Successful programmes wanted: Exploring the impact of alignment

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Abstract

Alignment between formulation and implementation of business strategy can be important for achieving successful programmes. The authors have explored developing a programme management alignment theory. Statistical testing suggests that interaction between the study model variables was found to be multidimensional, complex and subtle in influence. They conclude that programmes have both deliberate and emergent strategies requiring design and management to be organised as complex adaptive systems. Programme lifecycle phases of design and transition were often illustrated by an unclear and confusing strategic picture at the outset which makes it difficult to control. Learning was established as an underlying challenge. The study model demonstrated continuous alignment as an essential attribute contributing towards successful delivery. This requires programme design and structure to adopt an adaptive posture.

Keywords: Corporate Strategy, Programme Management, Governance, Continuous Alignment, Deliberate and emerging strategies.

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1. Introduction

This paper considers the impact of programme alignment and related factors that contribute towards successful programme delivery. The study attempted to disclose the key underlying assumptions that connect programme management with related theory of strategic, organisational and project management. Exposing the hidden management ideology and practices that actually inform structure and content require understanding of programme success and failure factors (Lycett, Rassau and Danson, 2004). The identification of an interaction structure and management practices that support continuous alignment may thus provide significant potential in reducing the unacceptable rate of programme failures (Kotter, 1995, Morris, Crawford, Hodgson, Sheppard and Thomas, 2006). The study will have relevance to all those that have influence over the formation and execution of programmes.

Business strategy is complex and intertwined with all the processes and systems that are required to effectively manage an organisation. Programme management may be considered as an effective building block and umbrella framework in the operationalization of business strategy. The links between business strategy and programme management reside within the alignment of the strategic processes of formulation and implementation. Strategic alignment will be unique to a particular organisation and will involve a dynamic and iterative process of mutual adjustment and reshaping (Beer, Voelpel, Leibold, and Tekie, 2005). Strategic implementation in many companies is an enigma through misaligned projects and a lack of a systemic approach in linking business strategy. Understanding the potential contribution of programme alignment may thus further contribute towards improving the effectiveness and efficiency in the delivery of strategic objectives (Burdett, 1994; Chorn, 1991; Strassmann, 1998). This study has empirically explored implementing strategy through programmes of projects and the need to continually manage programme context.

Programme management environments are complex and the uncertainty arising from multi-combinations of uniqueness, stakeholder expectations, assumptions, constraints, changing environments, and human social systems can provide the impetus for failure (Lehtonen and Martinsuo, 2009). The messy, complex and multi-faceted environment of programme management produces a need to continually realign the programme and related-projects to changing environmental and corporate objectives (Thiry, 2004). Research has been recommended to focus attention on causality and complexity in context (Ivory and Alderman, 2005; Morris and Pinto, 2007; Pollack, 2007). The inherent complexity involved in applying structured programme management frameworks to organisational contexts thus warrants further serious consideration (Pellegrinelli, Partington, Hemingway, Mohdzain, and Shah, 2007). This study responds to this by applying a dynamic systems perspective to programme management. This may improve the usefulness and practical application of existing good practice frameworks (OGC, 2007; PMI, 2009).

2. Theoretical background and model

The study was operationalized through the core concepts of systems, governance, innovation and learning, corporate strategy, environmental factors, continuous alignment and successful delivery (Figure 1). This viewed success as a multidimensional construct – programme management success, programme success, achieving business objectives, strategic orientation and business success (Shenhar, Dvir, Levy, and Maltz, 2001). These dimensions consider success from a business, corporate and economic level respectively. Appropriate hypotheses were advanced to formulate a reasonable prediction about the relationship of the variables contained in the model.

INSERT FIGURE 1

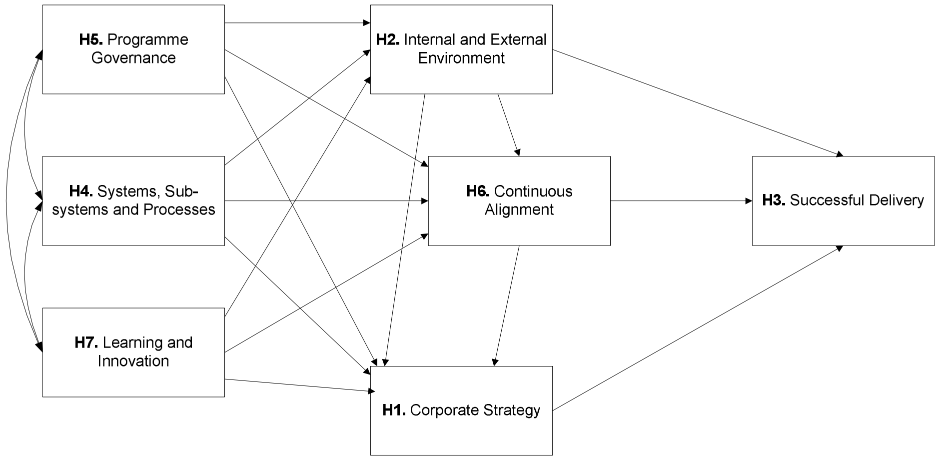

Fig. 1. Theoretical model and hypotheses.

2.1 Corporate strategy, project and programme management. Programme management is strategic in orientation through delivering outcomes and benefits related to the organisation's strategic goals (OGC, 2007; APM, 2007; PMI, 2009). This will require the programme and interrelated projects to have their objectives and strategies aligned with corporate strategy to create an iterative hierarchy that develops into business operations (Dietrich and Lehtonen, 2005). Some organisations may be adopting programme management as they develop their strategic management capability. There will be a multiplicity of options available in achieving strategic objectives through programme-driven approaches requiring intelligent programme design. Context will be crucial in determining appropriate programme formation (Pellegrinelli, 2002 and Pellegrinelli, et al, 2007). International, government, societal, industrial, commercial and business programmes will differ in focus and predictability of outcome.

Clearly articulated corporate strategy will support the prioritisation and execution of the right programmes and projects. This alone will not guarantee programme success. Ill-conceived business strategy will not necessarily be redeemed by programme and project management. This will make reliable prioritisation and consistent allocation of resources based on the greatest strategic contribution more difficult (Hrebiniak, 2006). Programmes may also be compromised by strategic business case misrepresentation. This will result in misalignment with strategic objectives. Managing programmes will involve the task of remaining aligned with corporate strategy (OGC, 2007).

