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A qualitative re-construction of project measurement criteria

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Abstract

Purpose – Failure is encountered regularly within project-based industries and there has been research for decades into this phenomenon. Much of it has considered the failure of projects in terms of the classic project progress issues such as time, cost and quality. Using cases from two major industries the authors aim to develop a different understanding of project measurement criteria. This work is part of a larger completed investigation into information systems and information technology (IS/IT) project management models, developed for industry comparisons.

Design/methodology/approach – During the study, the concept of project failure and success is investigated. The authors carry out a UK-based, grounded study of two project-based industries of differing maturity levels (construction and IS/IT) to investigate measures of project failure or success across the two industries.

Findings – The paper presents a reassessment of project measurement criteria. This is based on the separation of measures for project performance and project progress.

Research limitations/implications – The adopted strategy of naturalistic inquiry has always been susceptible to the criticism that it relies too much on subjective interpretation of data. In addition, no clear relationship was established between the factors discussed and the criteria for measuring project success.

Originality/value – The paper discusses current differences in perception of what actually constitutes a failed or successful project. The paper highlights that often two different (but closely related) concepts, are being discussed by project stakeholders.

Keywords Project management, Measurement

Paper type Research paper

Introduction

The effects and impacts of projects which have been unable to meet specific stakeholder criteria measures within the information systems and information technology (IS/IT) industry have been firmly in the consciousness of most project management professionals since the demise of both FoxMeyer (Chen, 2001) and Iridium (Finkelstein and Sanford, 2000), in 1994 and 1999, respectively. In both cases, the road to bankruptcy commenced with poor IS/IT implementations.

In IS/IT alone, it is anticipated that around 20-30 per cent of all commissioned projects are unable to meet specified stakeholder criteria measure resulting in total wasted spend of around £75billion in the USA and £70billion within the EU (Gauld, 2007). The construction industry is considered to be a mature project-based industry (Morris, 1994) but it has been faced with similar problems. Historic examples of failed construction projects include the Suez Canal with cost overruns of 1,900 per cent and the Channel Tunnel with cost overrun of 80 per cent (Flyvbjerg *et al.*, 2005). Recent major UK construction projects that have been regarded as having failed, for differing reasons, include; the London Millennium Bridge which failed to perform and was closed

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immediately on opening; the London Millennium Dome which was success as a construction project but failed in public perception; Wembley Stadium and the Scottish Parliament building which were late and over cost. In Nigeria, the Ajaokuta Steel Complex was commissioned in 1979 to be completed in six and half years by December 1987 (Duru and Sunday, 2005). Plagued by misinformation, massive and unaccounted cost overruns, benefit shortfalls, and waste which Flyvbjerg (2007), identifies as a typical failure driver for large-infrastructure projects, the project is still on-going and yet to be completed.

The reality seems to be that numerous reports (The Standish Group, 2001, 2004; National Audit Office, 2006; The Royal Academy of Engineering, 2004; Egan Report, 1998; KPMG, 2003) confirm that the inability of projects to meet certain measure or performance objectives appears to be a constant. This is despite efforts to address the factors which are driving the inability of these projects to meet these criteria. There are numerous reasons why this may be the case. In the first place, business change is often driven through projects but change may also affect them. As a result, organisations often find themselves dealing with projects that are increasingly difficult and expensive to implement in order to secure the financial success of their organisations. In some cases, it does appear that these organisations end up struggling to define a clear set of measurement criteria that aligns to their strategic objectives.

Background

There are various studies including that of Saleh and Alshawi (2005), Wateridge (1995, 1998), de Wit (1998) Westerveld (2003), Agarwal and Rathod (2006), Calisir and Gumussoy (2005), Lindahl and Ryd (2007) and Johs *et al.* (2007), that in their reviews have contributed to the current state of knowledge on measures of failure or success for projects. So far, there has been no definitive solution produced.

Other research, in particular examining the macro (external factors) and micro (internal factors) that determine failure or success criteria has been conducted in studies carried out by Lim and Mohamed (1999) and also by Agarwal and Rathod (2006), although this study was heavily constrained due to concentration on the perception of failure or success accepted by only the project team.

