and complexity of project	Rank IV	P6
A7: Poor project mgt	Rank V	-
A8: Poor requirements and scope mgt	Rank V	-
A3: Poor business case and financial mgt	Rank VI	-
A4: Poor staff performance	Rank VI	-
A1: Breakdown in relationship between external contractor and organization	Rank VI	-

Initiation stage		P variable interaction
A3: Poor business case and financial mgt	Rank I	P1, P3, P5, P8, P10
A7: Poor project mgt	Rank II	P1, P3, P6, P9, P10
A8: Poor requirements and scope mgt	Rank III	P2, P3, P4, P5, P6, P9, P10
A6: Sze and complexity of project	Rank IV	P1, P3, P4, P6, P7, P10
A10: Poor change management	Rank V	P1, P2, P3, P6, P9, P10
A2: Inadequate project sponsorship	Rank VI	P1, P6
A5: Insufficient audit and post mortem	Rank VII	P1, P6, P10
A9: Poor communication	Rank VIII	P1, P2, P6, P9, P10
A4: Poor staff performance	Rank IX	P1, P3
A1: Breakdown in relationship between external contractor and organization	Rank X	-

Delivery Stage(s)		P variable interaction
A7: Poor project mgt	Rank I	P1, P3, P4, P6, P7, P9, P10
A8: Poor requirements and scope mgt	Rank II	P2, P3, P4, P5, P6, P7, P9, P10
A6: Sze and complexity of project	Rank III	P1, P3, P4, P6, P7 ,P8, P10
A10: Poor change management	Rank IV	P1, P2, P3, P6, P9, P10
A3: Poor business case and financial mgt	Rank V	P1, P3, P5, P8, P10
A9: Poor communication	Rank VI	P1, P2, P3, P6, P9, P10
A5: Insufficient audit and post mortem	Rank VII	P1, P6, P10
A2: Inadequate project sponsorship	Rank VIII	P1, P3, P6, P10
A1: Breakdown in relationship between external contractor and organization	Rank IX	P3, P6, P10
A4: Poor staff performance	Rank X	P1, P3

Final delivery Stage		P variable interaction
A10: Poor change management	Rank I	P1, P2, P3, P6, P9, P10
A7: Poor project mgt	Rank II	P1, P3, P4, P6, P7, P9, P10
A8: Poor requirements and scope mgt	Rank III	P2, P3, P4, P5, P6, P9, P10
A3: Poor business case and financial mgt	Rank IV	P1, P3, P5, P8, P10
A6: Sze and complexity of project	Rank V	P3, P4, P6, P7 ,P8, P10
A2: Inadequate project sponsorship	Rank VI	P1, P3, P6, P10
A5: Insufficient audit and post mortem	Rank VII	P1, P6, P10
A9: Poor communication	Rank VIII	P1, P2, P3, P6, P9
A1: Breakdown in relationship between external contractor and organization	Rank IX	P3, P6, P10
A4: Poor staff performance	Rank X	P1, P3

Figure 4: IRP FF ranking for each stage

The key observations from the IRP FF ranking listed in figure 4 are as follows:

- The factor *A5: Insufficient audit and post mortem* is identified in the pre-project stage as a high ranking factor identifying the significance of learning lessons from previous projects and the potential of early audit to ensure project feasibility is scrutinized adequately prior to business case approval. The ranking signifies that failings during feasibility could significantly impact the project at this early stage (Barker and Frolick 2003; Pan et al. 2008) potentially carrying risk throughout the project if not addressed early in the lifecycle. This factor has a mid-to lower level ranking for each of the subsequent stages highlighting that failings in this area are important, but do not dominate as highly as many other factors as the project progresses through to delivery.
- The factor *A7: Poor project management* is allocated a mid ranking within the pre-project stage highlighting that as the project is still within feasibility, the project manager may not as yet be appointed or their impact may not be a factor in this early phase. The factor *A4: Poor staff performance* is categorized as having low levels of dominance not just in the pre-project stage but in each of the subsequent stages and is allocated the lowest level of dominance in the delivery and final delivery stages of the project. This highlights that although poor staff performance is a key factor in isolation, when compared in the context of ranking with the remaining factors, is perceived as not being dominant.
- The Initiation stage identifies the factors - *A7: Poor project management* and *A8: Poor requirements and scope management* as ranked II and III respectively highlighting the increasing dominance of poor project management as a factor and the criticality of issues relating to poor requirements and scope at this early stage in the project.
- Although the factor *A2: Inadequate project sponsorship* is allocated a high ranking in the pre-project stage highlighting the importance of adequate early top management support for new initiatives within organizations (Hughes et al. 2015; Prosci 2012), this factor is ranked lower for the initiation and delivery stages. This finding could be viewed as detracting somewhat from aspects of the literature where studies advocate top management support as a strong predictor for success and failure (Prosci, 2012; Standing et al. 2006). We argue that this finding does not necessary deviate from previous studies in that the ranking should be seen in the context of other factors and that the PRINCE2® methodology advocates delegated authority for the project manager via the *management by exception* principle. The factor however, is ranked higher for the Final delivery stages highlighting the increased importance of top management support during final delivery and subsequent benefits realization, where adoption needs to be supported beyond delivery.
- The factor *A7: Poor project management* features highly in the rankings for the initiation, delivery and final delivery stages. This reflects the widely held consensus within the literature on the impact of effective project management (Kerzner, 2015) and the major issues when this factor becomes a significant problem (Standing et al., 2006; Verner et al., 2008).
- The dominance of the factor *A10: Poor change management* features at a consistently high level through all stages of the project. The inability of senior management to effect successful organizational change is a key contributor to project failure (Brown and Jones, 1998; Fitzgerald and Russo, 2005; Gauld, 2007). The top ranking for the final delivery stage reflects the impact on positive outcomes when poor change management becomes a factor at this late stage in the project, when delivery and subsequent benefits realization is impacted by user resistance and adoption issues.
- The factor *A6: Size and complexity of project* is consistently ranked relatively highly throughout all stages of the project with the highest dominance identified in the pre-project and delivery stages. Issues relating to size and complexity can result in significant problems for organizational senior management (Jones, 2004; Mitev, 1996; Verner and Abdullah, 2012), with studies highlighting the inevitability of failure inherent with this genre of project (Scott and Vessey, 2000). Addressing size and complexity issues early in the lifecycle is a key task for senior management and one that requires practical mitigating strategies to drive successful outcomes.