Some organisations have well-developed programme management maturity and organisational management systems that support continuous alignment. Well-aligned organisations will be able to prioritise both activities and how identified work gets executed. The greater the alignment between the operating environment, strategy, structure and processes the more positive effects this will have on performance (Middleton and Harper, 2004). Alignment will be essential for strategic success although non-alignment may exist for temporary periods through significant organisational and industry sector change. Strategy formulation and implementation will thus require organisational alignment with its resource capability (Engwall and Jerbrant, 2003). Shenhar, et al (2001) also suggest that project success will be strongly linked to an organisation's business effectiveness.

Research indicates that project failure is distinctly linked to factors at the front end of a project through misalignment with an organisation's key strategic priorities (Pinto and Slevin, 1998). Hyvari (2006) and Engwall (2003) support this in concluding that organisational context will be an important factor in determining success or failure. Programmes should be selected and formed from organisational strategy by aligning and coordinating related-projects (Morris and Jamieson, 2005). Programme formation and structure may be unclear at the outset requiring flexible strategic implementation planning and modular phased projects. This need for a dynamic interface provides a clear business case for organisations to improve their capability in the management of programmes of projects and to ensure that structure follows business strategy. These and other context-dependent and decision-orientated issues lead to the following hypothesis:

H1. Corporate strategy leads to a vision and stakeholder strategy that takes account of the organisation, market and sector in which it operates.

2.2 Environmental factors. Modern organisations are constantly analysing their business activities and industry sector searching for business opportunities (Venkatraman, 1989). This may result in constant change of business priorities and plans. De Wit and Meyer (2005) argue that the most common cause of corporate failure is misalignment between the organisation and its environment. Sheppard and Chowdhury (2005) strengthen this argument and emphasize that a fundamental failure of management will exist if they do not properly evaluate the environment. Globalization and technological innovation create dynamic and complex environments for many current businesses where change is a constant factor. Managing major changes successfully may require an organisation-wide approach and this will impact at both the operational and strategic levels (Carnall, 2007). The size and scale of some organisations make it impracticable for a radical change from existing practices to be orchestrated at the same time. Strategic change decisions must be orientated in the most appropriate sequence to increase the likelihood of execution success (Bruch, Gerber, & Maier, 2005). The OGC (2008) recommend the adoption of programme and project prioritisation categories to ensure alignment between business priorities, current capability and capacity to deliver.

Well-constructed and managed programmes should provide confidence that the right projects are being sponsored and that the desired benefits will be achieved. Managing a programme will be a complex undertaking requiring both project management acumen and the capability of a business leader (Pellegrini, 1997). Every programme will be unique to its contextual environment. Rapidly changing and chaotic environmental factors will create a high-level of task and organisational complexity. This will require the impetus to monitor and challenge programme and project performance. Increasing programme complexity may provide an ever-present threat of failure. Solving one unyielding problem may create unexpected drawbacks elsewhere. The more complex the programme the greater interaction risk and interdependence with the internal and external environment (Verma and Sinha, 2002). This will need focus on the tension between strategic direction, project delivery, operational effectiveness and external influences. The organisation is unlikely to be in total alignment and will have different change capabilities. An open outlook and sense of cooperation would be ideal but this is seldom realised in practice (Kotter and Schlesinger, 2008). Organisational change resistance will be inherent (Ford and Ford, 2009). The programme will more than likely be differentiated and gradual rather than radical and coordinated.

Knowledge of the current and future environment will influence the choice of strategic objectives and strategies employed. Changes to the organisational and business environment may lead to significant alterations to the programme scope and priorities. The time-horizon and long-term nature of some programmes can have a significant impact on manageability. The speed of technical evolution and communication technology may require adjustment or even cancelation of tight timeframe programmes. The programme's mission should provide a focus for an integrated continuous decision alignment framework (Scherpereel, 2006). Major strategic reviews may be required at different times in the programmes lifecycle to coordinate alignment. This will be an indicator of organisational strategic maturity (APM, 2007). Unpredictable environmental factors are thus cross-linked to managing programmes and will require a dynamic, flexible and adaptive temporary organisation. Programme management in practice will involve top-down strategic implementation linked with bottom-up emerging management strategy through successful project integration in the host organisation (Srivannaboon and Milosevic, 2006). These emergent-shaping conjectures lead to the following research Hypothesis:

H2. The organisation's strategy is influenced and reshaped from both the internal and the external environment.

2.3 Systemic factors. Programme management is a management strategy informed by complexity thinking which increases manageability and coordination. Deliberate and emergent business strategies will require flexibility in the programme design (Mintzberg and Waters, 1985; Mintzberg, 1994; Mintzberg, Ahlstrand, and Lampel, 1998; Elizabeth and Ysanne, 2007). Emergence describes a dynamic process that is the product of ongoing system interactions. This refers to the coexistence and impact of programme management, project management, business-as-usual activities, environmental factors and corporate governance. The emergent and co-evolutionary dynamic of programme management will require open systems. Open system refers to the uncontrollable variable of the environment and the self-organising tendency if left unmanaged. This introduces nonlinear interaction, unpredictability and feedback loops in support of organisational learning theory. Open systems theory considers the organisation as a number of interdependent sub-systems that are open to and connected with their environment. This provides the potential for the system to take on a new form in response to environmental factors requiring the facilitation of information-driven activities.

Programme management provides an integration solution for strategic business management in dealing with complexity and chaos in multiple-project environments (Pourdehnad, 2007). Establishing systemic alignment between people, processes and technology will provide benefits. Emerging technologies can be adopted to enhance organisational alignment capability and maturity (Gaddie, 2003). The programme system may be radically unpredictable beyond its immediate future requiring a dynamic approach of emergent planning (Kash and Rycoft, 2000). The capability of an organisation and the coordinated presence of critical programme elements will influence integration success. Critical programme elements refer to the contextual programme design or blueprint. Established programme processes will need to continuously integrate adaptive decision making through leaning processes (Lindkvist, 2007). This will require a focus on complex interactions, interdependency, processes and the co-evolution of business systems.

