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Project Management: a conceptual framework for identifying components of reported project success – insights for Information Systems (IS) researchers

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How can we truly assess the outcome of a project when we (in the project management field) cannot fully agree on how "project" success" should be determined?

(Pinto and Slevin, 1988:67)

Abstract

Recent research interest in project typologies has increased understanding of different project types. Acknowledging project typologies repositions our capacity to interpret reported project success measures. In addition to simply capturing success measures associated with project outputs and outcomes (such as critical success factors), we must now recognise the need to adjust project evaluation methodologies to account for typological differences in inherent project risk. Similarly, the selection of appropriate success measurement methodologies will vary across different project types and affect reported success. This paper aims to make a contribution to PM theory by developing a conceptual framework for identifying components of reported project success that acknowledge this repositioning.

Keywords

EE01 – IS Project Management Methods And Tools, AF0405 – Management Theory/ Management Activities/ Evaluation

INTRODUCTION

Information Systems' project management and project managers are often compared unfavourably with those from other disciplines due to relatively lower reported project success rates (Shenhar and Widemann 2000; Cooke-Davies, 2001). This paper seeks to identify previously unrecognised influences to reported project success and to challenge the correlation between "good" project management and high reported project success rates which is traditionally assumed.

It is hoped that by publishing this framework, awareness of the influences on measuring, assessing and reporting project success may be raised. Changed perceptions of success resulting from greater awareness may in turn help to improve the reputation of Information Systems projects and project management practitioners, and may assist academics in taking greater care in some aspects of the future evaluation of the field.

Recent recognition of the limited theoretical foundations underpinning project management (PM) have contributed to renewed research interest in project typologies and fundamental PM principles. As a result, there has been an increased sophistication in our understanding of the range of project types and their differential characteristics that reposition existing measurements of reported project success. Previous work examining project success tried to identify critical success factors across all project types. Initially these factors focused on easy to measure aspects of project outputs (such as time, cost and quality) and later evolved to the harder to capture measures associated with project outcomes (such as client satisfaction). Although these traditional measures retain their utility, this paper repositions them as part of a broader framework of factors influencing reported project success.

In developing the conceptual framework presented in this research paper the starting point was a desire to examine the concept of 'project success', and to grapple with how to

meaningfully conceptualise the manner in which the nature and components of different projects affect the reported levels of project success (and failure).

This paper deploys a basic model of the components of a project[1] as a vehicle to explore potential influences on reported levels of project success at particular breakpoints within the model. The conceptual framework developed aims to contribute to PM theory by providing a heuristic device for 'checking' accuracy in reported project success. More specifically it redresses the lack of detailed examination of the impact of project selection and project evaluation measures on reported 'success'. These categories have traditionally fallen outside the scope of project definitions and have as a result not been included in previous work on reported project success.

Given recent increased understanding of different project types (Shenhar and Dvir, 1996; Shenhar and Wideman, 2000), there is a need to make sure when interpreting reported project success that we are meaningfully comparing like with like. It is no longer tenable to compare reported project success levels across known typological boundaries (such as level of technological innovation or industry sector) without making normalising adjustments for skew due to inherent risk and other differential factors.

THEORETICAL BACKGROUND

Overview

The theoretical foundations for this model draw primarily on the works of Smyrk (1999) in his paper "Project 'Solutions': Who is accountable?" and Shenhar and Dvir's (1996) paper "Toward a typological theory of project management".

Smyrk has adopted a theoretical approach – the Input-Transform-Output (ITO) model – which proposes that projects are fundamentally comprised of two main chronological phases: the transformation phase in which inputs are *transformed* to outputs, and the utilisation phase in which outputs are *utilised* to accomplish the project's ultimate objectives. Projects where the second component is formally managed are termed "business projects", while those where the utilisation phase is scoped outside of the formal responsibility of the project manager are termed "infrastructure projects".

Shenhar and Dvir have taken a quantitative approach using regression analysis to prove the existence of several distinct types of project based on project characteristics such as project scope and technological uncertainty. Their research links project types with project effectiveness (which they equate with project success).

