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A Research Note: A Multi-perspective, Systems-based (MPSB) Framework on Information Systems/ Information Technology (IS/IT) Project Appraisal

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Abstract:

This paper examines the practical and theoretical concerns on the subject of Information Systems/ Information Technology (IS/IT) project appraisal from the literature of Information Systems, Systems Thinking and Project Management. From this investigation, an overall intellectual landscape of the IS/IT project appraisal topic is revealed. This broad-brush picture informs the writer's attempt to synthesize the various notions and approaches in IS/IT project appraisal into a Multi-perspective, Systems-based (MPSB) Framework. It is intended that the MPSB Framework will contribute to the theoretical development on the appraisal topic as well as to guide the practice of IS/IT project appraisal in an increasingly sophisticated technological and business environment. Construction of MPSB Frameworks, as is done in this paper, is a key activity in MPSB Research.

Key words: Multi-perspective, Systems-based Framework, IS/IT project appraisal, Scientific progress, Systems Thinking

Introduction

Information Systems / Information Technology (IS/IT) project appraisal has long been a main topic of study and research in both the Information Systems, Systems Thinking and Project Management fields, among others. Due to the increasingly sophisticated IS/IT application in business as well as the increasingly turbulent competitive landscape facing many

3303

companies, the topic of IS project appraisal remains both academically and practically challenging. In this paper, the writer examines IS/IT project appraisal based on the literature of Information Systems, Systems Thinking and Project Management. It then synthesizes the relevant ideas from these three subject sources into a Multi-perspective, Systems-based (MPSB) Framework to clarify the present theoretical status as well as to guide professional practices in IS/IT project investment appraisal.

Evolution of the conventional view of IS/IT project appraisal theories and practices

Organizations conduct IS project appraisals for good reasons, such as investment justification, decision support on choice of alternative projects and IT expenditure control, just as there are normal and idiosyncratic reasons why appraisals are not carried out sometimes (Rosacker and Olson, 2008). Nevertheless, from the literature on IS project appraisal, e.g. Lefley (2013) and Jones and Hughes (2001), a number of concerns in IS/IT project appraisal practices are noted:

(1) Differences of stakeholder's expectation towards the IS/IT projects as well as conflicts of priorities between staff from different functions in organizations
(2) High complexity of some of the IS/IT projects
(3) Substantial challenge of IS/IT project appraisal arising from the dynamic and complex business environment
(4) Much bias in project selection, e.g. from project champions
(5) Lack of consensus of appropriate combination of IS/IT appraisal methods to use.
(6) IS/IT project appraisals considered too costly or unnecessary
(7) IS/IT project appraisals are not conducted rigorously

Given these IS/IT project appraisal concerns, there remains a general endorsement in the literature on the focus on "project success", comprising the topics of success factors and success criteria (see, Műller and Jugdev (2012).), in IS/IT project appraisal discussion. This focus on "project success" has been identified with the Factor School in project management research (Söderlund, 2011).

IS/IT project appraisal and evaluation is conducted throughout a typical System Development Life Cycle (SDLC) and beyond. For Lefley (2013), project evaluation at the initial project justification phase is called "appraisal" while that at the latter phases of SDLC is called "evaluation". While this paper's main attention is on "appraisal", much less on "evaluation", the literature on both IS/IT "appraisal" and "evaluation" is informative for the discussion here.

In standard study materials from Accounting professional bodies, the main traditional investment appraisal methods are: (i) the payback method, (ii) the accounting rate of return method, and (iii) the discount cash flow methods such as net present value (NPV) and rate of return (IRR) (FTMS Global, 2006). These traditional IS project appraisal methods hava been felt to be weak in appraising the intangible aspects of IS project investment. As Rosacker and Olson (2008), referring to Schell (1986) stated: "financial techniques often overlook intangible benefits associated with IT investments, thereby understating the project's true value."

Additional IS/IT project appraisal methods have emerged, ranging from the employment of the expert systems approach, the linear model method, the value based Decision Support Systems Method and the scoring model (Anandarajan and Sylla 2000). Similarly, Turban *et al.* (2004) broadened the traditional (and predominantly financial) appraisal stance to cover operational, tactical, strategic and intangible considerations. In this regard, the balanced scorecard approach can be considered as helpful to meet the heightened aspiration

on more comprehensive appraisal requirements, see Milis and Merchen (2004) and Chand *et al.* (2005). Meanwhile, the prominent models of Porter, namely, the 5-Force Model and Value Chain Model, have been shown to be insightful for evaluating the strategic value of IS/IT, see, for example, Porter (2001). Finally, the Decision School in Project Management further contributes knowledge on how project appraisal and selection is done by drawing on decision-making theories and organization theory (Söderlund 2011). The Decision School underlines the fact that IS/IT appraisal is, often, less than rational. The Decision School can thus improve IS/IT project appraisal practices.