Understanding what management practices are required for any given programme will be an important challenge. It will be fundamentally important that the distinguishing features of the programme are understood as this should influence programme design (Meyer, Loch, and Pich, 2002). Uncertainty (structural, technical, directional and temporal) will be inevitable and a basic feature of this complex system. Leading a programme will thus be multi-faceted, situational and transient (Uhl-Bien, 2006). Contextual uncertainty may materialise in the form of an opportunity or risk. High uncertainty and complexity will require a holistic approach in designing the programme (Maylor, Brady, Cooke-Davis, and Hodgson, 2006). Influences from the external environment may be frequent, accidental and unpredictable with the internal environment being equally as dynamic (Rybakov, 2001). Drawing together these system dynamic principles leads to the following research Hypotheses:

H3. The programme mission and objectives support the creation of worthwhile business benefits and the successful delivery of the programme.

H4. Programmes and projects are managed through a set of interdependent critical processes and subsystems that support strategic alignment and realignment.

2.4 Governance. Corporate governance provides the structure for initiating and determining the objectives of an organisation and the means of monitoring, evaluating and influencing performance. Effective programme governance will be a major strategic factor and cannot be confined to a narrow static model that ignores dynamic complexity. This will require emphasis towards flexibility with the organisation-programme-governance interface (Rycroft and Kash, 2004). The sponsoring group will be pivotal for success. A further critical aspect will be the determination of structures and control measures to ensure alignment with the unique organisational and contextual environments. The success of the programme will require a flexible governance structure that can be identified from contextual design criteria to ensure that it is fit for purpose. The programme mission will be a critical reference point for aligning structures, policies, procedures, behaviours and decision making.

Multi-owned programme governance will require a strong focus on alignment (APM, 2007). This will be derived from intertwining multiple perspectives of governance in establishing a self-organising complex adaptive system (White, 2001). Various alignment strategies may be needed in response to stakeholder objections and agenda-setting behaviours. Emergent and ill-defined programmes will need to make greater use of alignment mechanisms and tools. Well-timed, accurate and focused reporting will be central to integrating both performance and learning loops. These attributes provide the essential platform for configuration activities in the process of actively shaping and reactively adapting to the shifting contextual environment. These issue and problem-based suppositions lead to the following research Hypotheses:

H5. Programme governance provides the control framework through which the objectives are delivered while remaining within corporate visibility and control.

H6. A continual process of realignment ensures that programmes and projects remain linked to corporate objectives and environmental influences.

2.5 Innovation and Learning. Organisational learning is essentially about an organisation increasing its ability to explore opportunities and undertake effective action (Carlile, 2004). This may lead to far-reaching changes and the formulation of new organisational strategies. Learning and continuous improvement is attributed as the highest level of management maturity. There must be defined roles, functions and procedures for learning to become organisational (Lipshitz, Popper, and Friedman, 2002). The various Body of Knowledge's incorporate the need to learn from projects. Learning through programmes and projects is thus a subset of organisational learning (Brady and Davis, 2004). This will need the systemic integration of data, information and knowledge. Sense (2007) suggests that projects are an embryonic structure that develops a new community of practice through situational learning and negotiation of emergent opportunities. This provides an experientially constructed temporary system for solving problems and knowledge transfer.

Learning from both success and failure will thus be essential in a programme of projects. Programmes provide enhanced opportunity for learning through the batching of related-projects, interdependency and the increased socialisation from resource sharing. Project management practices will differ between industry sectors and organisations providing a potential gulf in language and learning that must be considered. The ill-defined requirements of some programmes will challenge the linear stage-gate process of innovation through inherent iteration (Smith and Winter, 2005). Programmes may require differing distinctive leadership styles at different junctures in the programme lifecycle. Multidisciplinary learning will emerge through a process of activity and alignment decision making (Fong, 2003). The following research Hypothesis captures this strong learning relationship:

H7. Within the lifecycle, programme and project processes embrace change and realignment by using learning to create innovation and improvement opportunities to support the successful delivery of the programme.

3. Method

The study was designed to bring to the forefront critical issues that supported the advancement of alignment theory for programme management. The need for a rigorous theory-building process led to the selection of a mixed method study design that involved both statistical and text analysis.

3.1 Sample and data collection. The participants were selected from a population profile that was established from the Rethinking Project Management Network, Accredited Project Management Training and Consulting Organisations, the email list for the Association for Project Management Programme Management Significant Influence Group and specific email groups from a UK-wide service-led organisation. The Rethinking Project Management Network was a UK Government-funded research initiative that aimed to develop, extend and enrich mainstream project management ideas in relation to developing practice. This included leading academics and practitioners in the field of project management. The programme concluded with five directions established for future research which were outlined in a special issue of the International Journal of Project Management (2006). These themes complimented this study through a growing emphasis on programmes and managing collections of projects. Association for Project Management Accredited Project Management training providers specialise in the delivery of project based training that is aligned to APM qualifications. These companies influence developing practice and project professionals through their consultancy practice. The APM Programme Management Specific Interest Group (http://www.apm.org.uk/group/apm-programme-management-specific-interest-group, accessed: 6 April 2011) aims to be the leading internationally recognised group for programme management. This study contributed to their mission to promote the science and discipline of programme management. The specific email groups from the service-led organisation consisted of those involved in both transformational change and Information System programmes. All respondents were further classified by their role within programmes and the context of their practice-related experience. This targeted professional groups who were classified as consultants or experts, senior managers that are actively involved in programmes, programme managers, project managers and those holding project-related job functions. This ensured the respondents were representative, knowledgeable and appropriate to the study.

Data collection was by means of a standardised questionnaire and semi-structured interviews. The quantitative data was collected through a multi-mode administration method primarily from an email-driven strategy supported by a web survey. The web survey mirrored the self-administered questionnaire. This did not include advance notification as it was administered through the Programme Management Significant Influence Group monthly newsletter. The email-driven list consisted of 264 subjects while the web survey provided a further 2005 subjects. Six volunteer informants were randomly selected for interviews that classified themselves as either programme consultants or experts and programme managers to ensure absolute knowledge of the dynamics of the study model. Each interview volunteer further represented a different programme management context – information technology, organisational change, new product development, civil engineering and someone who had diverse experience of different types of programmes. These interviews further explored the causal relationships of the research model to understand how participants actually constructed theory and determined emerging phenomenon in relation to the study. This provided the opportunity for the interviewee to introduce issues that they conceived as important. The quantitative and qualitative phases were integrated by an iterative process each influencing the other accordingly.