The theoretical model developed here applies Shenhar and Dvir's results to the key elements of Smyrk's model and extends that model by exploring the implications of typologies for reported project success.

The historical basis of project management: practice over theory

Project management, while a significant discipline today, is still relatively immature. Endeavours such as the construction of the pyramids, the Great Wall of China, and other significant engineering endeavours are often highlighted as early example of project management (Wideman, 1985/2001). Most writers however identify the start of the profession with the emergence of open systems theory, and the development of tools based on linear algebra and critical path theory such as the Gantt[2] and PERT charts in the 1940s and 1950s (Wideman, 1985/2001; Cleland, 1964).

Despite these theory-oriented beginnings however, most observers agree that the profession of Project Management has developed largely on the basis of experience, practice and a 'how to' approach (Wideman, 2000). Largely on this experiential base, 'bodies of knowledge' (BoKs) have been produced by the US-based Project Management Institute (PMI) and other project management organisational bodies (Crawford, 2000). These bodies

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[1] While recognizing that such a model is at best an approximation, due to the existence of distinct typologies (Shenhar and Dvir, 1996; Dvir, 1998; Shenhar and Wideman, 2000)

[2] Or at least the Gantt chart's adoption, since it was developed first by Henry Gantt around 50 years before it became commonly used in project management.

of knowledge aim to summarise best practice, and produce generic models of the role and content of project management' (Wideman, 2000).

In general, these bodies of knowledge have a predominantly historical/ experiential focus, with the project lifecycle and other key project management processes drawn from what is broadly termed 'industrial project management'. Critically, they rely on singular models of high-level processes, based on the assumption that these processes are applicable to all types of project. This base assumption that "a project is a project is a project" limits the ability of research to identify patterns of success or failure in sub-groups of projects, and has recently been challenged by Shenhar and others (Shenhar and Dvir, 1996; Dvir, 1998; Shenhar, Poli *et al.*, 2000; Shenhar and Wideman, 2000).

Another consequence of project management's short history is that little attention has been paid to its philosophical and theoretical foundations. From a research perspective this raises the obvious question as to whether it is legitimate to label a broad range of activities as "project management" without first assessing the extent to which they exhibit sufficient commonalities. Also significantly, the lack of theory addressing the evident complexity of project management raises serious problems for academic researchers trying to validate findings beyond the specific case (Wideman, 2000).

What is a project?

As a result of the 'practice over theory' nature of project management, the term 'project' is rarely defined consistently within the field. Instead of a standard convention, project management research often resorts to a preliminary review of the primary characteristics of a project and the variety of definitions of the term, followed by the selection of a definition with characteristics that are appropriate to the concerns under consideration. (Pinto and Slevin, 1988; Mochal, 2000; Schwalbe, 2000; Shenhar and Wideman, 2000).

Due to the nature of the discipline it seems probable that this definitional heterogeneity/ ambiguity will remain and it is important for academic researchers to acknowledge that these different definitions may compete with, complement and cancel one another out in discussions of particular dimensions of project management. In this context this paper acknowledges this heterogeneity and deploys a definition that allows for a detailed examination of the impact of project selection and project evaluation measures on reported 'success'. These factors have traditionally fallen outside the scope of project definitions and have consequently not been included in previous work on reported project success.

Pinto and Sleven (1988) present the traditional characteristics of a "project" as:

- A defined beginning and end (specified time to completion);
- A specific preordained goal (or set of goals);
- A series of complex or interrelated activities; and
- A limited budget.

(Pinto and Slevin, 1988)

Gilbreath[3] takes a slightly different perspective, identifying the major commonalities between projects as:

- Working with few existing standards;
- The need for creativity and synthesis;
- A temporary pulse of effort; and
- A keen sense of, if not reliance on, the phenomenon of change.