4.1 *Implications for Practice*

The results highlight a correlation between FF ranking and specific PRINCE2® project stages, in that specific factors are judged to be impacted, depending on where in the lifecycle the FF materializes. This finding has clear implications for senior management when assessing the wider threat to the project when problems arise. The findings contextualized for each of the PRINCE2® project stages are shown in table 7 – FF ranking order by project stage.

Table 7: FF ranking order by project stage

	Ranking by stage			
Failure Factor	**Pre-Project**	**Initiation**	**Delivery**	**Final Delivery**
A1. Breakdown in relationship between external contractor and organization	6	10	9	9
A2. Inadequate project sponsorship	1	6	8	6
A3. Poor business case and weak financial mgt	6	1	5	4
A4. Poor staff Performance	6	9	10	10
A5. Insufficient audit and post mortem process	2	7	7	7
A6. Size and complexity of project	4	4	3	5
A7. Poor project management	5	2	1	2
A8. Poor requirements and scope management	5	3	2	3
A9. Poor communication	3	8	6	8
A10. Poor change management	2	5	4	1

The factors *A7: Poor project management* and *A10: Poor change management* are identified as exhibiting a high degree of ranking correlation within project stages with a maximum variance of +/- 3 dominance weightings. This finding aligns with aspects of the literature that advocate closer integration between change and project management (Hornstein, 2015; Leyland et al. 2009; Oakland and Tanner, 2007) either in the planning context or through the "lens of knowledge integration" (Soderlund, 2011). In practical terms, this finding highlights that senior management should strategically plan for early stage alignment of these two disciplines to reduce the potential threat to the project (Hughes et al., 2015). The consistent, relatively high ranking of factor *A6: Size and complexity of project* within each of the stages, identifies the significance of this factor and its potential threat to the organization throughout the project. The literature has identified that very few large projects are delivered successfully and are ten times more likely to fail than smaller less complex projects (Standish Group, 2013). Organizational senior management are advised to embrace a more *practical pessimistic* stance on the likelihood of success for projects identified as large and complex, and take steps to mitigate further more catastrophic failure as an early lifecycle activity.

4.1.1 *Pre-project stage*

The findings highlight a high dominance for the factor *A2. Inadequate project sponsorship* in this stage, highlighting the criticality of executive support to drive the initiative forward during the early phases as the project is established. The factor *A5: Insufficient audit and post mortem* is also identified as a high ranking factor during the pre-project stage. Learning the lessons of previous failures is a vital early phase step for any project (Kerzner, 2013), however many organizations fail to formalize this process (Williams 2008). Senior managers that fail to apply these lessons are setting themselves up to potentially repeat the same mistakes as previous initiatives (Verner et al. 2008). The early stage criticality of identifying user resistance and the scope of change are highlighted by the high ranking of *A10. Poor change management*. Senior management would be advised to allocate resources to address these areas early in the lifecycle to mitigate the criticality of this risk further on in the project.

4.1.2. *Initiation stage*

The initiation stage highlights the high ranking of the factor *A3. Poor business case and weak financial management.* The results indicate that issues relating to a poor business case and financial management are particularly critical to the project during the initiation stage as the project formally defines the benefits, gains financial approval and agrees the project plan for the first stage of the project. The results highlight the diminishing criticality of this factor as the project progresses through the delivery and final delivery stages, indicating the *expert* participants views on the ability of the PRINCE2® structure and processes to mitigate the impact of this factor in subsequent stages. The factor *A7. Poor project management* ranks higher during the initiation stage as the core deliverables of the project are established and scoped. The factor *A8. Poor requirements and scope management* exhibits a high ranking in the initiation stage and also in subsequent stages indicating the impact of this factor in relation to other factors. Formally managing and controlling project scope and addressing the impact of *scope creep* is key to keeping the project within its financial and time constraints (Kerzner 2013).