3.2 Measures. The questionnaire design was structured to gather information and understanding about organizational, environmental, programme and project management alignment. Respondents were requested to respond based on their practice-related experience and expertise. This required questions to be answered by respondent experience and insight. Close-ended questions were used to classify the professional orientation (Programme Management Consultant/ Expert; Senior Manager involved in Programmes; Programme Manager/ Director; Project Manager involved in Programmes; Other – Please Specify) and programme management context of participants (IT/ Software Development; Organisational or Management Change; New Product Development; Construction/ Civil Engineering; Generalised). These differing characteristics and attributes were coded by a five-category nominal level of measurement. The model variables and hypotheses were included in the questionnaire as close-ended questions to validate respondent's opinion of the statements. These were measured on a four-point Likert scale ranging from 1 (never) to 4 (always). This was a deliberate decision in removing the availability of a middle alternative to ensure respondents indicated the direction of their viewpoint.

The model variables and hypotheses needed to be constructed into a Structural Equation Model to test and confirm proposed relationships. This involved translating the proposed alignment theory into a structural model. Learning and innovation, programme governance and systemic factors were classified independent variables in the study model. Successful delivery was the dependent variable which was hypothesized to be influenced by the independent variables and intervening variables of environment, continuous alignment and corporate strategy. The general sample characteristics and size of the study data determined the measurement and interpretation of the statistical analysis. The selection of structural equation modelling ensured that measurement error was taken into account in the procedures (Schumacker and Lomax, 2004). The model was identified through including an error parameter for each variable that fixed the factor loading to 1.

This multivariate statistical approach combined the application of both path and confirmatory factor models in analysing the causal model and study data. AMOS (Analysis of Moment Structures) is an add-on module for SPSS that allows structural equation models to be specified by using a simple drag-and-drop drawing tool to test proposed casual relationships. The specified structural model follows standard drawing conventions to show the cause and effect relationships (Figure 2). The variables measured in the study model are depicted by enclosed rectangles. Unobserved variables or model measurement errors are denoted by circles. This ensured that measurement errors were explicitly considered in statistical calculations. Straight-line single headed arrows from one variable to another indicate a direct influence from that variable to the other. Zero rating values would indicate that there was no direct impact. The absence of a straight-line single headed arrow between variables indicates that there are no direct effects hypothesized. Double-headed curved lines between variables indicate a covariance. These coefficients detect and measure the relationship between two variables through an index range with zero indicating no relation to 1.0 suggesting a perfect relationship. The strength and impact of each model parameter estimate is illustrated by the numerical output beside an arrowhead or variable in the study model. Problems in specifying the drawn model structure are highlighted by an error message or by the AMOS text output not calculating. Measurement and study model modification involved identification with and linking of qualitative data.

INSERT FIGURE 2

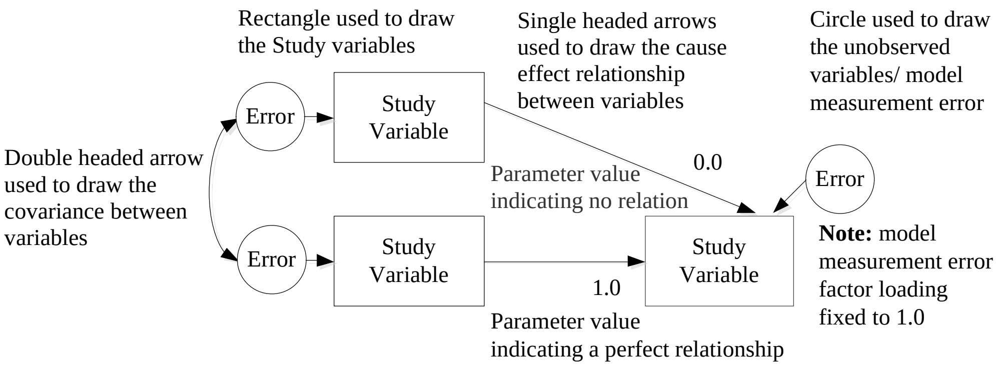

Fig. 2. Structural equation model drawing conventions

3.3 Reliability and validity. The mixed method study design combined the different criteria used for validity and reliability in both qualitative and quantitative research. There were a number of prerequisites that needed to be satisfied before a multivariate analysis could be undertaken. Exploratory data analysis validated the appropriateness of statistical methods and techniques (Table 1). Kurtosis outputs established that outliers in the data sample were not problematic as this can provide misleading values with statistical methods and techniques. The presence of outliers would affect structural equation model fit significance tests. Pearson Correlation coefficient (1911) and two-tailed significance level tests indicated that all variables were significantly correlated. Correlation is a measure of linear dependence between variables. The stronger the correlations, the more power Structural Equation Modelling has to detect an incorrect fitting model. Reliability testing provided an indication of the general quality of the study data. Cronbach's Alpha statistic (1951) was adopted as a measure of the internal consistency and reliability of the study data. This statistical output ranges from any value less than or equal to 1 and provides an unbiased estimate of generalizability. The value of above .70 is recommended although values exceeding .80 are desirable for higher reliability test studies. Cronbach's Alpha statistic output of .831 thus validated that the internal consistency reliability of this analysis was good.

The exploratory data analysis procedure concluded that the data was approximately multivariate normal in distribution and suitable for application to Structural Equation Modelling. This classification was essential as small deviations from multivariate normality can lead to a large difference in the Chi-square test. AMOS labels this test global model fit (CMIN). This label will now be adopted throughout the remainder of this paper when referring to the Chi-square test.

INSERT TABLE 1

		1	2	3	4	5	6	7	Mean	Std D.
Strategy	Correlation	--	.407**	.402**	.366**	.360**	.441**	.386**	2.89	.695
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000		
Environment	Correlation	--	--	.297**	.309**	.301**	.403**	.336**	3.23	.673
	Sig. (2-tailed)			.002	.001	.001	.000	.000		
Successful Delivery	Correlation	--	--	--	.503**	.485**	.442**	.454**	2.93	.726
	Sig. (2-tailed)				.000	.000	.000	.000		
Systemic Factors	Correlation	--	--	--	--	.490**	.453**	.406**	2.89	.782
	Sig. (2-tailed)					.000	.000	.000		
Governance	Correlation	--	--	--	--	--	.531**	.354**	2.89	.758
	Sig. (2-tailed)						.000	.000		
Continuous Alignment	Correlation	--	--	--	--	--	--	.522**	2.70	.761
	Sig. (2-tailed)							.000		
Learning & Innovation	Correlation	--	--	--	--	--	--	--	2.50	.751
	Sig. (2-tailed)									
Cronbach's Alpha Reliability Statistics Based on Standardized Items										.831