The reality is that previous attempts have not been able to provide a definitive view on project measurement criteria for the primary reason that there has not been a clear concept defined that can link failure and success (Wideman, 2000).

An additional issue for consideration is at what point a project is considered to be successful or not. Take, for example, a project such as Kodak's Project Advantix system-Orion. Was it a successful or failed project? From a project management perspective, it was recognised by the Project Management Institute as the 1997 International Project of the Year. The unfortunate reality is that falls in Kodak's stock price of about 67 per cent were directly attributed to the project failing from a strategic perspective because the project sponsors had failed to anticipate the accelerating switch to digital photography (Bandler, 2003). Such occurrences raise serious questions about how and when project performance should be measured, and the relationships that exist with measures of success. One view, highlighted by Andersen *et al.* (2006), is the need to only consider failure or success of a project months or years after the termination of the project. In a way, it might well be that the failure or success of a project can only be determined at the end of a project, not necessarily its completion, but the end of the life of the project (i.e. at the point the overall driving business objectives are no longer required).

Research methodology

The methodology for data collection and analysis was rooted in grounded theory (Glaser and Strauss, 1969; Strauss and Corbin, 1990). This acknowledges the researchers' experience in the field being investigated but uses analytical techniques recommended in the literature to develop theoretical sensitivity. This includes maintaining an attitude of scepticism to early categories and validating them within the data.

In this case, the analysis tools were based on the use of matrices and conceptual coding starting with open coding to identify and develop categories then moving to axial coding to relate categories.

A total of 15 semi-structured interviews were conducted (Table I). Each interview lasted between one and two hours. Five of the interviews were conducted with project management professionals working for three major UK construction companies, measured by turnover (*Corporate Watch*, 2004). The other ten interviews were with project management professionals working within the UK IS/IT industry (across five different organisations). Validation of results was then conducted with a panel made up of six additional project managers (all IS/IT). No member of the validation panel had been previously interviewed.

The major interest of the primary study was to investigate the IS/IT industry. However, it was considered that useful data could be found by also considering another project-based industry at a different level of maturity. Construction is an industry which has been using project management methodologies for a long period and is considered a "mature" user (Morris, 1994). Cross-industry learning is supported by previous work conducted by Gilbert and Veloutsou (2006), who carried out comparative studies across six industries on customer satisfaction. In addition, Green *et al.* (2004), point out that such comparisons, especially for industries that are so different, allow for existing management assumptions to be challenged, thus better equipping managers to cope with change. This study of the application of such an approach is feasible because of some underlying principles in the application of project management principles across both industries. For example, there are broad similarities in the application of project management methodologies in their deployment (Hartman and Ashrafi, 2002; Cooke-Davies and Arzymanow, 2003; Dixon, 2000).

The interviews were carried out over a six-month period. As in the case of many qualitative studies, the justification for closing the sample rested on the notion of establishing data saturation – that is the sample reaches the point at which no new insights from interviewees are being obtained. The sample size satisfied this need of information redundancy and saturation.

The samples were identified using non-random purposive sampling techniques based on professional contacts of the authors. There is however, an appreciation that such an approach will result in limitations especially as the data sample were to be drawn from people within a specific network. To compensate for this limitation, the researchers adopted two approaches. The first involved obtaining the data from several levels of the management chain. The second involved a framework exercise to validate the initial survey.

Methodology and approach for analysis

Analysis of the interviews was initiated by first categorising the data with the intention of discovering patterns and concepts related to a number of areas including

