The Project Objectives Measurement Model (POMM): an Alternative View to Information Systems Project Measurement

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Abstract: The information systems (IS) project management profession has been faced with numerous socio-technical challenges. As part of its analysis, research has expressed discontent with the traditional measures used to assess the success or failure of these projects, i.e. conformance to time, schedule and specification requirements espoused by the project management (PM) standard bodies. Despite this, research has also revealed that industry continues to place high reliance on this approach in determining the outcome of their projects. These developments imply, in part, a misalignment between research and practice and a scarcity of appropriate measurement tools that are aligned to the realities of different project contexts. The research presents a Project Objectives Measurement Model (POMM) that attempts to address some of these concerns through the development of project measures that are aligned to key project stakeholders' values and objectives within the unique project contexts. It is argued that objectives are the key performance criteria of the project hence measures must be aligned to these criteria and formal procedures should be in place to assure that these objectives and measures are carefully developed and reflective of the persons to which the project matters, the stakeholders. The POMM is grounded on several principles of the Value Focused Thinking (VFT) and Goal Question Metric (GQM) techniques. The evaluation of the proposed model was performed in two parts: a team of industry experts examined the principles of model and provided feedback on its practicability to practice, and a case study of a Caribbean educational institution's IS graduate programme development was used to illustrate the procedures of the model.

The research provides theoretical and practical implications for IS evaluation particularly within the project management and performance measurement domains. The research aims to extend the debate on suitable evaluation methods for IS projects while providing project practitioners with an alternative approach that can enhance their decision making processes during the life of the project.

Keywords: IS project; project objectives measurement model (POMM); success criteria; IS project management; Caribbean

1. Introduction

Information systems (IS) projects play an important, often strategic role in contemporary organisations. Given this prominence, executives and other project stakeholders have a vested interest in assessing the real value that these projects provide (Brynjolfsson, 1993, Melville et al., 2004). It is therefore important to find appropriate methods to evaluate them, including the value that it provides to relevant stakeholders. Current analysis indicates several challenges with regards to current practices. There is growing disenchantment with the traditional methodology (i.e. conformance to time, cost and scope requirements) which has been described as an incomplete measurement paradigm (Atkinson, 1999, Atkinson et al., 2006, Wateridge, 1998). Despite its perceived limitation this approach continues to be pervasive in practice (White and Fortune, 2002, KPMG, 2005). A compounding concern is the varied perception of performance, as success may mean different things to different stakeholder which may lead to disagreement on whether a project is successful or not (Shenhar et al., 2001, Shenhar et al., 2002).

Against this background, we argue that an effective evaluation approach for IS projects should consider active alignment of stakeholders' value to the measures. The research explores an alternative measurement system for assessing IS project performance that extends the traditional approach. We therefore propose the Project Objectives Measurement Model (POMM) which adapts the principles of the Value Focused Thinking (VFT) method (Keeney, 1992) to elicit and structure stakeholders' project values and objectives, and the Goal Question Metric (GQM) method (Basili and Weiss, 1984) to derive measures that are linked to the identified project values and objectives. The POMM can be used to provide guidance to practitioners in the design of project metrics/measures that are closely aligned to the realities of their IS projects in a manner that transcends the restrictive frames of traditional approaches. Further it aims to enable project stakeholders to be better equipped to see the project is, identify missing links or inconsistencies in project design, and take appropriate corrective actions where necessary, thus increasing the likelihood of achievement of the objectives or project performance criteria.

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With continued calls to extend the conceptual foundations of project management (PM) through the analysis of similar events in other disciplines and increase the alignment with practice (Engwall, 2003, Winter et al., 2006b, Smithson and Hirschheim, 1998) the study seeks to extend the knowledge base in the discipline. The research uses empirical investigation to help demonstrate our claims. First, a preliminary evaluation of POMM is performed by a team of IS PM experts and stakeholders. Second, a case study illustration of POMM using an IS graduate programme project is presented. Findings indicate that POMM has credence in practice and can be suitable in assisting practitioners in strengthening their evaluation process.

2. Research Background

2.1 Trends in evaluating projects

An appreciation of the full context within which the project is being performed will assist those involved in project management to deliver a project (APM, 2006), as these activities continue to play key role in organisational change. Projects are unique, transient endeavors undertaken to achieve a desired outcome (APM, 2006) including a unique product, service or results (PMI, 2004) and refer to single or multiple endeavours. Assessing outcome of these projects is of extreme importance to the key stakeholders involved (Cleland, 1986). However, with the continued problems with assessing the value of IS (Irani, 2002), the true contribution of IS projects are often not realized or identified. Thus, it is essential to find more insightful analysis of project performance or outcome to assess where we are and whether we need corrective action to get back on track.

A review of key project evaluation literature revealed that the primary responses to examining the performance of projects have been to develop alternative success criteria to assess these projects (Atkinson, 1999, Morris and Hough, 1987, Nelson, 2005), and critical success factors (Fortune and White, 2006, Belassi and Tukel, 1996, Pinto and Slevin, 1987, Shenhar et al., 2001, Shenhar et al., 2002) while others have focused on the business value contribution of these investments (Kaplan and Norton, 1992, Kumar, 2003, Fitzgerald, 1998). In an analysis of the literature over the last forty (40) years, Jugdev & Muller (2005) showed the evolution of our understanding within the framework of the project and product life cycles in the determination of outcome perspectives. The four (4) evolving research themes were categorized into project implementation and handover, critical success factor (CSF) lists, CSF frameworks and strategic project management paradigms (Jugdev and Muller, 2005).