**. Pearson Correlation is significant at the 0.01 level (2-tailed).

Table 1. Pearson Multivariate Correlation and Cronbach's Alpha Reliability Tests

Multiple pilot-testing methods were used to refine the standardized questionnaire and qualitative interview structure to validate that the designs were clear, simple and elicited the appropriate responses. Missing data was eliminated with participants of the online survey as this adopted a computer questionnaire which needed a response before progressing and completing the survey. The quality and completeness of the returned email questionnaires was extremely high. The only incidence of missing data was clarified by a follow-up email. Structural Equation Modelling used interval data from the questionnaire for testing purposes. Randomised selection was adopted for the interview informants to address the amount of diversity bias evident from the quantitative data phase. This ensured that a representative sample could be generalised across the wider programme management community. The semi-structured interviews focused on rigorous subjectivity by respondent validation of the quantitative research findings. This involved asking questions such as ‘does the model structure make sense?’ and ‘are the relationship paths representative of your experience?’. Respondents were then encouraged to justify opinions and provide alternative explanations. This facilitated understanding and interpretation of relationships between study variables.

Structural Equation Model validation essentially involved statistical and theoretical evaluation of model fit. The selection of appropriate statistical fit measures considered issues such as sample size and overall complexity of the model. These tests are based on the assumption that the correct and complete relevant data have been modelled. The study sample size adopted a lower limit of 100 respondents as proposed by some authors (Chen, Bollan, Paxton, Curran, and Kirby, 2001; Gagne and Hancock, 2006). Unobserved error variables were included to explicitly depict the unreliability of measurement in the model. This allows the structural relations between variables to be accurately estimated. Criteria for study model fit and testing were determined from the size of the study data and sample multivariate characteristics. Model validation was determined through global model fit (CMIN), root-mean-square error of approximation (RMSEA), goodness-of-fit index (GFI) and other normalised model fit measures. Global model fit (CMIN) of zero illustrate a perfect model fit although it is generally accepted that this is impractical in reality. For reasonable sample sizes, a difference enough to produce a Global model fit (CMIN) in the region of the Degrees of Freedom (DF) would suggest a close model fit. The root-mean-square error of approximation (RMSEA) was adopted as this provides an output that does not penalise model complexity. Modification index results following a specification search illustrated the reliability of the relation paths drawn in a specified Structural Equation Model.

3.4 Data analysis. Study model modification followed an iterative process between the Structural Equation Model statistical analysis (Arbuckle, 2007) and model structure theoretical validation through semi-structured interviews (Silverman 2006). The best-fitting model which is also consistent with theory is selected. Structural Equation Models combine measurement models (e.g., reliability tests) with structural models (e.g., regression weights). This is based on data-driven model fitting. AMOS provided automated modification indices as an alternative to manual model-building and model-trimming. Model fit was firstly measured on the closeness of the study sample variance-covariance matrix. Modification needed to satisfy this measurement criteria and the need to have theoretical meaningfulness. Statistical model cross-validation through semi-structured interviews established problems in the structure of the model. This resulted in the model structure being redefined so the variables were arranged differently affecting path relations (Figure 1).

The model estimates were then recalculated. This involved the AMOS automated modification function through indicating that all the model correlations and direct relations from the independent variables to the intervening variables were optional. This supported the potential of further model refinement by removing poorly weighted relationship parameters following the specification search. This provided a multiplicity of other models that fitted the data and identified potential adjustments that could be made to the model. The AMOS text output indicated the estimated change and reliability in the new path coefficient for each alternative model proposed. Improvement in model fit was measured by a reduction in Global model fit (CMIN). The statistical model output indicated that overall model fit was adequate and could not be further statistically improved (Table 2 and Figure 2). The model structure was then further refined to provide a theoretically validated model. This introduced a new variable that could not be statistically measured.

4. Results

The email-driven survey provided a response rate of 31% (81 No.). The web survey had a larger population but significantly lower response rate of 1% (29 No.) reducing the overall study response rate to 5% (110 No.). This provided some concern regarding statistical significance. Various studies have concluded that a lower response rate does not necessarily differentiate reliably between accurate and inaccurate data (Visser et al. 1996; Keeter et al. 2006). The findings of these studies found that much lower response rates were only minimally less accurate. The 29 web survey respondents were included as they provided a rich source of expert data but more importantly this enhanced the sample size to improve statistical model significance. Survey respondents were reasonably dispersed over 4 programme management practice-related groups – expert (25%), senior managers (27%), programme managers (21%) and project-related roles (27%). An evaluation of Hoelter's (1983) critical N from the model output suggests that the largest model sample size required at a significance level of 0.05 is a threshold of 37. This provided reasonable confidence of sample size adequacy (N = 110) against concerns of statistical significance.

The statistically modified model is illustrated in figure 3 following measurement model reliability testing. An analysis of the number of distinct parameters (NPAR = 25) and the number of degrees of freedom (DF = 3) determined that the model was complex. This outcome will provide conflicting results with some model fit measures that attempt to balance parsimony or simplicity against model complexity. The root-mean-square error of approximation (RMSEA) provides an output that does not penalise model complexity. The modified model has an output of .248 that exceeds the reasonable error approximation of .1 suggested by Browne and Cudeck (1989). This suggests poor model fit although RMSEA can be misleading when the minimum sample discrepancy function (CMIN/DF) is small and sample size is not large (> 200). Figure 3 illustrates the modified model which provides an adequate Global model fit (CMIN = 23.156) with the minimum sample discrepancy function being satisfactory (CMIN/DF = 7.719). The minimum sample discrepancy function (CMIN/DF) attempts to make Global model fit (CMIN) less dependent on sample size. The minimum sample discrepancy function (CMIN/DF) should be close to 1 for perfect fitting models. Global model fit (CMIN) for models involving 75 to 200 cases are a reasonable measure of model fitness. However, complex models are more likely to have a good Global model fit (CMIN). P-values for Global model fit (CMIN) for sample sizes less than 200 are also useful as this measure is a function of sample size (p=.000).

