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Why Project Performance Varies: A Capability-Based Explanation

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WHY PROJECT PERFORMANCE VARIES: A CAPABILITY-BASED EXPLANATION

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Abstract

Project performance is a continuing issue in research and practice. As an operational and strategic enabler in organisations, Information Systems is challenged by business value creation being undermined by inconsistent and often poor project outcomes. This theory development paper revisits the issue by proposing a different lens. In contrast to the dominant approaches of identifying critical success/failure/risk factors and developing better processes, it highlights the importance of having the right capabilities to deliver projects and how capabilities can be diminished or undermined by common conditions that can arise in projects, leading to underperformance. Drawing on theory from the management literature, a capabilities-based model of project performance is proposed. The model includes drivers for both project performance and underperformance such that the outcome of any one project is the contested result of these opposing effects on the capabilities available to the project, thus accounting for variations in outcomes. The theory is illustrated using a classic case from the literature and a more contemporary Australian case. The paper concludes that the proposed model improves our understanding of project performance as well as our ability to explain empirical data on performance outcomes and anomalous cases in practice of successive projects failing or succeeding.

Keywords: Project, Performance, Capabilities, Competencies, Liability of Newness, Incumbency.

1 INTRODUCTION

Opportunities for improvement in Information Systems (IS) project performance continue to exist despite over 50 years of refinement. Trends toward smaller projects, incremental methods, process framework compliance and project manager certification appear to have a beneficial impact on project outcomes. However, industry data suggests that, on average over the last ten years, only a third of IS projects succeeded outright while the remaining two thirds underperformed against schedule, budget and/or features, or failed to complete (Standish 2011). While these studies have been challenged in the literature (for example, by Eveleens & Verhoef 2010), they accord, anecdotally, with views held by many executives and managers that IS projects are high risk ventures.

A further complication is that project performance seems to vary within individual organisations over time. A classic case example from the literature is American Airline's outstanding competitive success with its SABRE airline reservation system project (Copeland & McKenney 1988; McKenney 1995) which was followed by the failure of its CONFIRM ground reservation system project (Oz 1994). Current theory suggests that as organisations apply 'best practice' process management, risk management and project management practices, project after project, they will develop and mature in their ability to perform projects well. However, cases of individual organisations (such as American Airlines) and aggregate industry data (such as provided by the Standish Group) challenge this view. For example, while the Standish Group data for 2010 records the highest success rate yet (up to 37% from 27% in 1996), the figures still suggest that an IS project is more likely (63%) to fail or underperform, on the Standish criteria, than complete within time and budget and to specification.

In response to this performance problem, this paper considers how a project might underperform. It adopts a capabilities-based perspective to consider how IS projects might more likely underperform than meet or exceed expectations, as is implied by this industry data, to explain what appears to happen in practice. It argues that current dominant factor- and process-based project performance models lack an explicit driver for underperformance. They argue that if you take account of all the relevant success, failure and risk factors (do the right things) and use appropriate processes (in the right ways) then the project will 'succeed'. This is fundamentally a linear main-effects model of project performance (performance increases proportionate to input of the right factors and processes). Underperformance is weakly explained as not having sufficiently accounted for all relevant factors and process needs (or not having sufficiently applied the relevant factors and processes); but one can learn and 'do better' next time. However, history suggests that this learning is slow and fragile.

The alternative model proposed adds the perspective of also needing the right resources (capabilities). It argues that while learning can build strong project capabilities, barrier conditions associated with projects can also diminish or negate the value of the capabilities applied to the project. This creates two opposing effects on the capabilities applied to a project: a positive learning effect that builds capabilities and a negative effect that reduces or destroys capabilities. The contested outcome of these opposing effects in an individual project creates a propensity to perform or underperform depending on whether the effects of the positive or negative drivers dominate, creating variations in outcome. It is argued that this model improves our ability to explain the industry survey data and anomalous cases of individual companies performing highly on one project and poorly on the next. This is illustrated using the American Airlines case from the IS literature and a more contemporary Australian case.