Given the differences in the two lists, it is hardly surprising that when these characteristics are translated into definitions of a "project", considerable differences emerge. These range from traditional views such as Baker's[4] definition of a project as "A unique venture with a beginning and an end, undertaken by people to meet established goals within defined constraints of time, resources, and quality", through to Nordic Project Management

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[3] Working with Pulses, not Streams: Using Projects to capture opportunity, extract McGraw Hill, 1987
[4] On Time/On Budget, Sunny Baker and Kim Baker, Prentice Hall, Englewood Cliffs, NJ, 1992

Terminology's[5] succinct "An organized undertaking, limited in time to achieve specific objectives".

One of the key differences between the many definitions is whether they perceive the project as having to deliver one or more specific product(s) or service(s), or whether the scope of the project includes the accomplishment of the project's (intangible) objectives.

The stance of the PMBok changed on this issue between the 1987 and 1996 editions, moving from the broader objective-based view to the narrower "temporary endeavor undertaken to create a unique product or service". With regard to the general area of study into typologies, the distinction between a project as output-focused or outcome focused can in itself be considered as a typology, so the broader definition is necessary.

Significantly, none of the above definitions relate projects to their environment – particularly to their parent organisation(s). As such, they cannot link the reason for the project's existence to that of the sponsoring organisation(s). One more recent definition of a project from Project Manager Today's Projectnet glossary[6] does however address this point and defines a project as "a temporary management environment which is created in order to achieve a particular business objective through the control and co-ordination of logistical and technical resources." Therefore expanding Projectnet's definition to recognise the possibility of multiple objectives existing within a project (a view common to most definitions) and generalising the link between the goal of the project and the goals of the organisation, this paper derives the following definition of a "project":

"A temporary management environment/ endeavour created/ undertaken in order to achieve specific objective(s) relating to the overall goals of the parent organisation(s)".

DEVELOPING A MODEL OF INFLUENCES ON REPORTED PROJECT SUCCESS

Defining project success

As discussed previously, definitional heterogeneity/ ambiguity is a defining characteristic of project management discourse and is illustrated not just with regard to definitions of 'a project' but also in the variety of perspectives on what constitutes 'project success'.

Pinto and Slevin's (1988) extensive study on project success measurement makes the point that the PM industry cannot agree on how to determine project success, and hence how to meaningfully assess the outcome of any project. They also noted that as far as the career development of individual project managers was concerned, faulty evaluation of success or failure is critically important, yet the industry as a whole has widely variable methods and standards for such assessment.

'Success' is clearly a complex phenomenon that can vary depending on the perspective and type of measurement deployed. The model developed below attempts to address the thorny question of 'what is project success?' by identifying the entire range of components that make up reported project success and mapping them onto the corresponding components of a 'project' as defined above. This component breakdown of reported project success allows for the identification of areas that can cause the reporting of Information Systems project success to differ from that of other disciplines. The definition of project success follows Cooke-Davies (2001) in using De Wit's 1988 distinction between types of project success as a starting point for further evaluation.

De Wit identifies two aspects of success in project management:

- Project success (relating to the overall objectives of the project);
- Project management success (relating to those aspects of the project involved with output-creation and normally considered to be under the control of the project organisation such as time, cost and quality).

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[5] NORDNET, Reistad Offset, Oslo, 1985
[6] Abstracted from Projectnet Glossary, April 1997, on the web site of the UK publication: Project Manager Today

The latter of these corresponds to the success of the management of the input-transform-output (ITO) phase of project management (Smyrk, 1999), or what Shenhar *et al.* (Shenhar and Dvir, 1996; Shenhar, Poli *et al.*, 2000) term the measures of success relating to "project efficiency".

In Figure 1 below, undertakings within the smaller sphere of project activity – P1 – are generally considered more controllable, and measures relating to them easier to capture (Pinto and Slevin, 1988; Smyrk, 1999). It is rarely the case however, that the development of the outputs resulting from this sphere of activity is the sole objective of under-taking a project. Rare exceptions where the sphere of project outcomes (P2) is genuinely the same as that of outputs (P1) do exists – usually strategic or infrastructure projects of necessity. As such, cases of "project success" equating with "project management success" are similarly rare.