INSERT FIGURE 3

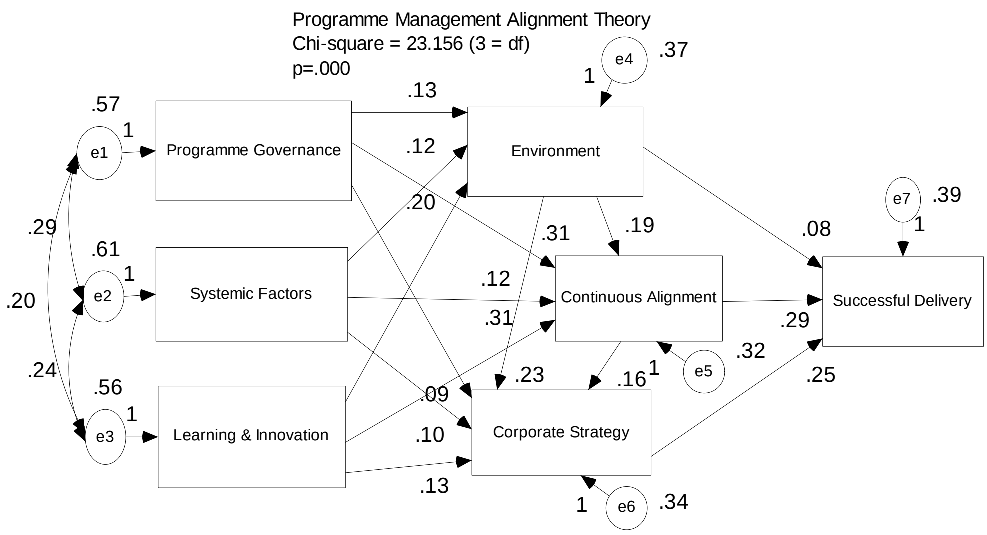

Fig. 3. Statistically modified Structural Equation Model

Other measures of model fit needed considered along with Global model fit (CMIN). The objective was to find the most parsimonious model which is well-fitting by a selection of goodness of fit tests. Comparison against a baseline model allows a further evaluation against the saturated (e.g. guaranteed to fit any set of data perfectly) and independence models (e.g. severely constrained to provide a poor fit) through a number of indices. These fitness measures are normalised to fall between the ranges 0 to 1 with an output close to 1 indicating a good fit. Jöreskog and Sörbom's (1984) goodness-of-fit index (GFI) supports this outcome of good model fit (GFI = 0.948). The Bentler-Bonett (1980) normed fit index (NFI) further suggests a good model fit (NFI = 0.900) although results less than this value indicate that substantial improvement is required. Bollen's (1989b) incremental fit index (IFI) and Bentler (1990) comparative fit index (CFI) both indicated a very good model fit (IFI = 0.912 and CFI = 0.904).

Parsimony adjusted measures provide an estimate of the required parameters to achieve a specific level of model fit. This rewards parsimonious models with relatively few parameters to estimate in relation to the number of variables and relationships in the model. Some researchers oppose penalising models with more parameters. There is no commonly agreed-upon cut-off value for an acceptable model although some authors use above 0.50 and others 0.60 (Preacher, 2006). The James, Muliak and Brett (1982) parsimonious normed index (PNFI = 0.129) and parsimonious comparative fit (PCFI = 0.129) suggest poor model fit. These results are influenced by model complexity. This measure of fit thus offers little in contributing to the selection of the best-fitting model other than for assessment after consideration of goodness of fit measures among proposed competing models.

Path correlation coefficients in the model needed interpreted once a good-fitting model had been accepted. Regression weight significance tests for each parameter relationship in the structural model are given in Table 2. The first column is labelled parameter Estimate with the next column indicating the Standard Error (S.E.) for each parameter. The Critical Ratio (C.R.) is the Estimate divided by the S.E. Any critical ratio that exceeds 1.96 in size would be identified significant using a significance level of 0.05.

The S.E. is only an approximation and therefore may not be the best approach in determining parameter significance and suggests caution with interpretation. Individual parameter values can also be affected by sample size with Anderson (1984) recommending sample sizes exceed 150 for reasonable and stable parameter relationship estimates. Structural path coefficients are the effect sizes calculated by AMOS. These are displayed above their respective arrows in the structural drawing diagram (0.8 high, 0.5 moderate, less than 0.2 low).

INSERT TABLE 2

Description of Path			Estimate	S.E.	C.R.	P	Standardised Estimate
Environment	<---	Governance	.134	.091	1.473	.141	.151
Environment	<---	Systems	.124	.090	1.378	.168	.144
Environment	<---	Learning	.201	.087	2.293	.022	.224
Alignment	<---	Systems	.122	.084	1.457	.145	.125
Alignment	<---	Environment	.191	.088	2.171	.030	.169
Alignment	<---	Governance	.312	.084	3.705	***	.311
Alignment	<---	Learning	.308	.082	3.741	***	.304
Strategy	<---	Environment	.233	.093	2.515	.012	.226
Strategy	<---	Alignment	.160	.099	1.621	.105	.175
Strategy	<---	Governance	.086	.092	.932	.352	.094
Strategy	<---	Systems	.101	.087	1.167	.243	.114
Strategy	<---	Learning	.129	.090	1.436	.151	.140
Successful Delivery	<---	Environment	.084	.102	.826	.409	.078

Successful Delivery	<---	Alignment	.293	.091	3.201	.001	.307
Successful Delivery	<---	Strategy	.246	.100	2.454	.014	.236

Table 2. Regression Weights and Standardised Regression Weights

All correlation coefficients for the variables that represent the critical programme elements are positive in direction and have moderate strength (0.20 to 0.29). The C.R. for each of these are statistically significant (C.R. = 3.927, 4.595 and 3.487). This indicates that there is a closely defined relationship between the critical programme variables suggesting a finely balanced direct correlated effect on the intervening variables. The continuous alignment intervening variable is directly influenced the greatest from the collective strength of all the independent variables (0.31, 0.12 and 0.31). Both the governance and learning and innovation variables are deemed statistically significant (C.R. = 3.705 and 3.741 respectively) although the systemic variable is insignificant (C.R. 1.457, p = 0.145). The dominant independent programme variable in relation to strength impact is learning and innovation (0.13, 0.31 and 0.20).

The relationship paths from the environment variable to continuous alignment and strategy are both statistically significant (C.R. 2.171, p = 0.030 and 2.515, p = 0.012 respectively). The environment variable has a direct (C.R. 0.826, p = 0.409) and indirect effect on the successful delivery dependent variable through both the continuous alignment and corporate strategy intervening variables. Continuous alignment also has a direct (C.R. 3.201, p = 0.001) and indirect effect on the successful delivery dependent variable through corporate strategy. Continuous alignment and corporate strategy have a moderate direct individual effect but a strong collective influence on successful delivery (0.29 and 0.25 respectively). The environment variable has a low direct impact on successful delivery (0.08) but moderately contributes indirectly through two other intervening variables (0.19 and 0.23).