Toward a contingency and comprehensive stance of IS/IT project appraisal

There are quite some IS/IT project appraisal methods discussed in the IS literature, besides the conventional financial ones. Some of them are targeted at specific types of IS/IT projects. For examples, Keen's (1993) Value Analysis is for Decision Support Systems and Renkema's (1998) P4 model is for IT infrastructure investment appraisal.

There are various types of IS/IT project investments (i) at the departmental, divisional and corporate levels, (ii) for different management objectives, such as informational, strategic, transactional and infrastructure objectives, see Weill and Broadbent (1998), (iii) for organizations surviving in different environments, and (iv) for different types of organizations, e.g. private and public organizations. Thus, a contingency stance on IS project appraisal, which recommends a different approach for a different situation, is practically and theoretically appealing. In this regard, Fitzgerald (1998) discerned 2 types of IS projects, namely, efficiency projects and effectiveness projects. The former delivers cost reduction as its major benefit while the latter offers certain benefits that can

only be enjoyed by the enterprises concerned with some behavioral changes in "some positive way" (Fitzgerald, 1998). The need for behavioral change to bring forth IS project benefit realization is more fully addressed in Peppard, Ward and Daniel (2007)'s benefits-dependency network framework. Another example of an explicitly contingency stance was taken up in Avison and Taylor (1997), who recommended different IS development methodologies (with implications on IS project appraisal practices based on different IS development methodologies) for different IS project contexts. Specifically, Avison and Taylor (1997) identified 5 types of IS project contexts: (i) well-defined, well-structured problem situation, (ii) well-structured problem situation with clear objectives but uncertain user requirements, (iii) unstructured problem situation where objectives are unclear, (iv) situations where there is a high user interaction with the system and/or user acceptance is vital, and (v) complex problem situations. Avison and Taylor's considered methodologies included both engineering (objective) as well as non-engineering (subjective) ones.

For Weill and Broadbent (1998), an appropriate business maxim should be adopted by an enterprise after a review of its strategic context; in turn, the chosen business maxim shapes its IT maxim; IT maxim cultivates the enterprise's IT infrastructure view; such IT infrastructure view informs the enterprise's IT infrastructure capabilities required. Subsequently, the need for a specific IT infrastructure capability drives the enterprise's IS project selection and appraisal with more concrete appraisal requirements. Their work also upholds a contingency logic.

All in all, contingency frameworks that are related to IS project investment appraisal in this paper, have been proposed by theorists as comprehensive frameworks that have contingency guidelines on IS/IT appraisal practice. For Söderlund (2011), these writings are related to the Contingency

School in Project Management.

Formulation of a Multi-perspective, Systems-based (MPSB) Framework of IS/IT project appraisal

To further clarify the theoretical status of contemporary IS/IT project appraisal study, it helps to anchor the existing IS project investment appraisal approaches/ frameworks on to specific theoretical perspectives. Such an endeavor is called Type-2 scientific progress in Ho (1997). The writings on theoretical anchoring of IS/IT project appraisal methods can be found in the literature of Information Systems and Systems Thinking. The ideas from these writings are assimilated into a multi-perspective theoretical framework in this paper.

In the Information Systems literature, Jones and Hughes (2001) identified two main IS appraisal approaches, namely, the formal IS appraisal approach and the situated hermeneutic IS appraisal approach. It amounts to a discussion on the objective and subjective theoretical perspectives of IS project appraisal. For Jones and Hughes (2001), the formal IS appraisal approach (which represents the objective theoretical perspective) has the following characteristics, among others:

     (i)   "Espouses single objective view"
     (ii)   "Economic factors dominate"
     (iii)   "Overt documented process"

As to the situated hermeneutic IS appraisal approach (which reflects the subjective theoretical perspective), the following characteristics are identified, among others (Jones and Hughes, 2001):

     (i)   "Seek multi-stakeholder subjective views"
     (ii)   "Social factors dominate"
     (iii)   "Covert non-documented process"

Mckenna and Metcalfe (2013) exuded the subjective perspective tone by saying: "Project conceptualization provides the intellectual coherence for a project in the face of conflicting

stakeholders demanding their concerns be accommodated…"