The paper is conceptual. The research method is theory development from management theory and the phenomenon in practice. The proposed model draws from capability-based theory, organisational learning theory, and concepts from the organisational ecology literature. The distinctive contributions are formalising the negative drivers and application of the existing theory in the proposed performance model. The paper is structured after the design suggested by Zmud (1998) for a theory paper. First, the theory is unfolded from the literature (Section 2) and the proposed research model is specified (Section 3). Then, in addition to Zmud's design, the proposed theory is illustrated using two case studies (Section 4). Finally, the contribution is discussed and conclusions are drawn (Section 5).

2 THEORY DEVELOPMENT

This section overviews the contributing theory from the literature. Three related bodies of organisation literature contribute to the development of the proposed model. The first, *capability-based theory*, (which derives from *resource-based theory*) provides a basis for determining project performance. The second, *organisational learning theory*, describes the primary generative mechanism through which capabilities are developed and accumulated. The third body does not exist as an integrated theory in the literature. Rather, it comprises various barrier conditions from the learning, innovation and organisational ecology literature that can reduce, block or negate the generative effects of learning on capabilities. A key contribution of the paper is to bring these disparate conditions together as drivers of project underperformance under the labels of *liabilities of incumbency* and *liabilities of newness*.

First, according to *resource-based theory* (Barney & Clark 2007), firm performance is a function of internal resources, which are heterogeneously distributed across firms. Firm idiosyncrasies in accumulating and using differentiated resources drive superior firm performance and competitive advantage. Rent-generating firm-specific resources are variously characterised as valuable, rare, non-tradable, inimitable, non-substitutable, causally ambiguous, socially complex, and having high organisational support (Barney & Clark 2007; Dierickx & Cool 1989). The *capability-based theory* extends this view by emphasising building and accumulating a subset of resources, called capabilities, better and faster than competitors (Prahalad & Hamel 1990).[1] Capabilities are organisational resources that have potential to generate value for a firm. They comprise an intricate mix of knowledge, skills, routines, technologies and values. A firm's effectiveness in developing and deploying capabilities, including those needed to execute projects, determines its performance outcomes. Indeed, the ability to build and leverage new capabilities is a capability in itself, called a 'dynamic capability' (Teece et al. 1997; Helfat et al. 2007).

Application of resource/capability-based theory to IS is not new. Noted research examples include Ross et al. (1996), Feeny & Willcocks (1998) and Bharadwaj (2000). Notable practice-based frameworks include *CMMI-DEV* (SEI 2010) and *PMBOK Guide* (PMI 2008). However, the former do not directly explain underperformance in IS projects and the latter are aligned more closely with extant process-based performance models (since their focus is on using best practice processes). Take CMMI for example. CMMI for Development (SEI 2010) is a process improvement reference framework that specifies 22 best practice process areas. Mastery of various combinations of these processes is mapped against a five-level 'capability maturity' hierarchy. Progression up the hierarchy is associated with higher process consistency and performance of the kind described above for current dominant performance models.

Organisational learning is the main generative mechanism of firm-specific capabilities. Capabilities are developed through learning from experience, or 'learning by doing' (Levitt & March 1988). They are a "messy accumulation of learning" (Hamel 1994). Organisational capabilities are developed and institutionalised in the operating routines, practices and values of the organisation in a way that outlives the presence of specific individuals, and are adapted over time in response to further experiential learning (Nelson & Winter 1982). Firms can also deliberately build capabilities through management practices (Hamel 1994; Montealegre 2002; Purcell & Gregory 2000). The firm is a learning organisation that builds and deploys advantageous, firm-specific capabilities and applies them to achieve superior levels of performance (Hamel 1994). Learning takes two forms (Argyris & Schön 1978). One is *continuous* with respect to existing organisational capabilities (termed 'single-loop learning'). The other is *discontinuous*, resulting in fundamentally different organisational rules, values, norms, structures and routines (called 'double-loop learning').

[1] *Capability* is a complex notion, described in different ways in the literature. Descriptors include capability, competence, strategic asset and invisible asset. In the interests of parsimony, *capability* is used in this paper but the terms are considered to be interchangeable (consistent with Barney & Clark 2007, and Hamel 1994).

In contrast to these learning effects on capabilities, the literature also describes a range of barrier conditions that can reduce or block learning and capability accumulation or make existing capabilities obsolete in the face of new or changed circumstances. These regressive conditions can have change effects that offset or negate the generative effects of learning on organisational capabilities, reducing or destroying an organisation's ability to perform well. These disparate conditions are not coherently integrated in the literature. They are brought together here under two unifying concepts adapted from the literature: *liabilities of incumbency* and *liabilities of newness*.