Table 1: Summary of success factors & criteria

Key Categorization	Outcome Perspectives	Literature
Project Management & Project Team	Minimization of project cost and project duration; strong project commitment; communication; monitoring and feedback; personnel & competence; planning,; clear project objectives; conformance to budget, time, scope requirements; project functionality, project efficiency,	(Atkinson 1999); (Bryde et al. 2005); (Freeman et al. 1992) (Morris et al. 1987); (Pinto et al. 1987); (Nelson 2005), (Shenhar et al. 2001; Shenhar et al. 1997; Shenhar et al. 2002)
Management & Executive	Top management involvement, politics	(Pinto et al. 1987); (Morris et al. 1987)
Client and Other Stakeholders	Satisfaction; endorsement; acceptance; user involvement; utility; use; safety; impact on customer; customer service; increased responsiveness	Belassi et al. (1996); Bryde et al. (2005); Kumar (2005) ; Pinto et al. (1987); (Standish 1994); Lim et al. (1999), Nelson (2005), Morris et al. (1987) ;
Project product or service	New product or market; safety; commercial performance; technical performance business and direct success; financial rewards; implementability; flexibility	Dvir et al. (1992); Lim et al. (1999) ; Fitzgerald (1998) ; Freeman et al. (1992)
Preparation for the Future	Value, personal growth, learning, readiness for the future	Bryde (2005), Nelson (2005) ; Freeman et al. (1992) ; Kaplan & Norton (1992)

2.2 Managing stakeholders' expectations

Success may mean different things to different stakeholders (Shenhar et al., 2001, Shenhar and Levy, 1997, Belassi and Tukel, 1996) which may lead to difficulties in managing these perspectives (Agarwal and Rathod, 2006) and determining the success of the project outcome. This has interesting implications, particularly the opportunity to synthesize the diverse views and transform these into suitable measurement frameworks, hence, facilitating richer analysis rather than simple listing of objectives.

The stakeholders group is diverse, and may include individuals that are internal and external to the project and organisation such as contractor, sponsor, project team and client (PMI, 2004). They are typically most involved in the project and have a vested interest in its outcome or contribution (PMI, 2004). These stakeholders may have certain expectations and consequently engage in behavior that may constructive or destructive (Bourne and Walker, 2006). Importantly, Courtney (2001) noted that open, honest, effective dialogue among stakeholders is a critical aspect in the development of multiple perspectives, which implies that reaching effective measurement tool is made easier open honest and effective dialogue about stakeholders' viewpoint.

2.3 Rethinking the profession

An interdisciplinary colloquium in the UK met to discuss and analyse initiatives that may enrich and extend the current project methodologies to better meet these and other contemporary challenges (Winter et al., 2006b) as it recognized that bridging the process of academic and practitioner perspectives is still imperative (Winter et al., 2006a). The need for new and better ways to think about projects and their management (Crawford et al., 2006) (Cicmil et al. 2006) revealed that current views do not adequately explain the richness of what actually happens in contemporary project environments This complements the view that current practice does not sufficiently address sources of uncertainty within the project and thus more sophisticated efforts are needed (Atkinson et al., 2006). The participants therefore called for increased focus on concepts and theories that resonates with the realities of practice thereby providing practitioners with practical concepts and improve alignment with contemporary thinking (Winter et al., 2006b) and recommended that PM research embraces theory about practice, theory for practice and theory in practice (Winter et al., 2006b).

3. Towards a new methodology for practice

An objective is defined as a lens or system of lenses that forms an image of an object (Merriam Webster Dictionary, 2008). In this case, the stakeholders' lens forms an image of the project that results in the perception of its performance. Hence, project objectives therefore can be considered the stakeholders' criteria through which performance outcome perceptions are based. Assessing the outcome of the projects based on these factors appears to better match the realities of practice. It is therefore critical that the objectives are robustly defined and reflects the views of the key participants.

3.1 Value Focused Thinking (VFT) approach

Understanding what is important to key stakeholders can enhance the decision-making process in the project. The VFT is a decision technique developed by Keeney (1992), it identifies the values of the stakeholders in a given activity. The technique has been applied successfully in other research, and is a proven methodology that has been used in various disciplines to aid in the analysis of strategic decisions (Sheng et al., 2005). The VFT is useful in uncovering hidden strategic objectives of diverse managerial processes, and has been used successfully in the operations management disciple to help chart a clear decisive path for the fundamental objectives and values of the activities thereby providing an unobstructed view to carefully assessing performance of organisational activities (Keeney, 1992, Keeney, 1996). Keeney (1996) suggested that the VFT enriches the decision making process. Further, while it is important to identify objectives, simply listing objectives is shallow as there is need for greater depth, clear structure, and a sound conceptual base in developing objectives for strategic decision contexts (Keeney, 1996).