As to the literature on Systems Thinking, the objective perspective endorses Hard Systems Thinking while the subjective perspective is compatible with Soft Systems Thinking. For Winter, Brown and Checkland (1995), Information Systems Development methodologies based on Hard Systems Thinking endorses Functionalist Paradigm while those based on Soft Systems Thinking embraces Interpretive Paradigm. For Checkland (1984), Hard Systems Thinking adopts the worldview that (i) Reality is systemic, (ii) Methodology is systematic, and (iii) Optimization is possible; while Soft Systems Thinking upholds the worldview that: (i) Reality is problematical, (ii) Methodology is systemic, and (iii) Learning is possible. To recap, traditional SDLC and software engineering approaches can be considered as typical Hard Systems methodologies; on the other side, there are specific Information Systems Development of methodologies based on Soft Systems Thinking, such as Checkland and Holwell (1998). Also, Stowell (1995) is a collection of Soft Systems Thinking readings on the topic of Information Systems, which can inform IS/IT appraisal study. The various strands of systems thinking have been well explained in Systems Thinking works such as Flood and Jackson (1991) and Jackson (2000). In the Information Systems literature, Butler (1998)'s hermeneutic method for interpretive research in Information Systems is compatible with Soft Systems Thinking. Lastly, the writer notes the work of Klecun and Cornford (2005) which offers an IT evaluation (and appraisal) approach grounded on Critical Theory. As Klecun and Cornford (2005) made clear: "the aim of a critical theorist or researcher as being to expose and undermine the status quo, thereby contributing to the emancipation of those who are (in some way) oppressed." Such a theoretical stance is more in line with the Emancipatory Systems Thinking as well as Critical Systems Thinking in the Systems Thinking field.

In Decision Support Systems study, Ho and Sculli (1994) developed a Multi-perspective, Systems-based (MPSB) Framework on Decision Support Systems (DSS). In their DSS Framework, three perspectives are identified, namely, Unitary (Hard Systems) perspective, Pluralist (Soft Systems) perspective, and, finally, Critical (Emancipatory Systems) perspective. The MPSB Framework on DSS is anchored on the Critical Systems perspective. Based on the contemporary systems literature, the writer now proposes an MPSB Framework on IS/IT project appraisal, which is depicted in Table 1 and Table 2 below.

	Unitary perspective	*Pluralist perspective*	*Critical perspective*
Simple problem situation	[Cell 1] Traditional financial methods of appraisal Formal IS evaluation approach of Jones and Hughes (2001)	[Cell 3] Scoring method with stakeholder participation Situated hermeneutic evaluation approach of Jones and Hughes (2001) P4 Model (Renkema, 1998) Linguistic turn approach to develop project evaluation criteria (McKenna and Metcalfe, 2004)	[Cell 5] IS project investment appraisal based on the other two perspectives, with Critical Heuristics (Ulrich, 1983) as the front-end phase in project appraisal Critical evaluation approach of Klecun and Comford (2005)
Complex problem situation	[Cell 2] Benefits-dependency network framework (Peppard *et al.*, 2007) Balanced Scorecard approach (Chand *et al.*, 2005; Milis and Kerchen, 2004)	[Cell 4] Soft Systems-based Information Systems methodology (e.g. Checkland and Holwell, 1998) used as front-end phase in project appraisal, as supported by	[Cell 6] IS project investment appraisal based on the other two perspectives, with Critical Systems methodologies (e.g. Flood and Jackson, 1991) as the front-

	Management by Maxim (Weill and Broadbent, 1998)	other methods from the Unitary and Pluralist perspective	end phase in project appraisal

Table 1: An MPSB Framework on IS/IT project appraisal approaches based on Jackson and Keys' Systems of Systems Methodologies

As a synthesizing framework on IS/IT project appraisal, Table 1 is derived from Jackson and Keys' (1984) systems of systems methodologies, which was proposed to relate various systems methodologies, based on their respective theoretical and methodological strengths and weaknesses, to various types of problem-situations. There are six types of problem-situations in Jackson and Keys' framework based on the following two dimensions:

> (i) *systems dimension (with simple and complex problem situations):* This refers to the elements and their relationships of non-participants *per se* in the problem situation

> (ii) *participants dimension (with unitary, pluralist and coercive situations):* This refers to the relationship, including extent of conflicts/ disagreements between stakeholders involved in the problem situation

Table 1 adopts the Jacks-Keys' *systems dimension* direct while the *participants dimension* is replaced with *theoretical perspectives dimension*. Here, three theoretical perspectives are indicated: Unitary perspective, Pluralist perspective and Critical perspective. These three theoretical perspectives have previously been employed in Ho and Sculli (1994).