Liabilities of incumbency (termed 'liabilities of age and tradition' by Tushman & Anderson 1986) are barrier conditions that slow or block the incremental accumulation of capabilities (see examples in Table 1). These conditions are often associated with the entrenched practices of established firms (hence they are a liability of holding an existing position in industry). Their effect is *continuous*, permitting various levels of flow like a water tap whose valve is progressively closed to restrict or fully interrupt the flow.

By contrast, *liabilities of newness* (a term introduced by Stinchcombe 1965 and Hannan & Freeman 1984) are barrier conditions that, in the face of newness and/or changed circumstances, make existing capabilities redundant or obsolete, reverting the capability status of the organisation to that of a new start-up, creating a high propensity to underperform or fail (see examples in Table 2). Their effect is *discontinuous*, requiring different capabilities to those needed previously. Together, these conditions have the effect of reducing or negating the level and value of accumulated learning and capabilities to that of a less competent organisation, refreshing its propensity to underperform or fail (Amburgey et al., 1993).

IS projects can be foci of competence-destroying change. IS project-related change can make established capabilities redundant 'over night', or by the time the next change project arises. Platforms, development tools, software versions and domain knowledge requirements change, as do the business and organisational contexts, motivations, drivers, and stakeholders, both during and between projects (especially large ones). Change and newness are inherent in the definition of a project as a temporary endeavour undertaken to create a unique product, service or result (PMI's *PMBOK Guide*). These barrier conditions can re-set or turn back an organisation's capability 'clock', negating the value of its accumulated learning and giving it the performance vulnerability of a new or immature organisation again.

Taken together, the learning and change effects variously act as drivers of capabilities available to an organisation to apply to its projects, as summarised in Figure 1.