Table I. Summary of organisations interviewed

Organisation	Annual turnover	Industry	Sector	Date of interview	Location of interview	Job title of interviewee
A	€600m	Const.	Private	21 January 2003	Newcastle upon Tyne	Senior project manager
B	€2bn	Const.	Private	27 March 2003	Newcastle upon Tyne	Senior site manager
C	€1.4b	Const.	Private	14 April 2003	Newcastle upon Tyne	Project manager
C	€1.4bn	Const.	Private	20 May 2003	London	Project manager
B	€2bn	Const.	Private	20 May 2003	London	Construction manager
D	€2.02bn	ICT	Private	21 November 2002	Newcastle upon Tyne	Operation cost control manager
D	€2.02bn	ICT	Private	04 December 2002	Shrewsbury	Senior project manager
D	€2.02bn	ICT	Private	04 December 2002	Shrewsbury	Programe manager
D	€2.02bn	ICT	Private	11 December 2002	Nottingham	Senior system control manager
D	€2.02bn	ICT	Private	11 December 2002	Nottingham	Technical project consultant
E	€882	ICT	Private	16 December 2002	Glasgow	Senior consultant
D	€2.02bn	ICT	Private	16 December 2002	Glasgow	Software project leader
F	€100M	ICT	Public	03 January 2003	Newcastle upon Tyne	Software development and project manager
G	N/A	ICT	Public	17 January 2003	Newcastle upon Tyne	IT manager
H	€300M	ICT	Private	21 January 2003	Newcastle upon Tyne	IP and Data delivery manager

those of failure and success measurement. Manual coding of the data was carried out using matrices and coding forms. The final part of the analysis involved identifying category notes regarding issues considered important by the interviewees. A total of 24 variables based on 163 transactions, were identified. In this paper, we discuss the variables that influence project failure and project complexity.

Research observations and discussions

What emerges from identifying key variables from the interviews is an assumption that there is no single project factor that will, in its entirety, influence the chances of a project failing or succeeding; rather, project failure or success occurs through a combination of events occurring on a continuous basis.

In order to address the issue of variables affecting projects, the interviewees were asked three questions.

(1) What variables are most likely to influence the success or failure of your projects?

(2) How do these variables affect project delivery outcomes?

(3) How do you know that your project is successful or not and how do you measure success or failure outcomes?

An analysis of responses enabled the development of concepts based on the following perspectives.

Information, planning and procurement

It appears from the interviews that the construction respondents have had to allocate a lot of resources in dealing with problems relating to incomplete information, poor planning and an inappropriate procurement route. By highlighting the importance of information availability in project success, the interviewees were confirming existing literature (Bendoly and Swink, 2007). This suggests that in projects, difficulty in project decision making handling relationships and complexities of multi-disciplinary teams can be caused by poor project information (Anwar and Tuqan, 2006; Mohamed and Stewart, 2003). Often, these variables will lead to an increase of business transaction costs. The repeated views were that effective control by the project manager depends upon timely and accurate project information, which facilitates informed decisions-especially on planning. By considering these characteristics, it is evident that project success will be greatly enhanced by a co-ordinated effort geared towards the effective management of project information.

The role of technology

A review of the responses on the role of technology as a success measure did not reveal any major changes in current knowledge. However, it did appear from the responses of some of the IS/IT project managers, that ability to deliver project solutions with newer technology influenced the perception of customers on whether a project was successful or not. To an extent, it could be argued that this is further confirmation of the perceived role of technology as a determinant of IS/IT project success. This has been discussed by scholars such as Poon and Wagner (2001) and Dvir and Lechler (2004) in earlier work. The role of technology as a determinant of project success was not emphasised as a major issue by the construction respondents, in effect confirming earlier assertions

that technology within construction is really only about enabling process and production (Mohamed and Stewart, 2003; Stewart and Mohamed, 2004), as against being a solution in itself. This does not however mean that its application is not regarded, as Nguyen *et al.* (2004), points out, as a key measure of construction success.

Design

The role of design has been long discussed by various scholars as a key project measurement criteria within both the context of IS/IT (Wooldridge and Jennings, 1998; Bourne *et al.*, 2002; Sumner, 1999) and also within the context of construction (Rwelamila *et al.*, 1999; Love and Li, 2000). However, during the interviews, no trend was established as specific to either industry.

Requirements management

On the issue of requirements, the view expressed by both sets of respondents was that the chances of delivering a product that the customer does not want and which fails to meet business needs was quite high. This was especially true when customer, user and stakeholder requirements are not properly and professionally captured, analysed and managed (Shen *et al.*, 2004).