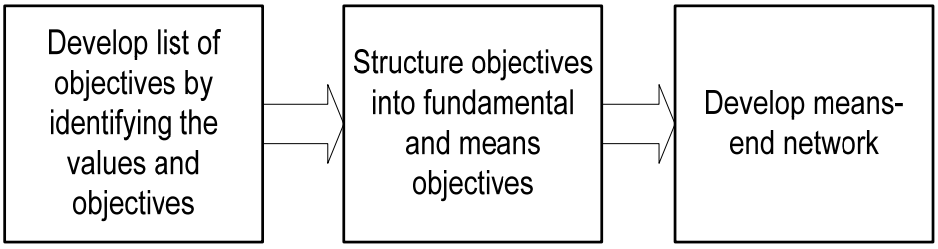

Figure 1: Steps in the VFT

The application of the VFT technique includes the following steps (Keeney, 1992, Keeney, 1996):

- *Develop list of objectives.* This involves identifying the values and converting values to objectives. Values are those principles that encompass what a person care about or value in a specific situation. An objective is characterized by three features: a decision context, an object and a direction of preference. This essentially means explicating the objective within its context based on the nature of the problem and determining exactly what the stakeholder is ultimately trying to achieve. It is also possible to derive more than one objective from a specific value statement (Drevin et al., 2007).
- *Structure objectives.* Objectives are classified into two types: (1) fundamental objectives - the end that the decision-maker values in a specific decision context, and (2) mean objectives – the methods to achieve the ends which are context dependent. This implies that consideration of the particular nature or purpose will determine how the fundamental and mean objectives are formed.
- *Develop means-ends network.* To perform this step, asking why each objective is important will help to distinguish between fundamental and means objectives which can be represented by the means-end objective network. Aided with this tool, decision makers are better able to see the relationship among the project objectives and can make more informed decisions in the project

3.2 GQM approach

Subsequent to the identification of core objectives of the project, the identification of suitable quantifiable metrics aligned to the objectives is essential. The GQM approach is a metric generation technique that develops performance metrics aligned with the goals (objectives) of the activities (Basili and Weiss, 1984). It utilizes a top-down method for the identification of metrics needed for certain goals by asking questions linked to these goals. It is a practical approach to bounding the measurement problem as it allows organisations to focus on its own context and culture. The method asks, *how do you decide what you need to measure in order to achieve your goals* (Basili and Weiss, 1984)*?* Applying these principles into the IS project evaluation context strengthens the generation of stronger metrics and measures associated with the project objectives.

The scope of the GQM application in this research is primarily to identify the metrics subsequent to the application of the VFT to identify project objectives. These steps include (Basili and Weiss, 1984, Solingen and Berghout, 1999):

1. Formalize measurement goals
2. Identify quantifiable questions
3. Define the measures to be used
4. Prepare plan for implementing and interpreting the measures

4. The project objectives measurement model (POMM)

The Project Objectives Measurement Model (POMM) involves the elicitation of objectives and measures that reflect the strategic and tactical vision of the project from the perspectives of its multiple stakeholders. Three key questions are reflected throughout the framework:

1. Do the project measures reflect the fundamental objectives identified?
2. Do the project objectives reflect the project contexts?
3. Does the evaluation process reflect the realities of the project?

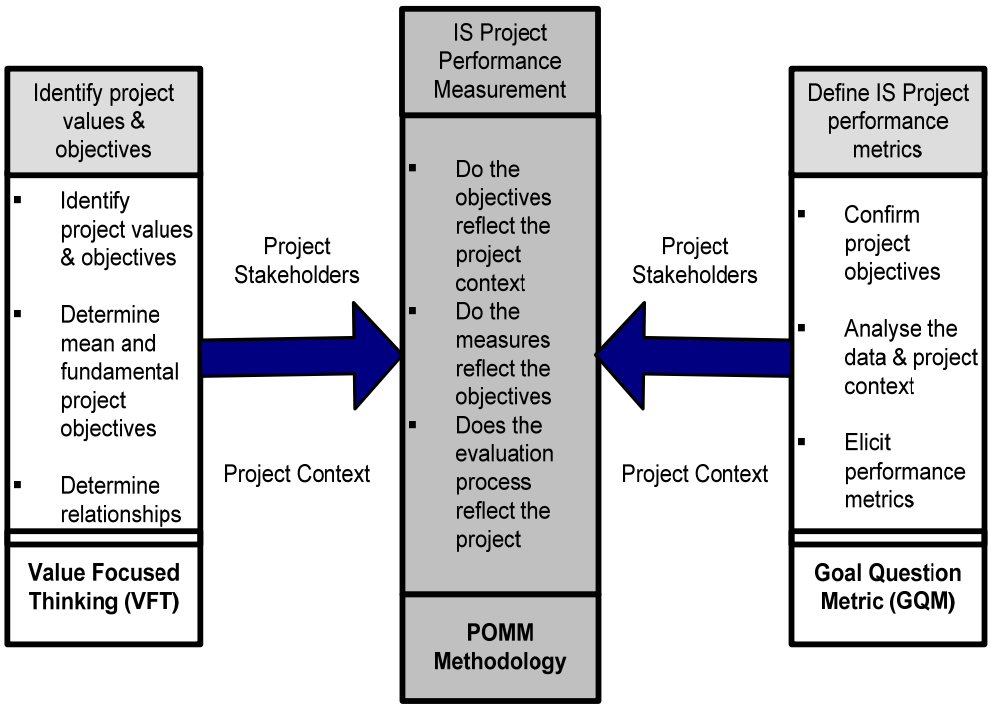

Figure 2: The POMM conceptual framework

POMM involves the following several steps:

1. Identify key stakeholders of the project, taking into consideration the roles involved, the organisations or personnel that may be impacted by the project and its results
2. Elicit project values and objectives for each key stakeholder, including standard objectives relating to time, cost and scope
3. Apply VFT method to determine the fundamental and means project objectives
4. Prioritize project stakeholder fundamental objectives
5. Develop, review and refine (where necessary) the project means-end network
6. Apply GQM method to elicit project measures
7. Develop, review and refine (where necessary) the project objective-measure network
8. Implement, monitor and take corrective actions throughout the project
9. Determine the cumulative outcome of the project