4.1.3. *Delivery stage*

The significance of the factor *A7. Poor project management* is highlighted in the results for the delivery stage. This indicates the criticality of this factor at this key stage of the project and in subsequent stages. Studies have highlighted the criticality of project manager competency looking beyond practitioner certification to a more holistic skills set (Crawford et al., 2006) that takes account of real world political and conflict resolution attributes (Kerzner 2015). The factor *A2. Inadequate project sponsorship* is surprisingly ranked relatively low within this stage indicating a lack of alignment with previous studies that have articulated the detrimental impact of poor project sponsorship at all stages of the project lifecycle (Hiatt and Creasey, 2012). This result is explained by the PRINCE2® principle of management by exception where delegated authority from senior management to project management is actioned based on agreed defined tolerances. Senior management are advised to ensure adequate controls are established to monitor the delicate balance of efficient use of management time and appropriate governance processes to assure full control of the project within agreed tolerances.

4.1.4. *Final Delivery stage*

The results indicate that factor *A10. Poor change management* is ranked relatively highly throughout the preceding stages but is identified as exhibiting a high ranking for the final delivery stage. The literature has identified numerous examples of projects delivering to their perceived criteria based on time, cost and quality, but ultimately failing to provide the necessary focus on key change management aspects (Barker and Frolick, 2003; Beynon-Davies, 1995; Cinite et al., 2009; McGrath, 2002; McDermott et al., 2013; Warne and Hart, 1997). Senior management are advised to view change management strategically and take steps to ensure these aspects are considered early in the project lifecycle and that resources are allocated to the key areas of user resistance and system adoption to ensure benefits are realized.

4.2 *Theoretical Contribution*

The literature has identified many of the factors associated with IS project failure highlighting the root causes that have contributed to poor project outcomes (Dwivedi et al., 2013; Fenech and Raffaele, 2013; Gould, 2007; Hughes et al., 2015; Standish Group, 2013). However, although many studies have provided extensive analysis of individual FFs and have articulated their individual contribution to failure (Bakker et al. 2013; Cinite et al. 2009, Nawi et al. 2011), few have addressed the need for a deeper understanding of the dominating interrelationships between FFs, impacting senior management's ability to address project outcome related factors, contextualized for each stage in the lifecycle. Previous studies have utilized IRP to explore factor dominance within other genres of research (Haleem et al., 2012; Luthra et al., 2014) exploring the suitability of the method and its application. The ISM based

methodology utilized within Hughes et al., (2016) explored the interrelationships and causal links between individual FFs but the study was limited by its inability to identify any priority or dominance between factors. We propose a more pragmatic perspective to IS project outcomes by proposing a new empirically supported narrative on IS project failure utilizing the existing IRP method that demonstrates a changing pattern of factor dominance at each stage of the PRINCE2® project lifecycle, thereby, providing new insight and we posit - a valuable alternative perspective on factor relationships. The findings represent an important new theoretical contribution to the existing body of literature where a more pragmatic position is advocated on the likelihood of project failure. We present this research as the first study to apply the IRP method in the context of IS projects and the also the first to explore the impact of FF dominance within individual PRINCE2® project stages.

5. Conclusions

This research is limited by the inherent constraints of IRP, namely its reliance on *expert* participant knowledge and therefore, potential inherent bias. As this study is the first to utilize the method within the IS project genre applied to project failure, contextualization and validation of results is problematic. The study is also limited by its alignment with PRINCE2® in that further study is needed to validate the results with alternative methods.

This study highlights the underlying emphasis of many aspects of the IS failure literature that have approached this topic from the perspective of a prevention narrative, rather than a *practical pessimistic* viewpoint. We argue the futility of the prevention narrative and present a more pragmatic approach recognizing that failure within IS projects is inevitable at some level (Cinite et al, 2009; Scott and Vessey, 2000; Wilson et al. 1994) and that senior management are best placed in understanding the patterns of failure and learning the key lessons to mitigate overall project failure. This study builds on the ISM based research in Hughes et al, (2016) and presents a new approach to the subject based on the implementation of IRP to identify key patterns of dominance between FFs within PRINCE2® project stages. In addressing the research question posed at the start of this paper, the findings highlight the changing patterns of ranking between FFs within individual project stages demonstrating variances in potential threats to the organization as the project progresses through the lifecycle, thereby providing valuable information to senior management at each stage in the project. The study has identified the consistent high levels of dominance for factors *A7: Poor project management* and *A10: Poor change management* that rank highly throughout the project lifecycle, and the early stage criticality of factors: *A2. Inadequate project sponsorship* and *A5. Insufficient audit and post mortem process*. Senior management are advised to adopt a *practical pessimistic* mindset and pay specific attention to these key factors at an early stage in the project.

Future research in the application of IRP as part of a contextualized IS project case study based on the outputs of this study, could be a useful mechanism to test the validity of the findings and serve as a test of the practical application of the method.

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