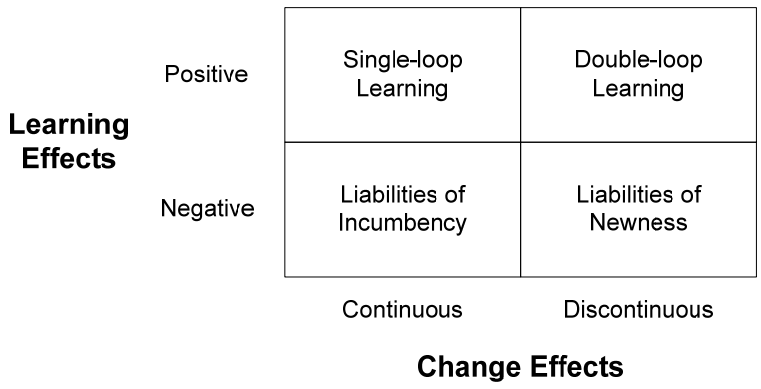

Figure 1. Capability drivers

Barrier Condition	Description	Sources
Time compression diseconomies	Limits capability stock accumulation due to long development lead-time, and absence of shortcuts.	Dierickx & Cool (1989); Knott et al. (2003)
Asset mass inefficiencies	Low pre-existing levels of a capability make it difficult to develop and accumulate needed capabilities.	Dierickx & Cool (1989)
Absorptive capacity	An organisation's ability to learn and innovate is a function of the level of its prior related knowledge.	Cohen & Levinthal (1990, 1994); Zahra & George (2002)
Transformative capacity	An organisation's ability to exploit and transfer technological knowledge across time can inhibit (or facilitate) learning.	Garud & Nayyar (1994)
Information processing limitations	An organisation's processing capacity is bounded; this and information overload inhibits new learning and development.	March & Simon (1993); Tushman & Nadler (1978); Lyytinen & Robey (1999)
Training and education	A lack of appropriate technical and business training / education can limit learning and capability development.	Lyytinen & Robey (1999)
Learning disincentives	Lack of proper incentives inhibits learning; this can occur in a culture obsessed with success (ignores failures).	Lyytinen & Robey (1999)
Certain organisational designs	Organisation structures, processes and practices can create artificial boundaries that limit learning, knowledge sharing and development (especially with respect to the positioning of the Information Technology function).	Ayas (1996, 1999); Nadler & Tushman (1997); Lyytinen & Robey (1999); Schulz (2001); Mohrman et al. (2002)
Low aspiration levels	If aspiration level is low, learning of capabilities tends to end too soon, resulting in an inferior achievement.	Winter (2000)
Tacitness	A source of great value in capabilities, but the difficulty in articulating what we know limits knowledge sharing / transfer and, therefore, learning from others.	Polanyi (1966); Attewell (1992); Nonaka & Takeuchi (1995)
Organisational inertia	Deeply established practices (especially successful ones) resist change (especially in stable environments).	Hannan & Freeman (1984)
Competency traps	Learning from past successes (existing capabilities) is favoured, inhibiting potentially relevant new learning.	Levitt & March (1988); Levinthal & March (1993)
Need for unlearning	Past learning may need to be unlearnt to enable new learning and competence development to take place.	Nystrom & Starbuck (1984); Durand (2000)
Interconnectedness	Extending a capability may depend on the presence of others.	Dierickx & Cool (1989)
Causal ambiguity	A source of great value in capabilities, but lack of detailed understanding of the makeup of capabilities can make it difficult to develop and maintain them.	Lippman & Rumelt (1982); Dierickx & Cool (1989); Reed & DeFillippi (1990)
Learning myopia	Organisations simplify and specialise their learning; they tend to overlook the long run, the larger picture and failures, favoring exploitation over exploration.	Abdel-Hamid & Madnick (1990); March (1991); Levinthal & March (1993)
Focus diversion	New learning can reduce maintenance of existing capabilities	March (1991)
Core rigidities	Core capabilities retained and applied inappropriately become core rigidities and inhibit new learning.	Leonard-Barton (1992, 1995)
Complexity and embeddedness	Effective capabilities are socially complex and deeply embedded in the organisation, which can also make it difficult to maintain and exploit them.	Kogut & Zander (1992); Hansen (1999); Garud (1997); Brown & Duguid (1998)
Stickiness	Knowledge is so deeply embedded in situational contexts that it cannot easily be fully explicated or transferred.	von Hippel (1994); Szulanski (1995, 1996, 1997, 2003)
Unjustified theories-in-use	Defensive routines prevent or greatly reduce learning when it is most needed (when failure occurs).	Argyris (1977, 1991); Lyytinen & Robey (1999)
Managerial cognition	Strong managerial beliefs influence new learning search processes and the development of new capabilities.	Tripsas & Gavetti (2000)
Certain project characteristics	Duration of a project is too short for effective capability development; projects provide a poor framework for capability development; projects are usually resourced by diverse temporary personnel (including contractors).	Leonard-Barton (1992); DeFillippi & Arthur (1998); Pettigrew (1998); Lampel (2001)
Recognition and progression	Lack of recognition and limits on skill growth due to progression pathways can stifle learning & development.	Leonard-Barton (1992)
System rigidities	Over-reliance on ISs and/or inflexible systems can inhibit organisational learning and development.	Orlikowski (1993); Gill (1995); Robey et al. (2000)

Table 1. Liabilities of Incumbency that Reduce and/or Block Learning

Barrier Condition	Description	Sources
Newness	Young or significantly changed organisations (or organisational circumstances) may have insufficient competence stocks to survive or succeed.	Stinchcombe (1965); Hannan & Freeman (1984)
Technological discontinuities	Major technological shifts can destroy (or enhance) existing capabilities and lead to organisation failure.	Tushman & Anderson (1986); Christensen (2000)
Architectural Innovations	Changes in the architecture of a product (without changing its components) destroy the usefulness of embedded architectural knowledge.	Henderson & Clark (1990)
Radical methods	Management methods such as radical business process reengineering destroy the value of existing capabilities vested in the status quo.	Hammer (1990); Galliers (1997)
Technological change	Technologies are developing faster than the capabilities to effectively use them.	Leonard-Barton (1992)
Organisational forgetting	Unintentional loss of valuable embedded capabilities through 'memory decay'.	De Holan el al. (2004)
Asset erosion	Capability stocks may be subject to 'ossification', decay and/or may become redundant over time.	Dierickx & Cool (1989); Knott et al. 2003)
Staff loss through turnover, downsizing and/or outsourcing	High staff turnover, downsizing and outsourcing drain accumulated experience/competence and increase development time and cost.	Simon (1991); Lyytinen & Robey (1999); Fisher & White (2000); Quinn & Hilmer (1994)