The *Objective-Measure Network* (Figure 3) is an output of these steps. It is an extension of the Means-End Network (Keeney, 1992) and represents the relationship between the means objectives, fundamental objectives and project measure of the project, highlighting the dependence of objectives on each other and the measures that are associated with them. This provides an additional aid to stakeholders and project managers in particular to analyse achievement of objectives, through-out the project cycle. Depending, on the project context the hierarchy of objectives may change (i.e. a fundamental objective may be a means objectives or vice-versa in another context). For example, cost containment objective may be a fundamental for a cost reduction project yet it may be only a means to another objective in another setting. This further highlights the benefit of this approach through its focus on understanding the rationale or importance of the objective within each decision context, which are solely guided by a restrictive set of objectives.

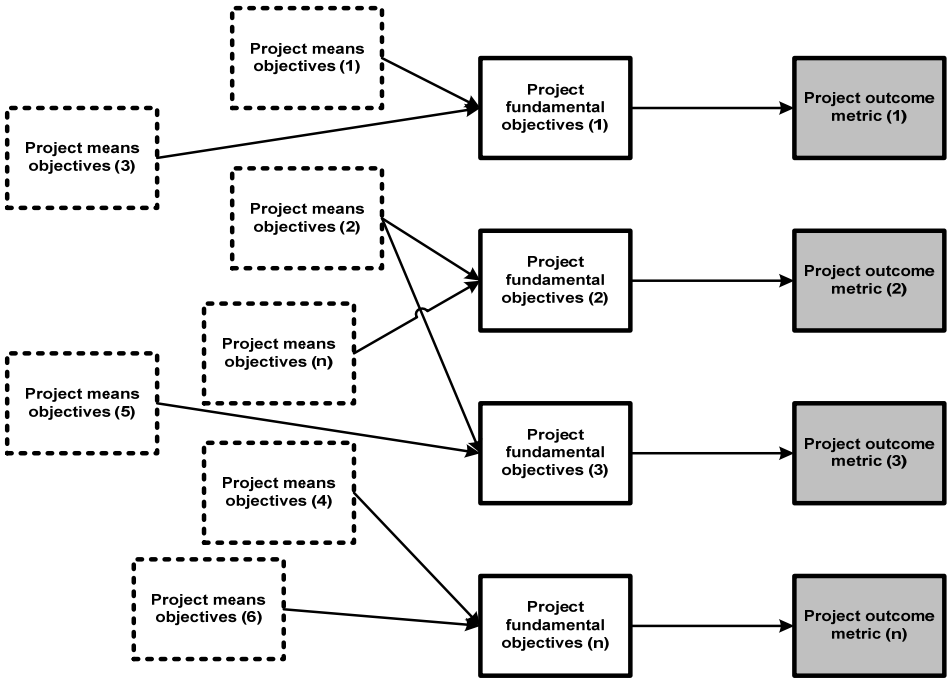

Figure 3: An illustration of the objective-measure network

5. Towards tighter coupling with practice

Whetten (1985) provided researchers with some important considerations in the theory development process. He explained that in the theory development process it is important to clearly state the "*what*", *"why"* and *"how"* of the research contribution. The "*what"* includes the concepts that are important in the research, *"how"* describes the casual relationships between the concepts or constructs, while "*why*" explains the justification for the research. Essential in the concept development is the need for comprehensiveness (are all relevant factors included) and parsimony (are there factors that add little value to our understanding) in the explication of theoretical models. The *when, where and who* are also important as it these provide the temporal and contextual factors, the boundaries of generalisability or limitations of the research and the intended audience of the research. He further explained that this facilitates better understanding on what is going on through an appreciation of where and when it is happening. Such an approach for theory development provides tighter coupling of knowledge claims and research solutions.

Against this background, eight (8) experts and project stakeholders in the PM and IS fields were asked to assess the POMM in order to establish its suitability, usefulness and practicability for practice, including comparing with the current standard practice of measuring IS projects, which these are sometimes poorly defined. This exploratory investigation is aimed at achieving tighter coupling with practice through an interactive design cycle in which practitioners' feedback are used to help refine the proposed model. This approach sets the stage for an explication of the principles of POMM through the case study illustration.

5.1 A preliminary evaluation of POMM

Two (2) rounds of interviews with IS PM experts were conducted to assess the practicability, usefulness and limitations of the POMM for practice. The interviews also included discussions based on issues and responses raised throughout the sessions. The first round was used to gather the perspectives of the practitioners, and the second interview round was used to clarify points and gather more supporting evidence for the arguments provided by the participants. The stakeholders played several different roles within their organisations (Table 2) and had shared experiences in managing and assessing IS projects. More importantly, these individuals have an important stake in finding alternative methods outside their current practice of adopting the standard methodology. This factor was the key motivation for their selection in this empirical evaluation combined with their availability to critically discuss the issues. They were asked to critique the model and offer their perspectives and interpretation through a questionnaire developed based on the objectives of our investigation and underlined by the principles highlighted by Whetten (1985).

Table 2: Stakeholders demographic data

Role (# of individuals)	Years of Experience	Industry
Project Consultant (2)	10-20+	Information Systems, Software Development, Telecommunication
Project/Programme Manager (4)	5 – 15+	Financial Services, Telecommunications
Executive Management (2)	15+	Banking, Information Services

5.1.1 Findings & discussion

The interviews took a structured path; the model was distributed to them initially, during the meetings it was explained and supported with visual aids. Subsequently, they were allowed to asked questions to clarify their understanding of the model and its objectives. Upon confirmation that their understanding was consistent with the model's intent they were asked to critically assess it.

