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The Impact of Project Management Practices and Project Sponsorship on Project Performance

David Bryde, Reader in Operations Management, School of Management, Faculty of Business & Law, Liverpool JM University, John Foster Bldg., 98 Mount Pleasant, Liverpool, L3 5UZ, UK, d.j.bryde@livjm.ac.uk

David Petie, Pricipal Consultant, Petie Ltd, 6 Erw'r Llan, Trevddyn, Mold, CH7 4PE, UK, dpetie@btconnect.com

INTRODUCTION

Performance of Information Technology Projects

Globally, reports of poor project performance of Information Technology (IT) are common. In the US a report of the Standish Group (2003) on IT projects cites that success rates are 34%. Whilst this is a 100% improvement since 1994, when only 16% were classed as successful, it still means that, in the words of the report, 15% of all projects are "failures" and 51% are "challenged" i.e. only partly successful. Furthermore the percentage overrunning or not providing the required functionality/features had increased since 2000. This raises the question, how does the level of performance of IT projects compare with other types of projects? Reports from other sources suggest poor performance is just as much an issue for other types of projects. In the UK the issue of poor performance has been identified in both public/private sectors. In the public sector The Office of Government Commerce (OGC) (2004) identified continuing weakness in project delivery in the Improving Programme and Project Delivery (IPDD) Report. Whilst in the private sector the reports by Latham (1994) and Egan (1998) highlighted poor performance in the Construction sector. However there has been little comparative analysis of performance of IT and other types of project, which leads to the first research question addressed in this study: *How do IT projects perform in comparison to other types of projects?*

Project Critical Success Factors

Over the last three decades academics and practitioners in the discipline of project management have sought answer the question: *What are the influences on project success?* Seeking the answer resulted in research into project critical success factors (CSFs). The concept of "success factors" was introduced by Daniel (1961) as "usually three to six factors that determine success; these key jobs must be done exceedingly well for a company to be successful" (p.116). The concept has been applied to project environments (Cooke-Davies, 2002) and analysis of the literature highlights two issues. Firstly, a recent review of 13 prior studies of project CSFs found that most studies had focused on deriving CSFs that are applicable to a particular industry, such as construction or IT (Iyer & Jha, 2005). This suggests a need for further work to identify generic project CSFs. Secondly, an outcome of most studies of project CSFs is a list of factors. Such lists makes it difficult for project managers to evaluate which are the key factors that impact on performance (Belassi & Tukel, 1996). In response to this difficulty, Belassi & Tukel proposed the development of frameworks that group CSFs, although to date there has been little evidence of theory development in this area, beyond Belassi & Tukel's exploratory 1996 study. This leads to the next research question: *How can existing theory be used to develop frameworks of project CFSs that apply to both IT and non-IT projects?*

Linking Project CSFs and Performance

Research into CSFs has led to another focus of empirical studies, which is an analysis of the links between operational practices and dimensions of performance. For example, practice-performance links have been explored in relation to Total Quality Management (Hendricks & Singhal, 2001; Kaynak, 2003; Shieh & Wu, 2002), Just-in-Time (Fullerton et al, 2003), Total Productive Maintenance (McKone et al, 2001) and Human Resource Management (Belout & Gauvreau, 2004). In relation to the management of projects, some of the project CSF studies have explored project management practice-performance links, though a limitation is that most have focused on specific success measuring parameters (and may be further limited by the lack of generalisability of the CSFs as discussed in the previous section) (Iyer & Jha, 2005). These limitations provide the rationale for the final research question: *What can project CSF frameworks contribute to our understanding of the key drivers of both IT and non-IT project performance?*

MODEL DEVELOPMENT AND HYPOTHESES

Using Sociotechnical Systems Theory

Despite the fact that some studies of CSFs have looked to develop models that group different factors (see, for example, Chan et al, 2001) there is a lack of theory to explain the linkages between the factors and project performance. In a study of how software project risk affects project performance, Wallace et al (2004) used sociotechnical systems theory to guide the construction of a framework comprising of dimensions of project risk. Using the theory, they proposed that there were two types of risk: social-subsystem risk, which captures the notion that project risk is embedded in a social context of organisations and users; and technical-subsystem risk, that focuses on the technical complexity of producing a product that meets requirements.