The level of achievement of project management success is usually a factor in meeting the objectives of the project. A project is unlikely to be successful without a degree of success in producing the planned outputs to within a reasonable margin of planned scope, cost, time, and quality. Again however, it is possible to conceive of cases where the sole project objectives are output-independent (such as the need to get two organisational units working together on good terms) and the management processes relating to the delivery of outputs are not a relevant component of the measure of "project success".

In most cases however, project success is an amalgam of project management success and the success of the other aspects of the project designed to influence utilisation (Pinto and Slevin, 1988; Smyrk, 1999; Dvir, 1998).

These two aspects are presented diagrammatically within the boxes P1 and P2 in Figure 1.
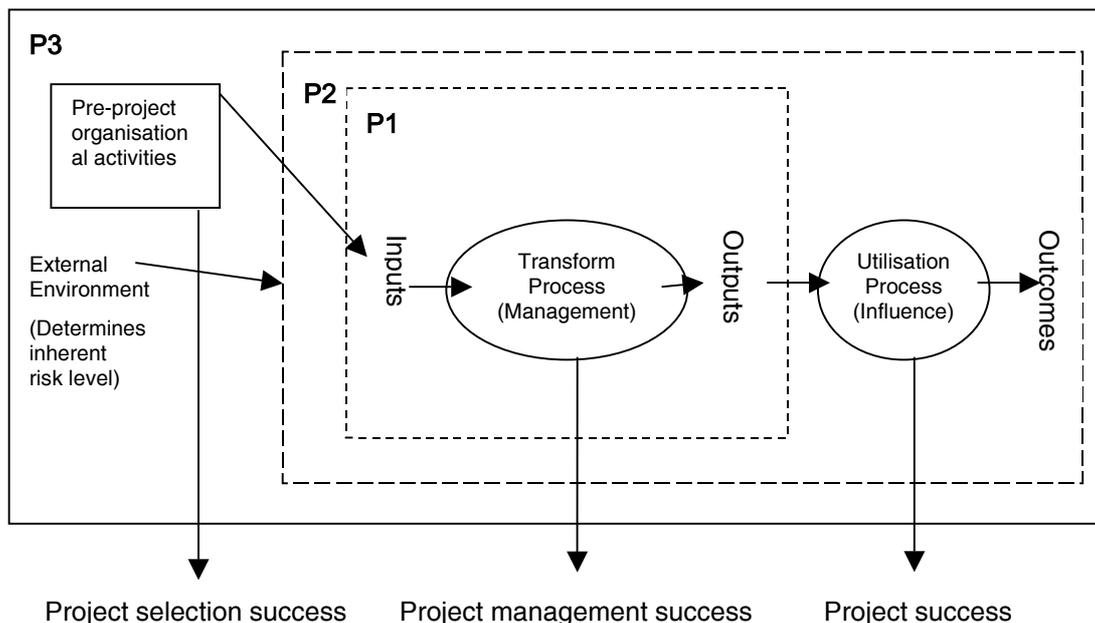

Figure 1: External influences on project success measurement

In the complete model we introduce the influence on reported project success of the selection of the measure(s) within the scope of P2 for reporting project success, from the 3 broad approaches outlined above (project management success, project success or a combination).

Relative project success

Before turning to examine the selection of approaches for project success measurement it is important to consider the concept of relative success. The model in Figure 1 is an expanded Input-Transform-Output (ITO) model (Smyrk, 1999) identifying the influences of events

external to the project including those derived from the project selection and scoping process prior to project initiation.

The model in Figure 1 introduces the impact of environments external to the project. These environments and the events that occur within their sphere, can affect a project's success (in and of itself) and its management success. In both cases, an assessment of the strength of the influence of these environments in preventing project success – or a measurement of inherent risk – is necessary to allow comparison between different types of projects.