5.2 Expected benefits

The model *"takes into consideration a wider set of objectives through the attention to the breadth of key stakeholders"* responded an executive manager. Another suggested that its use may provide some insights into IS projects that have failed by the traditional approach yet successful upon implementation and use, or vice-versa. The interviewee went on to claim that *"few [of their] projects completely fail even they deliver some value to the organisation"*. This underscores the need to have a method to help identify the values important to these stakeholders and the organisation as a whole, and provide a process through which these can be translated into quantifiable measures. Some of the project managers expressed that the POMM's philosophy was aligned to their current thinking as their experiences have shown that a project outcome may be successful in terms of increased revenue or market share, despite it being over budget or late for example. In addition, the model provides beneficial results through the improved identification of project objectives, strengthening of the project design process and the evaluation mechanisms and process. The case was also made for improved decision-making through the analysis of factors that may not have been previously considered or identified. An example was cited of a project that has been implemented but has had severe environmental challenges; it was proposed that with the use of the POMM approach *"some of these issues may have been brought to the fore, and additional stakeholders may have been taken into consideration"*. Improved stakeholder management was also highlighted as this could be enhanced through the open communication and the perception that their perspectives are deemed important in the elicitation of key project objectives.

"*This [approach] could be use when we are developing our business case*". An executive noted that with such an approach the project justification may become clearer and thus created a better opportunity for stakeholders buy-in while possibly identifying possible trade-offs and help mitigate some of the potential project risks. This is an important value proposition as it highlights the value of the model's flexibility in enhancing project justification, design and the evaluation of the project itself. The detailed investigation of the project stakeholder objectives through the POMM approach allows improved analysis at the onset of the project selection process which can help eliminate or reduce unknowns.

5.3 Factors impacting successful adoption

Some of the essential factors that may influence the model's successful adoption in practice were similar to the discussed on the extant literature on critical success factors (e.g. Pinto and Slevin, 1987, Morris and Hough, 1987). The participants highlighted executive support and buy-in and stakeholder commitment to the process as important consideration in the model's success in their respective organisations. Other key factors suggested were the level of awareness of the techniques of the POMM and conformance to its standards by stakeholders. Hence it is anticipated that the learning curve may be steep during early adoption.

A project manager suggested that organisational buy-in may be difficult as project managers and organisations may find it difficult to move from the standards e.g. PMI Body of Knowledge (PMI, 2004) "It is difficult to walk away from the [project management] bible". This was reinforced by another expert who expressed reluctance in adopting it in their project because of the continued use of the established practice of conformance to time, cost of specifications. "I am more comfortable with a method that is tried and proven". Notably, this was despite agreement of its practical benefits. This finding reinforces the prominence

of standard bodies' methodology and its strong influence on practice (Morris et al., 2006). Additionally, this phenomenon may be further explained by several technology adoption theories, particularly intuitionalism (c.f. DiMaggio and Powell, 1983).

Some of the participants saw stakeholders as a restrictive set, primarily focusing on the most influential (i.e. executive management) without much initial considerations for wider project context such as the clients, external consultants and other third parties. We propose that more formal approaches to identify project stakeholders are needed for the critical process (Sharp et al., 1999).

The main concerns raised were the issue of prioritization of objectives and the model's adaptability to small organisations. The interviewees noted despite best efforts some objectives may be more critical than others and it is essential not to be swayed solely by the most influential project stakeholder. Keeney (1992) stated that one the principal benefits of the VFT technique was avoiding conflicting decisions as the rationale for the objectives become known. This point becomes more apparent in the illustration of the POMM, because in asking the question of values and why each are important helps to classify (and prioritize) the objectives into means and fundamental objectives wherein all the fundamental objectives will be top priority. Alternatively, multi-criterion decision techniques such as the Analytic Hierarchy Process (AHP) is useful in prioritizing diverse perspectives within a particular context (Saaty, 1990) since it can help resolve complex problems involving high stakes and diverse perceptions (Bhushan and Rai, 2004). The issue of adaptability was raised primarily because of the assumption that smaller organisations may not have the requisite resources or skill-sets to use the model effectively. This is indeed an important consideration; however a key consideration of the POMM is its applicability to different contexts, organisations or project sizes. The model is accompanied by simple steps that may used by any individual or organisation. As noted earlier a challenge may be the initial learning curve, however the potential benefit of greater project clarity and justification may outweigh that. Additionally, where organisations notice a knowledge gap, this can be resolved through the hiring of qualified consultants or investing in training programmes for staff.

6. A practical illustration of POMM

A single case study was used to illustrate the concepts and contributions of POMM. The case study approach is recommended for the in-dept study of an object or model in the business environment (Hevner et al., 2004). The case study approach embodies an account of past or current phenomenon drawn from multiple sources of evidence (Leonard-Barton, 1990, Yin, 2003) and involves an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; (Yin, 2003). Several researchers advocate this methodology for investigating real-life events, including organisational and managerial processes (Orlikowski, 2000, Darke et al., 1998, Yin, 2003) and allows the researcher to retain the meaningful and holistic characteristics of real-life events (Yin, 2003). Additionally, the case study method is applicable because of its suitability in providing enhanced understanding to organisational contexts and IT-related innovations (Darke et al., 1998). The illustration of the POMM makes the case for its usefulness in providing an alternative evaluation technique for IS project outcome.