In our study we explore whether sociotechnical systems theory can be similarly useful in developing frameworks of project CSFs. Using the extant project management literature on CSFs, i.e. Pinto & Slevin (1987), DeWitt (1988), Belassi & Tukel (1996), Bytheway (1999), Chan et al. (2001), Fui-Hoon Nah et al. (2001), Procacinno et al. (2002), we identified 2 broad groupings of CSFs: "Project Management Practices", which relate to activities aimed at delivering high levels of project and project management performance; and "Roles and Responsibilities", which relate to the establishment and character of the relationship between two of the main parties involved, the sponsor and the project manager. We then use sociotechnical systems theory to posit that project management practices/roles and responsibilities can be grouped into two types. Those practices focused beyond the management of the individual project life cycle to include the programme perspective (Lycett et al., 2004), the management of benefits and the

delivery of long-term success (the social-subsystem perspective) and those focused on the project management of an individual project (the technical-subsystem perspective). Those sponsor/project manager roles and responsibilities issues relating to organizational competency and strategic delivery issues linked to project management, in such areas as programme management, benefits management, sponsoring individual projects, long-term planning and governance and training and support (the social-subsystem perspective) and the sponsorship provided by one person to an individual project (the technical-subsystem perspective).

Hypotheses

To explore the third research question: *What can project CSF frameworks contribute to our understanding of the key drivers of both IT and non-IT project performance?* We developed the following hypotheses:

H1: Social-subsystem Project Management Practices will be significant predictors of project

performance.

H2: Social-subsystem Sponsorship will be significant predictors of project performance

OPERATIONALIZATION OF VARIABLES

A composite measure of project performance was developed consisting of 11 items, reflecting the multi-dimensional character of project success (Shenhar et al, 2001). Items were included to reflect the distinction in the literature between "project management (pm)" performance and "project" performance (DeWitt, 1988), with pm performance comprising adherence to cost/time/quality-related objectives (Atkinson, 1999) and to how the project is managed through its life cycle; and project performance incorporating a measure of the effect of the final product/service on the customer and other key stakeholders (Baccarini, 1999). Perceptual-based measures of performance were used, which is consistent with prior studies (i.e. Shenhar et al, 1997; Tukel and Rom, 2001). The 11 items are shown in Table 1. We then used the project CSF literature, outlined previously, to establish project management practices that incorporated both social-subsystem and technical-subsystem perspectives. Finally, we drew upon the following literature relating to sponsor/project manager roles and relationships: Kliem & Ludin (1992), Morris (1994), Briner et al (1999), Turner (1999), Anderson & Merna (2003), Hall et al (2003), to delineate social and technical elements. Table 2 shows the resultant items for both practices and roles/responsibilities.

METHOD

Survey Instrument

A questionnaire was designed to obtain data about project management practices and sponsor/project manager roles/responsibilities in general. Respondents were also asked to select a particular project and report on its performance. A 5-point Likert scale of Strongly Agree to Strongly Disagree was used in each. The questionnaire was mailed to a random selection of 1,000 organisations, with a total of 109 (10.9%) usable responses were received.

Analysis Procedures

In order to explore the first research question t-tests were used to compare the mean performance scores given by respondents to their chosen projects, using the composite variable of project performance described above, for the independent groupings of IT/IS projects v others. The Levene test was used to test for homogeneity of variance (with F value not significant, $p > 0.05$ required) (Kinnear & Gray, 1997).

The second research question focused on delineating the factors that were emphasised in the project management practices and in the establishment and fulfilment of the project sponsor and project manager roles and responsibilities. To do this exploratory factor analysis was used. In the case of the project management practices, 15 items were reduced from the data to its constituent factors and in the case of roles and responsibilities 16 items were reduced. The exploratory factor analysis used Principal Components Analysis as the extraction method and Varimax rotation with Kaiser normalization (Kinnear & Gray, 1997). The critical assumptions underlying factor analysis were tested and confirmed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (must be greater than 0.5) and the Bartlett Test of Sphericity (its associated probability must be less than 0.05). All factors with eigenvalues greater than 1.0 were extracted and a cut-off loading of 0.5 was used to screen out variables that were weak indicators of the constructs. The datasets were examined to ensure the 5:1 sample-to-variable ratio was exceeded to maximise the potential generalizability of the results (Hair et al, 1998).