Table 2. Liabilities of Newness that Make Capabilities Obsolete

3 PROPOSED THEORETICAL MODEL

Based on the above theory, the proposed alternative explanation for project performance is inherent in the generative and regressive mechanisms underlying organisational capabilities (a subset of which is applied to projects). While progressive learning can accumulate organisational capabilities, liabilities of incumbency can retard or block capability development and liabilities of newness can render existing capability stocks redundant. Liabilities can expose the organisation to the vulnerabilities of a start-up and, thereby, subjecting it to higher risks of underperformance or failure. Fundamentally, learning drives project performance and 'success' through capability accumulation, and liabilities of incumbency and newness drive project underperformance and 'failure' through capability reduction and negation. Project performance is the contested outcome of these joint effects, which is difficult to predict, resulting in performance variations ('success', 'failure' and 'challenged' performance). These relationships are shown in Figure 2.

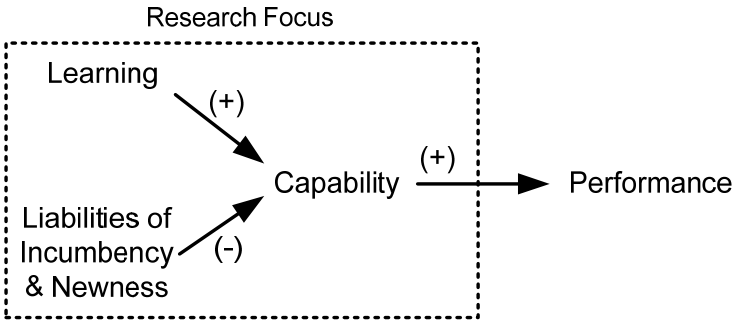

Figure 2. Proposed Research Model

In this model, *Learning* is the process of developing capabilities through experience. *Liability of incumbency* is the creation of a propensity to underperform or fail through the effects of barrier conditions that retard and/or deplete organisational capabilities. *Liability of newness* is the creation of a propensity to underperform or fail through the effects of barrier conditions that make existing

organisational capabilities redundant. *Capability* is the differentiated resources that generate operational and strategic value for an organisation. Finally, *Performance* is the extent to which the outcome of an IS project meets stakeholder expectations.

The central focus of the proposed model is the boxed area in Figure 2. The relationships between organisational capabilities and performance are accepted, a priori, as hypothesised in the literature. Consistent with conventional thinking, strong performance is associated with project 'success', while poor performance is associated with project 'failure'.[2]

More formally, the proposed model is defined in the following propositions. First, the relationship between learning and capability is also accepted, a priori, as hypothesised in the literature and discussed above. Learning from experience is the generative mechanism by which capabilities are developed, institutionalised and embedded in the activities of the organisation (Levitt & March, 1988; March, 1991). Here this relationship is re-stated as a proposition for completeness:

Proposition 1: *Learning develops existing and new organisational capabilities.*

Figure 2 includes two variables that are negatively associated with capability. The first, liabilities of incumbency, represents conditions that reduce or block the learning improvement effect on capabilities, while the second (and, arguably, more powerful), liabilities of newness, represents conditions that make existing capabilities obsolete or redundant in the face of new requirements. The first effect is continuous, interrupting or slowing the incremental accumulation of capabilities. Using Dierickx & Cool's (1989) stocks and flows analogy, this is equivalent to the flow. Liabilities of incumbency can turn the tap partially or completely off, reducing or stopping the flow of capability asset stocks into the organisational 'tank'. By contrast, the second effect is discontinuous, making existing capability stocks obsolete for requirements under the new condition. Combined, these effects slow learning (flatten the learning curve) and/or move the organisation to a lower position on the learning curve, reflecting a lower level of organisational capability. Accordingly, it is proposed that:

Proposition 2a:*Liabilities of incumbency reduce or block capability accumulation (continuous effect)*;
2b: *Liabilities of newness make existing capabilities obsolete (discontinuous effect)*.