The areas P1, P2 and P3 in figure 1 represent spheres of control. Within P1, control is assumed to be at the discretion of the project manager. Likewise, within P2, the project manager is assumed to be able to independently take actions to affect the levels of utilisation of the products produced within P1. P3 however represents areas of control outside of the project.

There are two significant distinctions of control within P3. One is that part of the world outside the project where the organisation still has a level of control. The other is the environment completely external to the organisation.

Project selection success

To judge whether a project is successful, account must also be taken of appropriateness of the decision to undertake the project with respect to this initial project environment. This is termed "project selection success" in Figure 1. To form a complete picture of the level of success of a project, this component of project success must be measured and accounted for.

There are many project selection processes (Frame, 1994), but whether one is used or not, and how appropriate it is, is rarely measured. Projects selected for initiation when the external or internal environment is not conducive to their outcomes being feasibly achieved, and which then fail on that criteria, are at least as much products of project selection failure as project management failure. Issues such as inappropriate timing (a great idea before its time) or mismatch between project output type (e.g. Call centre) and staff personality types (for example staff who chose to work in customer support for the face-to-face human interaction) are examples.

Calibration of project management success measurement

The other type of influence of project selection is in project estimation and/ or allocation. There are times when estimation is within the control of the project team itself (within P2) and times when it is imposed from P3. These project boundaries can influence the project management success, project success – and reported project success if they are not adjusted for.

To illustrate, if the same project is initiated from within an organisation, with exactly the same outputs and outcomes required, with the same time, scope and quality requirements, but with different budgets, an unintuitive situation can arise. Assume that the budget for project A is $10million, and for project B is $5million, and that neither project has sufficient capacity to influence this decision (i.e. it is entirely in P3). If project A has reasonable management processes, and completes the project to time, scope and quality requirements at a cost of $9 million, the project management success rating is likely to be high. In the case of project B, if excellent project management processes are employed, and the same time, scope and quality requirements are met for only $7 million, project B – with $2 million in cost overruns – is likely to be given a low project management success rating, despite having significantly better project management processes.

In order to assess the two projects, a calibration process based on the management feasibility of the project management process needs to be undertaken. This process takes into account the variables derived external to the project, the techniques used to derive them (if any), and their appropriateness. Without such a process, comparing the reporting project success across two projects will not be comparing like with like.

Calibration of project success measurement based on inherent or background risk levels of the project environment

In a similar vein, some project environments are inherently more or less likely to be conducive to achieving project success. In some of these cases, initiating a project under unfavourable conditions to achieve outcomes is a failure of project selection as outlined above. In other cases however, a higher risk project is a appropriate management decision, and is undertaken as such.

Again, the task of normalisation is to identify equivalent levels of "success" and "failure" based on levels of different exogenous risk factors. An example of the use and validity of risk/ return ratio analysis for projects (and by implication acknowledgement of different acceptable failure rates) is given in Souder (1988) within the discussion of the development of frontier models for project selection.

One typological distinction raised by Dvir is that of technological uncertainty (Dvir, 1998). The level of technological uncertainty for a project is linked to a level of success likelihood in research (greater technological uncertainty correlates with higher project failure). In making comparisons across industries that have a level of correlation to this typological boundary, levels of success will differ when all other variables are kept the same. For a valid comparison of project management success in these cases, and hence project success, a normalising factor must be derived so that relativity between the measures can be achieved. This is a typological distinction of particular concern to Information Systems project management researchers and practitioners.