The third research question looked to explore the predictive quality of the latent factors identified in the exploratory factor analysis on project performance. This was done using stepwise multiple regressions. This method has been used in comparable situations i.e. Williams (2002), Pinto & Prescott (1988), Corbett & Claridge (2002), Forza (1995). The robustness of the method is compromised if outliers are present (Agostinelli, 2002) therefore the data were examined to ensure there were no cases outside 3 standard deviations from the mean. Cumulative probability and scatterplots were generated and examined to ensure that the residuals were normally distributed and that assumptions of linearity and homogeneity of variance are met (Kinnear & Gray, 1997).

RESULTS

Descriptives and t-Tests

99 (90.8%) of respondents worked in services and 10 (9.2%) in manufacturing. 42 (38.5%) were employed in the private sector, 67 (61.5%) in the public. 73 (67%) respondents reported on a current project, 35 (32.1%) on a completed project and one person did not answer the question. 23 (21.1%) classed themselves as programme manager, 33 (30.3%) as project manager, 22 (20.2%) as sponsor, 17 (15.6%) as team member and 12 (11%) as 'Other'. Two respondents did not answer the question. 76 (69.7%) classed their project as IT/IS, 11 (10.1%) as change management, 7 (6.4%) as strategic and 13 (11.9%) as 'Other'. Two respondents did not answer.

The results of the t-test comparing the perceptions of performance between those reporting on IT/IS projects (n=76) and those reporting on other types of projects (n=31) gave the Levene Test value of F=2.377 and a p value of 0.126. Therefore the test was valid and the Mean Difference was not significant, suggesting that there was no significant difference in the performance between IT and non-IT projects.

Exploratory Factor Analysis

Project Management Practices

The exploratory factor analysis on the 15 variables identified four factors, which were labelled as follows: 'Benefit Management and Success Measurement', 'Project Perspective', 'Project Management and Financial Performance', 'Scope Management' (see Table 1). Both the KMO statistic (0.757) and the Bartlett Test of Sphericity (.000) were acceptable for the factor analysis. All variables, apart from 1, loaded satisfactorily onto the factors. This variable was: 'Intangible benefits are identified for each project'. This variable was subsequently discounted in the regression analysis. The first factor accounted for 31% of the variance and the second factor for 10%. Overall the four factors accounted for 58% of the total variance.

Roles and Responsibilities
Four factors were identified from the exploratory factor analysis (Table 2). These factors were labelled 'Socio-sponsorship', 'Techno-sponsorship', 'Project manager-sponsorship (performance-related)' and 'Project manager-sponsorship (change-related)'. All 16 variables satisfactorily loaded, with 1 variable 'project sponsors monitor benefit realisation of projects' loading onto both Socio-sponsorship and Techno-sponsorship. Acceptable values for the KMO measure (0.861) and Bartlett's Test of Sphericity (0.000) were reported. Socio-sponsorship accounted for 39% of the variance and Techno-sponsorship for 8%. 61% of the total variance was accounted for by the four factors.

Stepwise Regression Analysis

Project Management Practice Factors
The 4 factors: Benefit Management and Success Measurement, Project Perspective, Project Management and Financial Performance, Scope Management, were loaded into the regression model as the independent variables, with the composite measure of performance as the dependent variable. The results are shown in Table 3. The stepwise regression shows that only Benefit Management and Success Management (with a multiple correlation cooefficient R of 0.444) is a worthwhile predictor of success. The inclusion of Project Perspective, Project Management and Financial Performance, Scope Management was not robust and they were excluded from the final model.

Roles and Responsibilities Factors
When Socio-sponsorship, Techno-sponsorship, Project manager-sponsorship (performance-related) and Project manager-sponsorship (change-related) factors were loaded as the independent variables Socio-sponsorship was identified as the predictor of performance (R = 0.378) (see Table 3). The 3 other factors were excluded from the model as not robust.