Finally, based on the preceding relationships, this brings us to the central proposition:

Proposition 3: *Project performance is the contested outcome of the positive effects of learning and the negative effects of liabilities of incumbency and newness on project capabilities.*

IS projects are particularly susceptible to the disruptive effects of liability conditions, which occur both within and between projects. Hardware, software, development tools and methods are constantly changing or becoming obsolete. These discontinuities significantly impact people, processes and technologies in use, destroying the value of existing knowledge and expertise (capabilities). Even when capabilities are developed in current technologies during a project, they are often different or obsolete by the time the next project starts – especially in organisations whose main business is not conducting projects. Different hardware platforms and software tools are required; project managers and teams change, and; the application domain changes. Similarly, changes in organisational directions, priorities, structures, processes and senior management can set back accumulated learning and/or negate the value of accumulated capabilities, increasing the likelihood of underperformance.

In IS projects, especially those involving large-scale and transformational developments, the initial capability stocks plus the learning that occurs on the project can be less than the liability effects experienced during the project. Even with 'best practice' management in place, this can result in a net competence liability that limits current and subsequent project performance. The liability effects can offset the learning effect so that capabilities for the project remain sub-optimal, resulting in poor

[2] The definitions of 'success' and 'failure' are not discussed here. The terms are used conceptually. For a discussion on this topic see Bannerman (2008a).

performance. When this persists, both within and between projects, limited learning accumulates and the organisation is in no better position to take on a subsequent project than it was at the start of the previous one (the second case illustration is an example of this).

Alternatively, the capabilities that are suitable for one project may not be as relevant in the next project. Liability of newness conditions may render existing capabilities irrelevant for the purpose of a new project, making it difficult for the project to acquire sufficient new capabilities to perform well within the duration of the project, resulting in underperformance or failure. This pattern can persist from one project to the next, resulting in highly variable performance outcomes of the kind commonly seen in practice. In particular, it can explain why an organisation might have an outstanding success with one project and a total failure with the next, or vice-versa (the first case illustration is an example of this). Factor and process performance models struggle to explain this variation in outcomes.

This model of project performance is different to that assumed by current explanations. In contrast to the assumption that factors and processes can be increasingly applied to deliver a successful outcome, the proposed model suggests that project performance is the outcome of two opposing effects on the organisation's project capabilities. Rather than reflecting a functional form in which factors have a main effect on outcomes, this model proposes a more complex form of contested outcome between two effects that have opposite signs. Furthermore, the liability effects cannot be interpreted as moderators of the main effect of learning on capabilities because both drivers include continuous and discontinuous effects. Discontinuities actually change the capabilities that are held (in the case of discontinuous learning) or needed (in the case of liabilities of newness) by the organisation. The unpredictable nature of liability conditions in particular, in frequency and magnitude, can produce substantial variation in project outcomes. This provides a basis for explaining the persistent variance in practice-based empirical data found in the literature. This explanatory power is illustrated, following, with two cases studies.

4 CASE ILLUSTRATIONS

Two case studies, one, a classic case from the literature (of American Airlines' experiences with the SABRE and CONFIRM system projects) and the other, a more contemporary case from an Australian DMV (Department of Motor Vehicles), illustrate the proposed theory.

4.1 American Airlines

American Airlines' SABRE airline reservation system is a classic success story in the IS literature. However, when the company attempted to replicate this success in developing the CONFIRM travel reservation system, the project was a significant failure. How can such a complete reversal of outcomes occur in successive projects?

The development of SABRE, over more than 30 years, is well chronicled in the literature (Copeland & McKenney, 1988; Hopper, 1990; Copeland et al., 1995). Through most of its history, SABRE dominated the US airline industry, successively evolving from a computer-based airline reservations system to a passenger service system, a sales distribution system, and an electronic travel supermarket. This experience built deep competencies in computerised reservation systems. As explained by one of the executives responsible for SABRE, "At American Airlines … we have spent 30 years handcrafting computer systems. We like to think we're better at this than most and that our skills in hardware evaluation, project management for software development, and systems integration have given us an important leg up on the competition" (Hopper 1990, p120). The dominance achieved by American Airlines through SABRE was also recognised by others as the result of 'intelligent persistence', the combination of learning by doing and opportunism, rather than the result of extraordinary vision (Copeland & McKenney 1988). Success was the result of consistent exploitation of opportunities that unfolded as experience accumulated during the evolutionary adaptation of SABRE. This 'experience

curve' effect was so strong that it was reputed that SABRE was so successful that it became more profitable than the airline business itself (Flowers, 1996).