The study considers a IS graduate programme development project at a Caribbean university, which includes activities such as the programme design and students' thesis development process and review of the thesis outcome. This activity was chosen for several reasons: 1) it clearly makes the case that the traditional method of assessing project outcome is insufficient because the success of the graduate programme involves more that conformance to time, cost and specifications as determined by the University; and 2) there is a great possibility that each set of stakeholders have their unique set of objectives combined with common set of the programme's project objectives. Therefore, the steps of POMM may be clearly seen through this view.

Identify Key Stakeholders. The thesis development process involves numerous stakeholders. The task involved considering the roles and actors that may be affected by the programme's evolvement. This process was achieved through documents' review and elicitation through discussions. Documents relating to the programme were reviewed to identify key roles that are involved in the programme, and specific stakeholders were asked to consider the process and the history of the programme to help identify groups or individuals that played a part in its development and management. The stakeholder entities were later grouped into personal, school community, academic and business communities were identified. The principal stakeholders therefore included advisors, administrators, internal and external examiners, executive sponsor, corporate sponsors or organisations. The stakeholder groups interviewed were students, advisor,

academic director, internal examiner, executive sponsor and an organisational representative. This was done to obtain a fair representation of the stakeholder groups and their availability in being interviewed.

Elicit Project Values and Objectives. The first stage involved interacting with stakeholders in an open forum to garner the essential elements that were important to them in the dissertation programme. Using the guideline set out by Keeney (1996), the participants were asked questions such as *what do you value or want from the dissertation project, and what are your ultimate objectives of the dissertation project*. Upon completion of all interviews, the notes were reviewed and a complete list of all the objectives identified was prepared. The product of this was a list of 46 project objectives. The second stage involved reviewing the objectives and converting them into common or consistent form as several of the objectives represented the same thing but were stated differently. This resulted in 26 objectives (see figure 3) which laid the foundation for the next step in the process.

Determine the Relationship between Objectives. Each participant was asked why each of their identified objectives was important. During this exercise it was discovered that this approach may result in additional objectives as the participants get an opportunity to elucidate more on what they value. For example, in discussing the importance of a high quality dissertation development process, the advisor noted that ignorance of stakeholders' (e.g. student, committee role) may lead to conflicts and they did not want any occurrence of unfairness or lack of objectivity to be experienced. Therefore along with an objective for clarity among stakeholders' role, the issue of objectivity in the review process was also highlighted. Also, as expected the exercise resulted in identifying the relationships among the objectives. For example, the student identified the need to improve research skills or enhance their understanding of research methodologies, however in asking why these were important in addition to completing the dissertation, the value of growth in the IS community or to produce relevant research were identified. Nine (9) fundamental objectives were identified and the list of all the objectives and relationships were converted to the project means-end network (see figure 4).

Determine the Priorities of the Project Fundamental Objectives. A simple rating method was used based on the decision context. The stakeholders were asked to rate the importance of the fundamental project objectives in determining a successful IS PhD programme. The level of importance ranged from 1-9, based on the number of project fundamental objectives identified, and was defined as follows: High = 7-9, Medium = 4-6, and Low = 1-3.

Each stakeholder was asked to explain their decisions in determining the ratings and an average score was produced as the final perspectives on priority of the objectives. Interestingly, none of the objectives received a rating below five which implies that the stakeholders valued each of the fundamental objectives and likert-like scale with closer range could be used. The higher priority objectives included: *exhibit intellectual independence, competence in the research process IS content knowledge and a formal process for IS PhD programme development*, see fig. 3.

Table 3: Fundamental project objectives & priorities

List of Project Fundamental Objectives	Average	
	Rating	Weight
Exhibit intellectual independence	9.00	0.124
Develop competence in research process	9.00	0.124
Possess doctoral-level IS content knowledge	8.67	0.119
Develop/enhance a formalised process of IS dissertation management (inclusive of development, review, etc)	8.33	0.115
Conform to ethical standards of the profession	8.33	0.115
Maximize the number of completed dissertation	7.67	0.106
Create a legacy of research	7.33	0.101
Dissertation effort must provide practical and relevant research to the Caribbean	7.33	0.101
Maximize opportunity to become established in the research community	7.00	0.096

Review Means-End Network. A review of the network was performed to ensure completeness of the objectives and accuracy and completeness of the relationships. The main questions asked during this process were: did it make sense and did it accurately reflect the views of the stakeholders. Minor refinements were performed to address missing links and consistencies among the project objectives.

Elicit Project Measures. The participants are asked to explain how they would measure the achievement of the stated objectives, those they provided initially and the full composite of project objectives. The GQM approach was used to analyse the data, elicit and identify measures associated with the project objectives. There are two strategies that may be employed in obtaining the measures by identifying the measures linked to the project means objectives or linked to the project fundamental objectives. This examination analysed all the project objectives to identify suitable measures. In eliciting the measures, the purpose of the objective is first identified, followed by the its issue, object or aim of the objective, and viewpoint through which the objective is seen (Basili et al., 1994). The set of questions are then developed from which the measures of viewing the objectives derived and the process was repeated for all the objectives. For example, the objective of *Possess Doctoral-Level IS Content Knowledge* is analysed by identifying purpose of the objective (i.e. attain), the issue (i.e. possession), the object of the objectives (i.e. doctoral-level IS content knowledge), and the viewpoints through which the objectives may be viewed (i.e. student, advisor). Questions include (1) *What are the characteristics that indicate or reflect doctoral-level IS content knowledge?* and (2) *Is formal assessments of students' content knowledge performed?* Therefore metrics include (1) *Score on comprehensive exam*, (2) *GPA on dissertation course work*, and (3) *Level of comprehensiveness of literature review section*.