All Factors
For the final regression analysis all 8 factors were run together. Two models were generated (see Table 3). The first model identified Benefit & Success Management as the predictor of success, with an R value of 0.451. A second model gave a slightly better predictor of performance (R value of 0.483). This model included Benefit & Success Management and Socio-sponsorship. The remaining 6 factors were excluded as not robust.

CONCLUSIONS

Returning to the research questions and hypotheses, although exploratory in nature, the empirical evidence of this study does support the following:

How do IT projects perform in comparison to other types of projects?

- The results of the t-test suggest that performance on IT projects is comparable to that of other types of project.

How can existing theory be used to develop frameworks of project CFSs that apply to both IT and non-IT projects?

- Sociotechnical systems theory seems to make a worthwhile contribution in establishing a framework of project CSFs. In the case of project management practices, the factor analysis produced 4 factors that could be distinguished in terms of a social-subsystem and technical-subsystems. The social-subsystem factor focused on activities associated with the management of benefits and activities that take place before a project starts i.e. approval and that take place when a project is finished i.e. measuring success. In the case of roles and responsibilities, the factor analysis again produced 4 factors that could be explained using sociotechnical systems theory. The social-subsystem factor focused on sponsorship activities either outside individual projects i.e. training and creating the right environment or on activities outside the individual project's life cycle i.e. benefit monitoring.

What can project CSF frameworks contribute to our understanding of the key drivers of both IT and non-IT project performance?

- The results of modelling the impact of the social and technical factors on project performance suggests that a CSF framework, informed by sociotechnical systems theory, can contribute to our understanding of the drivers of performance for all types of project.

H1: Social-subsystem Project Management Practices will be significant predictors of project performance.

- The results of the step-wise regression analysis suggest that socio-sub system Project Management practices are a useful predictor of project performance, but that the addition of technical-sub systems does not produce a robust and reliable predictive model.

H2: Social-subsystem Sponsorship will be significant predictors of project performance

- The results of the step-wise regression analysis suggest that social-subsystem Sponsorship activities are a useful predictor of project performance, but that the addition of technical-sub systems does not produce a robust and reliable predictive model.
- Finally a model comprising of social-subsystem factors for both project management practices and roles and responsibilities (but excluding technical-subsystem factors) is the most predictive of project performance

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Table 1. Items to measure project performance

Item
My organisation classes/is likely to class this a successful project
The project achieved/will achieve its stated objectives
The project is delivering/will deliver the expected benefits
The project delivered/will deliver the required outputs within the time constraints specified
The project was regarded/will be regarded as a success by the client
The project was regarded/will be regarded as a success by other important stakeholders
The project outputs was/will be of the expected quality
The project outputs addressed/will address the requirements of the end user
The project outputs was regarded/will be regarded as a success by the people working on it
The project delivered/will deliver the outputs within the cost constraints specified
The project management process used was/is effective

Table 2. Items to measure practices and roles/responsibilities

Item
Project management practices
Time, quality and cost are the only realistic measures we use for determining project success
We generally use financially-based criteria for justifying projects
In our organisation all projects must demonstrate a pre-defined Return on Investment before they can be approved
Our projects are restricted in size or impact to improve the chances of success
Business benefits of a project are managed through to their realisation
Projects are planned in terms of activities, milestones or deliverables
Projects are subject to rigorous project risk analysis
Tangible benefits are identified for each project
Some of our projects get cancelled because the risk profile is too great
In our organisation, the success criteria are specified for each project
In our organisation, the project scope usually refers to the set of project deliverables
The business benefits associated with a project are clearly identified
The success of a project is measured against pre-defined criteria at the end of a project
Intangible benefits are identified for each project
Projects are reviewed after completion in terms of meeting original plans
Roles and responsibilities
The project sponsor is usually responsible for defining the business benefits/requirements
Senior management make a demonstrable commitment to project management
Project managers usually approve the re-definition of a project if required
Usually the establishment of a project strategy, including priorities, is undertaken by the project sponsor
Project sponsors monitor benefit realisation of projects
On most projects the project sponsor agrees the project definition, including project objectives
Where necessary staff are given training to ensure projects objectives will be achieved
Project sponsors will usually champion projects, including making resources available
Senior management create the environment for projects to succeed
The project sponsor is usually responsible for defining the project success criteria
The project manager is usually responsible for specifying any constrains to a project
Ongoing monitoring of projects' business environment is carried out by project sponsors
If appropriate, a project sponsor will cancel a project
The monitoring of project performance is overseen by the project manager
Project sponsors support project managers in fulfilling their role
Project sponsors take delivery of projects at completion