Following its success with SABRE, American Airlines (AMR) formed a new Information Technology arm (AMRIS) to combine running SABRE with leveraging its success into other business areas (Oz, 1994). In late 1988, it began building CONFIRM, a reservation system for the combined travel, accommodation and car rental industries, through a joint venture (Intrico) with Marriott, Hilton and Budget Rent-a-Car. The project budget was $55 million with delivery scheduled for June 1992. In July 1992, the project and joint venture were disbanded due to insurmountable technical problems and mismanagement, at a direct cost of $125 million and a further $160 million in legal settlements (Oz, 1994).

With hindsight, the CONFIRM project was different to the SABRE development. It involved unfamiliar technologies and technical integration complexities; development with multiple parties via an independent joint venture entity; a different organisational culture; and required managerial skills that both AMRIS and Intrico lacked (Flowers, 1996). There is also evidence to suggest that the capabilities brought to the project were inadequate (McPartlin, 1992). For example, AMR/AMRIS management may not have provided the same leadership as they did with SABRE; AMR claimed that its partners were indecisive, failed to specify exactly what they wanted from the system, and assigned personnel who lacked knowledge of their industries; AMR recruited developers externally rather than use its own SABRE resources; AMR did not assign the right project manager; development schedules were over optimistic; and the project used inappropriate technologies (McPartlin, 1992).

The net effect of these differences was that the capability profiles of SABRE and CONFIRM were different. Consistent with the model proposed above, the liability conditions confronting AMRIS (especially of newness) rendered the carry-over SABRE capabilities irrelevant to, or ineffective in, the CONFIRM project. The capability stocks at the start of CONFIRM were low for the requirements of that project and the project faced significant liabilities of newness. Furthermore, since the required new capabilities could not be developed in time (due to liabilities of incumbency such as time compression diseconomies and asset mass inefficiencies), the negative drivers outweighed the positive drivers of capability development, resulting in substantial underperformance and, ultimately, failure.

4.2 An Australian DMV

A more contemporary illustration is provided by a longitudinal study of a major system development in an Australian State Government DMV. The case is detailed in Bannerman (2004) and summarised here.

A project was initiated to replace the Department's inefficient batch processing mainframe system with a new server-based online system for administration of the State's drivers and motor vehicles. The study examined the initial development project and subsequent upgrades from 1989 to 2001.

The initial development was an interesting case of a 'successful failure'. That is, the new system was very late, well over budget and significantly de-scoped in functionality, but it ultimately achieved the Department's major business objectives, including savings of $20m a year. Consequently, the success was acknowledged with an industry award for excellence for the system project.

Due to this anomalous outcome, the case presented an opportunity to examine the substance of the Department's excellence and performance in IS development projects. One implication of the award is that the initial project 'failure' was an exception, and exemplary performance would dominate subsequent projects. However, this was not evident. To understand why, the case was examined for evidence of learning accumulation and liability condition effects.

The study period featured many organizational and technology changes that occurred concurrently with or as a direct result of ongoing development of the system. These occurred in conjunction with a stream of ongoing software version upgrades, escalating design complexity and architecture fragmentation, and the movement of key people. To resource the project, the DMV relied heavily on

contract developers. While they were highly skilled and experienced professionals, there was no incentive for them to transfer knowledge and skills to staff or between each other.

Changes in the status of eight core IS capabilities adapted from Feeny & Willcock (1998) were analyzed in four phases across the study period. The capabilities were: leadership, business systems thinking, building business relationships, infrastructure management, making technology work, building vendor relationships, managing projects, and managing change. Capability strength was measured as low, medium or high for each capability in each phase of the study. Liability conditions associated with each capability were also identified in each phase. Measurement was aided by empirical indicators developed for each capability and liability condition (described in Bannerman 2004).

The analysis found that very little cumulative learning occurred in the capabilities during the study period. Furthermore, liability conditions were found to be high and significantly associated with each capability across the study. In particular, newness discontinuities were found to negatively impact over 80% of the capabilities over the study period. The study concluded that any organizational learning and capability development that occurred during the study period was offset by the effects of recurrent liability conditions, resulting in the maintenance of a cumulative net competence liability rather than accumulated organizational learning and capability development. The level of capability stocks at the end of the period was no greater than at the start (rather, it was slightly lower). This profile fitted the absence of observed exemplary performance in projects over the study period.