The approach allows for objective and subjective ratings of the objectives (Basili et al., 1994), so an objective measure would be the *exam results* and a subjective measure of an advisor would be the *rating on the level of comprehensiveness of the dissertation* or sections of it. It was observed that the exercise of identifying metrics was also made easier with the use of the VFT technique. It became evident that the VFT provided a clearer vision of what the stakeholders needed (richer objectives), and it was observed that the act of developing questions and finding associated metrics was made easier with the aid of the project means-end network. The project measures are later summarized in the Fundamental Objectives-Measures network, a product of the POMM displayed in Table 4.

The reader may observe that each objective has multiple measures, and that measures appear to have different scales. Through the use of appropriate transformation rules, scores for all measures could be converted to a uniform scale (e.g. High = 7-9, Medium = 4-6, and Low = 1-3). For a given fundamental objective, the scores of its associated measures on the uniform scale would be synthesized using some method (e.g. averaging) resulting on an overall score for the *fundamental objective*.

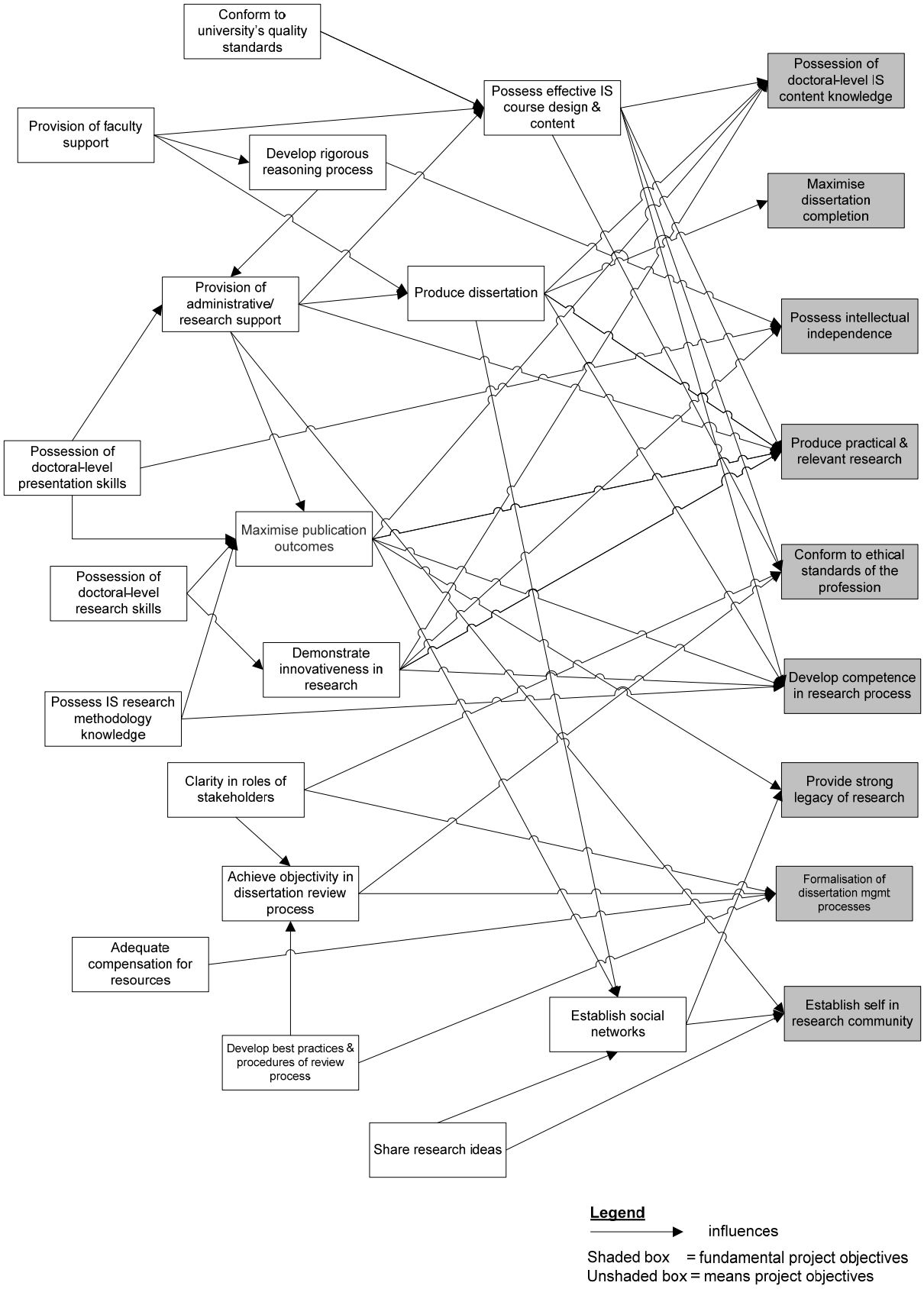

Figure 4: Project means-ends network - IS Thesis Programme Project

Table 4: Project fundamental objectives-measures network

Project Fundamental Objectives	Measures
Develop competence in research process	▪ Subject course grades ▪ Rating on dissertation research development
Possession of doctoral-level IS content knowledge	▪ Course work grades ▪ Comprehensive exam results ▪ Rating on completed dissertation ▪ Rating on Literature Review section of dissertation
Possess intellectual independence	▪ # of independent research activities ▪ # of independent publications ▪ Ratio of independent activities/publications to collaborative activities/publications ▪ Rating on level of intellectual growth during programme
Develop/enhance a formalized dissertation mgmt process	▪ Detailed procedures on review and assessment process ▪ Detailed procedures on accountabilities, structure, how the programme works ▪ Results of benchmark against other universities ▪ Results of independent audit of programme
Conform to ethical standards of the profession	▪ Rating of the standard of the completed dissertation ▪ Rating of conformance to standards set-out by IS profession
Maximize dissertation completion	▪ # of completed dissertation ▪ Ratio of completed dissertation to enrolled students ▪ Average latency of completion
Provide strong legacy of research	▪ # of graduates ▪ Rating of cadre of students/graduates ▪ Creation of facilities that promote Caribbean research/IS research (e.g. a conference)
Produce practical & relevant research	▪ # of publications ▪ # of practitioner-based publications ▪ # of research adopted in practice ▪ Rating on the level of interest shown by practice (e.g. business community)
Establish self in research community	▪ # of publications ▪ # of citations of published works ▪ # of consultations and/or requests ▪ # of invitations (reviews, research community service)

Review Objective-Measure Network. The participants were later asked to review the means-ends network to determine whether 1) it represented what they wished to convey 2) there were any missing relationships, objectives or measures, and 3) it was an understandable tool that would be useful to them in generating richer project objectives. The stakeholders conveyed that the model and approach was useful as it highlights the objectives, relationships and measures that may be used to assess the achievement of same.

Monitor Project Objectives. The performance of the project is monitored against the achievement of the objectives based on the measures identified. Equipped with the set of objectives and measures, the university (e.g. programme coordinator) may assess the progress or achievement of the respective objectives and determine whether any refinement or corrective actions are needed throughout the remainder of the project. For instance, in monitoring intellectual independence of students, the number of independent publications would be evaluated or ratio of independent and collaborative activities. These may be further compared against agreed baselines that are included in the programme's policies and procedures (objective – formalization of programme). If performance is below expected standards, corrective measures such as research workshops may be conducted and independent research activities reevaluated. Evidently, as seen by the diverse objectives some may be achieved within the short term and others over a longer term, for example, course grades and procedures can be evaluated during the life of the programme, the number of graduates at the first cycle and number of publications per student over a longer period. This is aligned with