Table 3 . Exploratory factor analysis of variables for project management practices

Factor	1	2	3	4
Benefit Management and Success Measurement (social-subsystem)				
In our organisation all projects must demonstrate a pre-defined Return On Investment before they can be approved	.682			
Business Benefits of a project are managed through to their realisation	.628			
Tangible benefits are identified for each project	.661			
The business benefits associated with a project are clearly identified	.699			
The success of a project is measured against pre-defined criteria at the end of a project	.715			
Project Perspective (technical-subsystem)				
Projects are planned in terms of activities, milestones or deliverables		.783		
Projects are subject to rigorous project risk analysis		.661		
Some of our project get cancelled because the risk profile is too great		.532		
In our organisation, the success criteria are specified for each project		.548		
In our organisation, the project scope usually refers to the set of project deliverables		.557		
Projects are reviewed after completion in terms of meeting original plans		.653		
Project Management and Financial-based Measures (tech-subsystem)				
Time, quality and cost are the only realistic measures we use for determining project success			.707	
We generally use financial-based criteria for justifying projects			.855	
Scope Management (tech-subsystem)				
Our projects are restricted in size or impact to improve the chances of success				.813
Some of our projects get cancelled because the risk profile is too great				.501
Eigenvalues	4.661	1.553	1.377	1.073
% of variance explained	31.07	10.36	9.18	7.15
Cumulative % of variance explained	31.07	41.43	50.61	57.76

Table 4. Exploratory factor analysis of variables for roles and responsibilities

Factor	1	2	3	4
Socio-sponsorship (social-subsystem)				
Senior management make a demonstrable commitment to project management	.720			
Project sponsors monitor benefit realisation of projects	.571			
Where necessary staff are given training to ensure project objectives will be achieved	.699			
Project sponsors will usually champion projects, including making resources available	.763			
Senior management create the environment for projects to proceed	.765			
Ongoing monitoring of projects' business environment is carried out by project sponsors	.517			
If appropriate, a project sponsor will cancel a project	.553			
Project sponsors support project managers in fulfilling their role	.642			
Techno-sponsorship (technical-subsystem)				
The project sponsor is usually responsible for defining the business benefits/requirements		.791		
Usually the establishment of a project strategy, including priorities, is undertaken by the project sponsor		.670		
Project sponsors monitor benefit realisation of projects		.509		
On most project the project sponsor agrees the project definition, including project objectives		.526		
The project sponsor is usually responsible for defining the project success criteria		.784		
Project sponsors take delivery of projects at completion		.606		
Project manager-sponsorship (performance-related) (tech-subsystem)				
The project manager is usually responsible for specifying any constraints to a project			.716	
The monitoring of project performance is overseen by the project manager			.802	
Project manager-sponsorship (change-related) (tech-subsystem)				
Project managers usually approve the re-definition of a project if required				.850
Eigenvalues	6.209	1.318	1.175	1.042
% of variance explained	38.81	8.24	7.34	6.51
Cumulative % of variance explained	38.81	47.05	54.39	60.90

Table 5. Results of regression analysis

Impact of project management practices factors on project performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Significance
1	.444(a)	.197	.190	5.477	26.272	.000(a)

a Predictors: (Constant), Benefit & Success Management

Dependent Variable: Composite Measure of Performance

Impact of roles and responsibilities factors on project performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Significance
1	.378(a)	.143	.135	5.705	17.512	.000(a)

a Predictors: (Constant), Socio-sponsorship

Dependent Variable: Composite Measure of Performance

Impact of project management practices and roles and responsibilities factors on project performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Significance
1	.451(a)	.203	.196	5.501	26.780	.000(a)
2	.483(b)	.233	.218	5.423	15.798	.000(b)

a Predictors: (Constant), Benefit & Success Management

b Predictors: (Constant), Benefit & Success Management, Socio-sponsorship

Dependent Variable: Composite Measure of Performance