Accordingly, in moving forward to any other large software project in the future, such as the next generation administration system, the DMV was in no better position to improve its likelihood of success than it had been for the previous system project. The earlier result appeared not to be an exception but rather a reflection of an underinvestment in organizational learning and capability development in the face on constant disruptive change impacting the system projects.

5 DISCUSSION AND CONCLUSIONS

This paper has proposed a capability-based model of project performance that recognises that ‘having the right capabilities’ is as important as ‘doing the right things in the right ways’. Furthermore, the model can explain variations in project outcomes. In the proposal, project performance is modelled as the contested outcome of drivers of capability accumulation through learning from experience and drivers of capability destruction through liability of incumbency and newness barrier conditions.

The proposal has some limitations. First, it is a theoretical contribution that is only weakly validated through illustration using a case study from the literature and another from contemporary practice. Empirical testing is required to establish the bounds of its relevance. Longitudinal case studies of the kind conducted on the DMV offer the opportunity to investigate the dynamics proposed in the model. Second, the model is not applied to any specific organisational capabilities in this proposal (although it was in the DMV case). Further work on this is in progress. Third, the model is not explicitly applied to different project scenarios. For example, organisations whose main business is not delivering IS projects versus IS services firms. Conceptually, the model may be applied in different project scenarios but the implications and effects may vary (see further below). Finally, the paper does not consider how capabilities are built, their inter-relationships, how they aggregate, the role of complementarities and intervening variables, or the capability threshold between project performance and underperformance. These are areas for future research.

The proposed model has implications for research and managerial practice. For research, one implication is to widen project research by challenging current assumptions and seeking models that take a different functional form, rather than only looking for more definitive critical success factors and processes. The proposed model suggests that project performance is more complex and dynamic than a main-effects relationship with antecedent factors and processes. Second, the proposed model provides a theoretical justification for capability-based sourcing. Capability optimisation has been a

motivator in sourcing decisions for many years but it has lacked a specific theoretical foundation outside of organisational economics (the 'buy or build' decision) and resource dependence theory. The model implies that an organisation is better-off focusing on building capabilities that are fundamental to its business because these are capabilities that it is more likely to be able to mature. This will improve its chances of staying in the continuous learning part of the model and minimise exposure to liability discontinuities. A final implication is for organisational change research. IS strategy research largely assumes a continuous world in which projects can be clustered and sequenced into a change program to implement strategy. By contrast, the proposed model suggests that transformational projects are quasi-independent events that are fundamentally discontinuous. This implies a need for further research on managing IS-enabled strategy under discontinuity via IS projects.

For practice, two key implications flow for managers. First, avoid limiting managerial focus to critical success factors, processes and methodologies. Rather, consider also the change conditions that might represent unexpected barriers to progress and performance. According to the proposed model, projects can underperform or fail despite good management. Also risk management falls down in the face of project discontinuities because they cannot be easily identified as risk before they impact the project (Bannerman 2008b, 2008c). Having high levels of capability in the project domain is critical to an organisation's ability to respond to unexpected and discontinuous change. Second, managers can structure projects to bias the organisation's position towards the learning side of the model. This can be done by choosing project roles that build on the capabilities that are operationally and strategically relevant to the business, thereby limiting exposure to liability conditions. For example, as is widely recognised, an organisation whose main business is not building information systems would be better-off outsourcing the development to a suitable service provider. This would enable the organisation to employ and further develop its own internal IS service delivery capabilities in managing the delivery from the service provider. This positions the organisation in the continuous learning part of the model in contrast to the position it would be in if it tried to build the system with inadequate stocks of system development capabilities. By contrast, the service provider is able to leverage the cost of building capabilities in systems development across multiple clients and concurrent projects, because this is its core business, thereby also biasing its position towards the learning part of the model.

In conclusion, improving project performance is critical to the role of IS as an operational and strategic enabler in organisations. New thinking is needed to redress a tradition of variable and poor performance outcomes. The theoretical model proposed in this paper fills critical gaps in current approaches to the problem by highlighting the importance of capabilities (in addition to factors and processes) in project performance, the existence of independent drivers of underperformance, and the underlying complexity of the performance model. The proposal contributes a new explanation of why projects are difficult to manage and why performance varies, and it improves our ability to explain anomalous project outcomes encountered in practice.

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