The final model presented as Figure 2, identifies the skew potentiate associated with project evaluation, and attempts to represent the internal, external and meta-level areas in which deviations between levels of actual and reported project success may arise. See Figure 2.
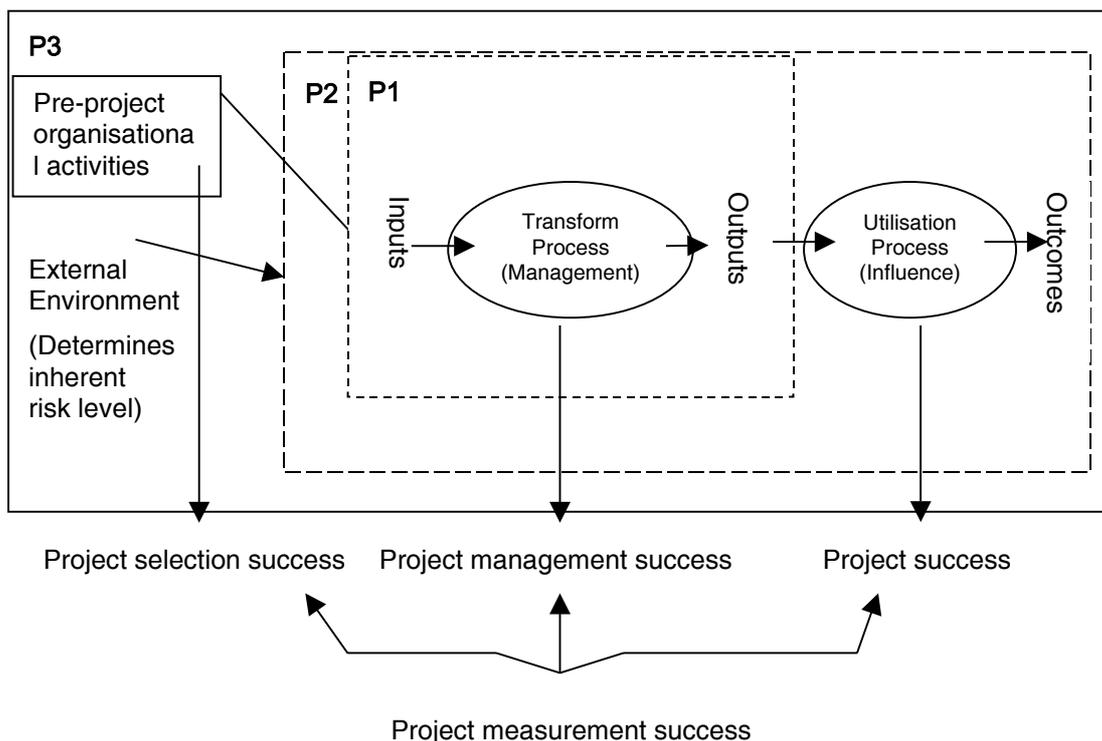

Figure 2: Determinants of Reported Project Success

PROJECT SUCCESS MEASUREMENT

From Figure 1 and the discussions above it is apparent that depending upon the type of project, multiple measures of success may be appropriate in order to accurately evaluate whether the project has achieved that which it was created to do, and (especially if it has not) to clarify in what areas it has been more or less successful.

Project success is usually a combination of project management success and the success of the influencing process (although in rare cases neither one or the other may be relevant). Where both are relevant, it may be appropriate to integrate the levels of success together using a formula and some weighting method, or an approach more analogous to the triple bottom line of business reporting where each are reported separately. Either approach will provide more useful information on reported project success than is currently available. Calibration of these project success level(s) against those of other projects may then be necessary to account for the inherent level of risk involved in the project environment or selection decision, and to take into account the relative level of project difficulty from organisational constraints. Again, this calibration and identification of selection success can be factored into an integrated measure or identified separately.

Given that typological differences in projects have been shown to exist (Shenhar and Dvir, 1996; Dvir, 1998), it is reasonable to suppose that different combinations of choices from the wide range of project success measurement options will be appropriate for different project types. To avoid the problems that currently arise from ambiguity of the singular statistic 'project success', it is desirable to include information necessary for comparative evaluation and decision making within the specific project scenario. The problems associated with the selection of the approach most likely to give this accurate reflection are included in the model in Figure 2, which identifies the meta-level concern of project success measurement as an influence on reported project success.

The incorrect or inappropriate use of project success measurement techniques that aggregate measures when it is not appropriate, or incorrectly weight them according to factors not relevant to the uses of the statistic in question, give rise to a measure of project success that is not in keeping with the desired goal.