Table 3 further summarises the testing of hypothesized relation pathways in the accepted study model (CR > 1.96, significant at p =.05 level).

INSERT TABLE 3

Description of Relationship Path		**Path Coefficients (Estimate)**	**Critical Ratio (C.R.)**	**P-value**	**Result**
H1	Successful Delivery<---Strategy	.246 (Moderate)	2.454	.014	Significant
	Design<---Strategy	No data	No data	No data	Untested
H2	Alignment<---Environment	.191 (Low)	2.171	.030	Significant
	Strategy <---Environment	.233 (Moderate)	2.515	.012	Significant
	Successful Delivery<---Environment	.084 (Low)	.826	.409	Insignificant
H3	Successful Delivery<---Strategy	.246 (Moderate)	2.454	.014	Significant
	Successful Delivery<---Environment	.084 (Low)	.826	.409	Insignificant
	Successful Delivery<---Alignment	.293 (Moderate)	3.201	.001	Significant
H4	Environment<---Systems	.124 (Low)	1.378	.168	Insignificant
	Alignment<---Systems	.122 (Low)	1.457	.145	Insignificant
	Strategy <---Systems	.101 (Low)	1.167	.243	Insignificant
H5	Environment<---Governance	.134 (Low)	1.473	.141	Insignificant
	Alignment<---Governance	.312 (Moderate)	3.705	***	Significant
	Strategy <---Governance	.086 (Low)	.932	.352	Insignificant
H6	Strategy <---Alignment	.160 (Low)	1.621	.105	Insignificant
	Successful Delivery<---Alignment	.293 (Moderate)	3.201	.001	Significant
H7	Environment<---Learning	.201 (Moderate)	2.293	.022	Significant
	Alignment<---Learning	.308 (Moderate)	3.741	***	Significant
	Strategy <---Learning	.129 (Low)	1.436	.151	Insignificant
H8	Learning <--- Design	No data	No data	No data	Untested
	Systems <--- Design	No data	No data	No data	Untested
	Governance <--- Design	No data	No data	No data	Untested

Table 3. Tests of hypothesized relation pathways (P-value <0.05)

The findings of the statistical investigation suggest that the independent variables are predicators of successful programme delivery through the complex interaction of the intervening variables. The outcome of the analysis illustrates that the model is complex with relationships being very precariously balanced. The modified model offers an empirical explanation of the critical relationships involved for continuous alignment and successful delivery. The results of this mathematical maximisation procedure are sample specific and can only be generalised to the study population. This provides a causal model that articulates but does not conclude causal assumptions. The semi-structured interviews further validated the relationship and importance of the statistical analysis impact weighting for each parameter. An underlying theme that emerged from each interview was the need to make more clearly explicit the activity of programme design. This provided a strong justification for the importance and inclusion of programme design in the study model. The inclusion and visibility of this variable was further supported by expanding the necessary dynamic feedback from corporate strategy. The model structure was revised accordingly (Figure 4). Quantitative data had already been gathered so the modified and theoretically validated model could not be statistically tested further.

INSERT FIGURE 4

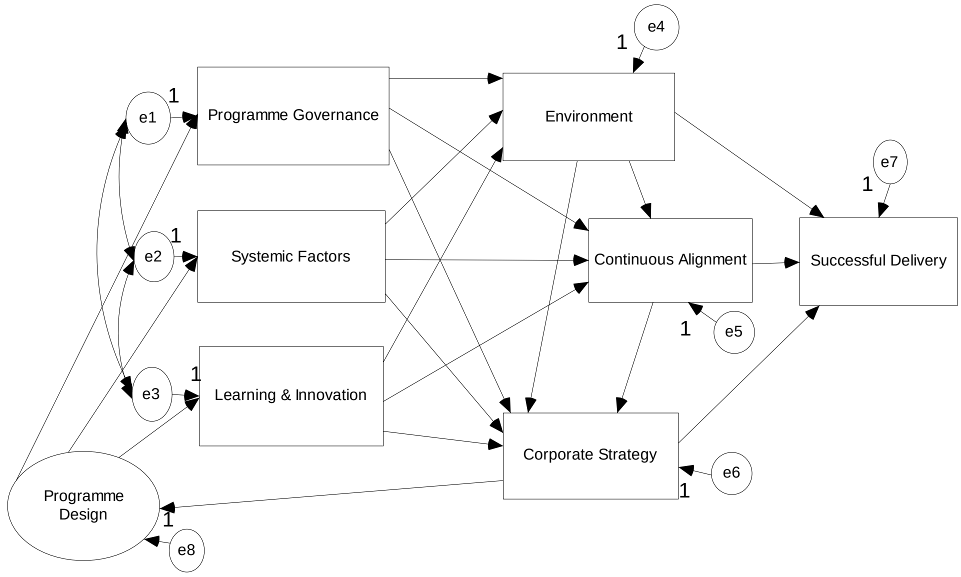

Fig. 4. Statistically Modified and Theoretically Validated Model

5. Discussion

The study was designed to advance the development of an alignment theory for programme management through a rigorous theory-building process. Structural Equation Modelling was selected as a technique that was used to estimate, analyse and test the study model that specified relationships among variables. This allowed testing and validation of already constructed theories involving an evaluation of structure and model fit. Semi-structured interviews were discovery-focused which uncovered contradictions and new ways of thinking in the study model. This resulted in the re-specification of the structural model variables and validation of the accepted conceptual model. The strength of structural coefficient paths in the model needed assessing as goodness-of-fit measures do not provide absolute guarantee that each particular part of the model fits well. The structural model was evaluated by modification indices that report the improvement in fit that results from adding or deleting an additional path to the model. This introduced competing models and the evaluation of individual parameters. Modification indices results suggested that model adjustments would make no further improvements to Global model fit (CMIN). Modifications also needed to have substantive sense and theoretical validation.