trends of including the product life cycle assessments as part of the evaluation of outcome of the project (Nelson, 2005).

Determine the Project Outcome. In the determination of the project objectives and measures practitioners now need a strategy to define the final outcome of the project in terms of success or failure or anything in between. Such an approach includes an assessment of the achievement of all the fundamental objectives and the use of a matrix as defined in Table 5 to define the achievement of an outcome. Table 5 includes a set of decision rules that could be used to assess the overall project outcome. For example, achievement of all fundamental objectives equates to a highly successful project, achievement of some of the fundamental objectives combined with all the other equates to a partially successful project outcome. Achievement of none of the fundamental objectives would equate to failure. All of the possible combinations are not shown, but rather an illustration of the decision rules that may guide practitioners in the determination of a clear project outcome.

Table 5: An example of project outcome determination

High priority fundamental objectives	Medium priority fundamental objectives	Low priority fundamental objectives	Project Outcome Results
All	All	All	Highly successful
All	Most	All	Highly successful
All	Most	Most	Highly successful
All	Some	All	Highly successful
Most	All	All	Mostly successful
Most	Most	All	Mostly successful
Most	Most	Most	Mostly successful
Most	Some	Some	Mostly successful
Most	None	None	Partially successful
Some	All	All	Partially successful
Some	Most	Most	Partially successful
Some	Some	All	Challenged
Some	Some	Some	Challenged
None	All	All	Challenged
None	None	All	Failed
*** All other Combinations ***			Challenged or Failed

Alternately the overall assessment of the project could be determined by using the weighting model as determined in the *Determine the Priorities of the Project Fundamental Objectives* step (see Table 3) and scores for the *fundamental objectives* as were determined in the *Elicit Project Measures* step. Other options include multi-criteria decision analysis (MCDA) methods such as AHP or Electre, which are useful strategies for assisting in the determination of the final outcome of the project. These methods have been cited for being most reliable or user-friendly based on a review of the literature. Hence, there is improved likelihood they can be easily adopted in this environment.

7. Concluding remarks

The POMM is proposed as a tool that can aid in the evaluation process of IS projects through the elicitation, development and alignment of project objectives and measures reflective of the values of the key project stakeholders. An exploratory assessment of the strengths and implications of the proposed model by a team of IS PM experts was performed. They concluded that the model can provide value to organisations through the identification of stronger set of project objectives, or even at the project selection/justification phase through improved project design, and is an improvement of the current standard methodology practiced in their organisations. The case study method was used to illustrate the procedures and concepts of POMM using an IS thesis programme. While this case may not have fallen into the typical business domain, we proffer that IS plays a role in every sector and the model can be applied within any domain seeking to evaluate their IS projects.

This research represents the first in a series of studies to extend the debate on perspectives of IS project evaluation tools. It is anticipated that this study will help project practitioner rethink their evaluation methods, and focus on a more complete approach that engenders stronger project design and improved accounting of project delivery. We argue that this will aid stakeholder satisfaction. Future research directions involve enhancing the generalisability of the study through further examination and refinement of the POMM and its application in diverse IS project case settings.

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