Some of the other factors that can be argued to be important in the methodology selection and aggregation or non-integration decision process are:

- The selection of success measurement over time (do you measure once, multiple times and when in either case, and then do you integrate to a single result or keep a series?);
- Integrating multiple objectives (for example, if there are 'primary' and 'secondary' objectives, what does this mean?); and
- The ability of the measure(s) to be (accurately) collected.

CONCLUSIONS

Summary of model

The model developed in this paper is designed to identify the component parts that have the capacity to affect the way project success is reported. Although ordered from left to right, these factors are not necessarily time linear or dependent and they may not impact on reported project success with the same weight(s). The purpose of the paper is simply to identify all possible actions within and around a project where influences to reported project success arise.

The extension of the ITO model (Smyrk, 1999), is designed to incorporate typological effects at the boundary of project success measurement: specifically in the "grey" pre-project (selection) and post-project (measurement) areas.

The main influences upon reported project success identified in the model are:

- **Project selection success** – Did the organisation choose the right project to undertake at the right time and set the project up in the right way? If not, how should overall success measures be adjusted to reflect this?
- **Project management success** – Were the project management processes performed successfully? Measured against the widespread and traditional measures of performance against time, cost and quality.
- **Project success** – Did the project achieve its critical success factors and to what level? Measured against the overall stated objectives of the project.

- **Project measurement success** – How accurately did the assessment of project success reflect the actual level of project success relevant to the project?. What was reported as project success – PM success, project success, or an aggregate? Were weightings used and if so, how? What stakeholder perspective(s) were measured? Over what time period(s) were the success measures undertaken? Did the measures take into account the level of project selection success and measure relative to that?

As can be seen from the above definitions, **reported project success** is a function of all of the above types of success.

Impact of model

How success is defined can affect activities at all stages of a project (Schwalbe, 2000). The decision to undertake a project, the methods and tactics employed during the project, decisions about when and if to terminate a project during implementation, and so on, are all related to the understanding of success within the project. The amount of work undertaken at the end of a project to assess it, the length of a project and its governance structure, can all be affected by the success criteria.

It can be seen that reported project success is a function of project selection success x project success x project evaluation success. Within this framework, most projects' 'project success' will in turn be a combination of successful project management (defined here as project management success), and successful output design and strategies for utilisation.

In a utopian organisation, the project success measurement process would not introduce any bias between "project success" and "reported project success" however in reality the latter will always be an approximation of the former. Similarly, a recognition of the risk or difficulty of the project and an assignment of expected success likelihood would ideally be made in every project during deliberation and included as a conscious part of the initiation decision making process. Consequently, projects in a higher risk category with lower levels of success would be viewed on a par with lower risk projects of greater success. Again, this distinction is not evident in practice or in current project management literature.

Application of model

The model presented in this paper can be used to assess the accuracy of a previous study of relative project success where projects are drawn from multiple project typologies. Comparing the evaluation methodology used in the study with the components in the reported project success model will allow the researcher to evaluate the significance of the study results. Where consideration of aspects of reported project success have been omitted, the significance of the omission can be assessed by considering the nature of the project typologies involved.

Researchers wishing to assess relative project success across typological boundaries can also use the model to confirm that all aspects of the measurement process have been considered and adjusted for in the methodology to be used in their studies.

FUTURE RESEARCH

In discussing the nature of projects, Shenhar and Wideman (2000:4) observe "to aid in sponsorship planning and decision-making, it would clearly be helpful if projects could be categorized into some meaningful and practical classification framework".

In order to deconstruct the nature of different projects and hence provide a framework upon which different definitions of success and "success-oriented" practices can be mapped, future research seeks to develop a map of project taxonomies and typologies from existing literature (a project meta-typology).

The model developed above, will be used with such a typological map to research relationships between:

- Different typologies and "appropriate" definitions of success;
- Project environments within various typologies and success; and

- PM methodologies (practices) and success within defined typological areas.

Such correlations, if demonstrated to exist, could be of significant value in PM training, refocusing academic research and in increasing the effectiveness of project selection in different sectors.

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