In effect, it did not appear that any new perspective emerged on the role of requirements management as a project measurement criteria, especially as this concept appears to be a rather well developed area of project management studies both within IS/IT (Verner and Evanco, 2005; Rexfelt and Rosenblad, 2006; Wheeler, 2004) and construction (Kelsey *et al.*, 2001; Shen *et al.*, 2004).

Project measurement criteria

One clear issue which arose during the interviews was the issue of measurement criteria for projects. When asked how, the responses were slightly unexpected, especially as there is substantial research available which discuss the strategic perspective of project measurement criteria (Shenhar *et al.*, 2001, Smith-Doerr *et al.*, 2004). In the first place, both sets of respondents suggested that project failure was best measured by assessing whether the project had been delivered within required timescales, quality, and cost. However, only four out of the ten IS/IT project managers discussed the role of the overall strategic objectives of a project as perhaps being an underlying measure of how well a project was progressing. It was, however, noted that all of the IS/IT respondents who emphasised the role of strategy in success were executive level managers. This is perhaps not surprising as Crawford (2005) discusses the ability to understand the context within which projects are being delivered as an important issue when considering project management competency. This finding is also in line with work already conducted which suggests that senior management will usually focus on strategic objectives (Witcher *et al.*, 2007).

Project complexity

The researchers made an attempt to investigate the effect of project complexity on the project measurement criteria.

Interviewees were asked what do you regard as project complexity and non-directive follow up probes were used to allow further input. It is important to point out that majority of the IS/IT respondents seemed to recognise project complexity from the point

of a requirement to ensure the strategic alignment of business needs and that of information solutions. None of the construction respondents made this observation. Generally, the majority of the construction interviewees linked complexity to difficulty co-ordinating the construction production process.

Validation of the variables

The evidence suggests that variables such as project planning, the procurement route, information and requirements capture, designs and project complexity are possible influences on the success or failure of projects. It is however important to highlight that, taken in isolation, it is quite difficult to establish a clear linear relationship between these variables and any established project measurement criteria success. Most variables affect each other and together form a complicated relationship both of the way they interact and how they actually impact on projects.

The perspectives arising from the research observations will eventually lead this research towards a framework that separates project performance (failure or success measures) from measures of project progress (time, cost and quality measures).

The first step towards the development of the concepts involved a validation exercise. A second round of interviews was conducted to validate the concepts emerging from the first. The validation exercise was held in London and lasted for two hours. No member of the panel had previously been interviewed during the research exercise. Four questions were asked in order to guide the panel through the concepts that appeared to be emerging. Two of the questions are discussed in this paper. These questions were:

(1) Do you see a distinction between project progress and project success?

(2) Do you see measures of IS/IT success based on this distinction?

Distinction between project progress and project success

It was observed during this validation exercise that there was a distinction being made between project progress and other project performance measures. The panel were asked further questions about this and some comments are given here to illustrate their views:

> This distinction depends on whose perception and understanding it was being made from...

This interviewee also suggested that:

> If it's from the project manager's point of view, then this will [could] usually be from a time, cost and quality perspective.

Seemingly agreeing with this interviewee on the need for a distinction between project progress and success criteria, two other members of the panel noted:

> Yes I do, however both have to be measured at the same time, they both go hand in hand. In my opinion, if either measure fails, then it's hard to say that the project was successful...
>
> I see a distinction; because when measuring progress, you are [appear] only concerned with meeting clearly agreed milestones [usually in terms of time and cost] for the project. Success is however slightly more difficult to measure because the overriding need of the project can disappear...

Measures of IS/IT success

Another question that was raised with the validation panel was whether they actually did see measures of IS/IT projects success being based on a distinction between project progress and project success.

There was general agreement that such distinction existed. This appeared to support the evidence on the strategic perspectives of projects already discussed. However, the general theme that seemed to emerge related to concerns about the practicality, application and utilisation of the framework in a business or project environment, especially when:

> The concern is actually with the project manager as he is the one stuck in the middle trying to meet two different sets of objectives. Basically, he needs to meet project time-scales and set quality gates at the end of each project phase, while at the same time; he needs to keep his eyes on overall business requirements. For large-scale projects, this is difficult...