Model evaluation is one of the most disputed and difficult issues connected with structural modelling (Arbuckle, 2007). Structural Equation Models are generally considered a good fit if the value of the global model fit (CMIN = 23.156, p =.000) and badness of fit index (RMSEA = .248) test is adequate, and at least one incremental fit index (GFI = 0.948), and one baseline fit measure (NFI = 0.900; IFI = 0.912 and CFI = 0.904) meet the predetermined criteria. The study model satisfies and in some cases exceeds this convention with the exception of Badness of fit index (RMSEA). The minimum sample discrepancy function (CMIN/DF) and study sample size make RMSEA difficult to interpret. This may be deceptive and not necessarily indicate a poorly fitting model. The structural model could be considered adequate against prescribed measures of fit providing a model that conveys causal assumptions. The meaning of causal needs interpreting with care as structural equation modelling does not confirm that an accepted model produces validated causal conclusions. The research framework provided convergence and corroboration of findings resulting in the statistically modified and theoretically validated model. This was responsive to changes in the unfolding of the study. The study model was only partly statistically tested due to insufficient data. This revealed weaknesses in the research design and methodology that needed to firstly validate the structural model and hypotheses before administrating the test instrument to the wider study population.

The qualitative research aspects of the study design offered a richness and depth of understanding unlikely to be achieved with a standalone quantitative approach. Some interesting issues were exposed relating to underlying relations in the study model most notably relating to strategy, learning and programme design. There was reasonably clear demonstration that strategic vision was being translated into programmes. Programme lifecycle phases of design and transition were found to be particularly problematic in practice by interview respondents. This emphasized that strategy was a rather ambiguous phenomena in practice. The creation of strategy was seen to be an easier process than implementation. This reinforced that organisations were complex systems. Strategic management was principally perceived by interview respondents as providing required organisational direction in dealing with success and failure from a business context. There was recognition that programme success would not be guaranteed even when a clearly articulated business strategy was apparent from the outset. Strategy was generally seen to be emergent affecting the programme as it moves down the organisation. There was recognition that absolute organisational alignment may be difficult and unrealistic as a consequence. Interview respondents confirmed that this made it necessary to view programmes as dynamic and evolving structures.

The front-end of programmes were identified to be frequently ill-defined with low levels of formation constraining the early definition of success. This suggested that programme design and structure was a dynamic process that needed to be continually assessed from programme formation through to programme close. Interview respondents emphasized that programmes of projects should continually use the best knowledge obtainable to inform a systems view. This was seen necessary otherwise something viewed as essential might not happen in practice. Other viewpoints emphasized the need to move from the linear, milestone-based processes of some business activities because integration was seen to be hand-in-hand with experienced complexity. The different practice-related views of the interview respondents demonstrated that in contextual detail every programme will be unique. This further confirmed the presence of a high level of execution-complexity with a high level of organisational and environmental complexity as a wide variety of variables need to be considered.

There was general consensus that many organisations were not designed for project management. Programme design was stated to be much bigger than a static process. Practical challenges were identified when the host organisation did not have the requisite project management capability. This further emphasized the highly complex nature of effectively designing programmes of projects. Interview respondents stated that programme design was a significantly important pre-implementation activity. This led to its greater prominence in the study model as inappropriate setup was seen as something that would negatively impact on implementation and management of the programme. Interview respondents suggested that programmes need to be designed to acknowledge complexity and the emergent detail of the programme.

The study further exposed that programme culture was often underscored by learning and innovation in responding to inherent programme complexity. This strong underlying profile for learning and knowledge-sharing practices was occasionally underrated in the interview phase of the study. There was some evidence of systemic learning driven by a project management approach with people who had similar levels of knowledge. Nonetheless, there was a general tendency for learning to be classified as low priority. However, the statistical model findings strongly suggest that learning and innovation in programmes is fundamentally important for success. The different types of learning that emerged related less to structured approaches but more to satisficing and improvisational outcomes. There was some recognition that increasing programme complexity will make organisational learning a primary measure of programme management effectiveness. Examples were given where programme learning had been effective but this had not been transferred to the wider-organisation.

6. Conclusions

The selected model provides a conceptual framework to support the understanding of programmes. The strength of the model is in the illustration of the systemic characteristics that will make programmes particularly challenging to understand and manage. The hypothesized statements can be conceived to be a plausible set of interconnected narratives that describe the relationships which support the conceptualisation of the study model. This needs to include the programme design variable to allow recursive feedback in the model. The study model does highlight the importance of effective programme design and transition management. The model suggests that successful programme delivery will be an elusive concept in practice that requires flexibility for strategic and environmental adaptation.

The findings of the study conclude that programmes have both deliberate and emergent strategies requiring programme design and management to be organised as complex adaptive systems. This integrates theoretical concepts from both systems thinking, organisational and project management theory. Complex adaptive systems are often illustrated by unclear strategies from the outset and influential constant changes. Interviewee knowledge of the concept of complex adaptive systems was limited although descriptions and viewpoints given supported this system dynamic. Senior managers and programme managers need to recognise the importance of all the study model variables, how they align and the programme capability required in successfully delivering business strategy. The adoption of programme management should thus be a well-thought through strategic decision.

This study contributes to programme management by the understanding of complex adaptive systems and its application to the project management field in many ways. Firstly, the study identified several high-level variables that need consideration for the successful alignment of programmes. These variables can be used to analyse project and programme failures contributing to organisational learning. Secondly, the exploration of these variables has led to the development of a model that reveals an interaction structure that depicts programme formation and implementation in practice. Finally, the results of validating the study model have indicated some of the managerial problems that need consideration when designing and managing programmes of projects.

7. Recommendations for further research

Based on the literature review, study results and emergent issues identified in the study there were some insights that provide direction for future research. The emergent reality of programme management requires a clearer understanding on the impact of structured, incremental and contextual learning. Learning within programmes is also an identified gap within the published literature. The study also identified a significant need to identify the effective practices and approaches that support effective programme design. This needs to consider how organisations effectively apply an adaptive posture to environmental factors.

8. Limitations

The study has a number of limitations. Structural equation modelling cannot test directionality in relationships. The directions of arrows in the accepted structural equation model represent the researcher's hypotheses of causality within a programme management system. This will be limited to the choice of variables selected and proposed relation pathways hypothesized. Increasing the sample size would improve the statistical model convergence and parameter estimate accuracy providing greater confidence in the model outcome. This may directly affect the model path regression weightings. The findings of the statistical model are also influenced by the researcher's organisation that were undergoing a significant organisation-wide change programme. This potential bias was adequately dealt with through the selection strategy for the semi-structured interviews. Change programmes are vision-led and emergent. This puts greater emphasis on culture change and organisational readiness which may have enhanced the model path relationship regression weightings for learning. Every programme classification will have an inherent need to remain aligned with business strategy regardless of issues relating to programme context.

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