Re-constructing concepts

Consideration of criteria measures for failure or success has featured consistently in project management research since initially discussed by Rubin and Seeling (1967) and Oisen (1971). However, according to research by Nguyen *et al.* (2004), Xia and Lee (2004); Smith-Doerr *et al.* (2004) and Chan *et al.* (2002), these definitions still suffer from an inadequate conceptual clarity of what failure or success actually means. There is also a realisation that perhaps it is necessary to consider other criteria than those that are normally specified, while also re-considering the role of the project manager (Shenhar *et al.*, 2001). This is being driven according to Atkinson (1999) by management's desire to adopt new strategies that might improve success rates such as improved methodologies and tools.

In this study, it was possible to identify that in industries where business benefit is delivered through projects, stresses can be encountered between individual project objectives and the business objectives. The area of programme management which has come to prominence in recent years (Pellegrinelli, 1997; Lycett *et al.*, 2004; Maylor *et al.*, 2006) can assist in understanding this. For example, Pellegrinelli's (1997) perception, which is also discussed by Thiry (2002), that IS/IT programme management should be linked to organisational change. Although there still seems to be a little confusion in terms of, the various concepts of programme management, multi project management and portfolio management, and also project management process (Winter *et al.*, 2006a, b) the work in the programme management area seems to confirm the existence of these stresses.

Arising from the analysis of the concepts identified by the respondents the authors are able to present a visual representation of these stresses (Figure 1). The businesses objective is represented as the road upon which the projects progress through time. The business progresses as a wheel rolling forward along this road while the projects and the products they deliver act as the spokes of the wheel and the rim can be seen as the balance of the business. Each of the projects has pressure to deliver the measurement criteria which have been identified through the study as project progress (the project-related benefit) and the project performance (the business-related benefit). The research suggests that these can be in conflict and produce stresses within the project. If the two are not in balance then the rim of the wheel can be seen to deform and produce an imbalance in the progress of the delivery of the overall business objectives (as a deformed wheel does not progress along the road particularly well).

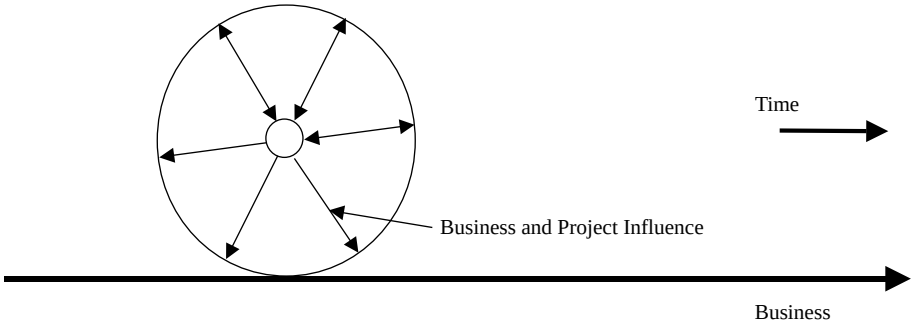

Figure 1.
Visual representation of project stresses

In conclusion, research on project measurement criteria (failure or success) indicates that it is impossible to generate a universal checklist of criteria suitable for all projects (Shenhar and Wideman, 2002). Success (or failure) criteria will differ from project to project depending on a number of variables including size, uniqueness, industry, complexity and the stakeholders involved. The authors suggest that what has emerged does not mean that project managers need to limit their objectives to meeting strategy objectives to the detriment of the traditional "project progress" measures of project success – the cost, time and quality criteria. Instead, these measures need to be established within a context of business benefit for the customers and stakeholders. It is not enough to assume that time cost and quality are the correct project deliverables but they must be discovered and quantified with an overall establishment of a number of complex and inter-related project measurement criteria which the authors would call "project performance". Measures for project performance and project progress cannot be regarded as autonomous of each other; neither can both be independently regarded as either wrong or right.

Whether, on the one hand, good project management requires a re-construction of the success measurement criteria, or whether a re-construction will lead to good project management practice is a further question to be investigated.

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