In our case, some project appraisal problem-situations are more complex than others, which demand certain IS/IT project appraisal methods with different strengths to deal with the tremendous complexity in the conduct of such appraisals. [Note: it is methodologically feasible to apply various systems methodologies, directly or with some adaptations, to appraise

IS/IT projects; this intellectual task is not taken up in this paper.]

Some further comments on the contents in Table 1 are made here:

    (i)   with participants strongly sharing common interests and objectives

    (ii)   IS/IT appraisal methods that offer concrete guidelines on collective learning and perception-analysis to cope with the soft complexity exhibited in project situations, like those in Cells 3 and 4, can more easily be anchored to the Pluralist perspective.

    (iii)   IS/IT appraisal methods, e.g. those in Cells 5 and 6, that explicitly deal with various forms of contradictions and coercion in project situations endorse the Critical perspective.

In the literature of Project Management, Baccarini (1996) discerned two types of project complexity, namely, organizational complexity and technological complexity. The essence of complexity in Decision Support Systems projects has also been examined in Ho and Sculli (1995) from the Systems Thinking perspective. These writings on complexity from the Systems and Project Management literature deepen our understanding on the nature of problem-situation complexity in the Jackson-Keys' framework as well as Table 1 here. It is, however, beyond the scope of this brief paper to deal with the notion of complexity further.

The MSPB Framework, as described in Table 1 takes stock of what IS/IT project appraisal methods are currently available as well as can be further developed. The general impression of the writer, from his working experience and research experience, is that those appraisal methods that support the Pluralist and Critical perspectives tend to be less developed and practiced, both because they are relatively new

and because they are less favored in commercial settings. This is especially the case for appraisal methods that are based on the Critical perspective.

Table 2 continues with the exercise of synthesizing the relevant concepts in Information Systems, Systems Thinking and Project Management into the MPSB Framework on IS/IT project appraisal.

	Unitary perspective	*Pluralist perspective*	*Critical perspective*
Problem types (Fitzgerald, 1998; Mitroff and Linstone, 1993; Camillus, 2008)	Efficiency problem Effectiveness problem Clearly bounded problem	Effectiveness problem Wicked problem Less clearly bounded problem	Wicked problem Unbounded problem
Likely types of IS/IT projects, in terms of the re-engineering spectrum (Talwar, 1994)	Process Improvement Process Re-engineering	Process Re-engineering Business Re-engineering	Business Re-engineering, Transformation Ongoing Renewal
Roles of Systems Analyst (Bell and Wood-Harper, 1998)	Technical expert	Facilitator Catalyst of change	Agent of radical change
Underlying inquiry systems used (Mitroff and Linstone, 1993)	First way of knowing: Agreement Second way of knowing: Formula	Third way of knowing: Multiple realities Fourth way of knowing: Conflict	Fourth way of knowing: Conflict Fifth way of knowing: Unbounded Systems Thinking

Table 2: An MPSB Framework on IS/IT project appraisal, problem types, types of IS/IT projects, the roles of Systems Analyst and underlying inquiry systems

The concepts related to problem-types come from Mitroff and Linstone (1993), Fitzgerald (1998) and Camillus (2008). As to the topic of IT project types, the writer refers to Talwar (1994). Using the work of Bell and Wood-Harper (1998), based on the Unitary perspective, the Systems Analyst (SA)'s role is a

technical expert; when based on the Pluralist perspective, the SA acts more like a facilitator and catalyst of change; finally, when the Critical perspective is adopted, the SA is an agent of radical social change. Different theoretical perspectives favour different types of inquiry systems, which are different methods to produce knowledge (Mitroff and Linstone 1993). This is noted in the fourth row of Table 2. The explicit grouping of these inquiry systems to the three perspectives renders the theoretical essence of various IS/IT project appraisal methods more visible. The underlying rationale for grouping all the ideas into the Unitary, Pluralist and Critical perspectives is further explained in the literature of Critical Systems Thinking and MPSB Research, see Ho (1996) and Jackson (2000) for a more detailed elaboration.

At this point, one can take issue with this broad-bush exercise on synthesizing the relevant literature on IS/IT project appraisal. For instance, one can dispute the location of specific IS/IT methods in specific cells in Table 1 or the location of specific concepts in specific cells in Table 2. It is admittedly desirable to refine and challenge such an impressionistic framework as a way to enrich the intellectual discussion on the topic of IS/IT project appraisal. Notwithstanding this, the writer recommends that the MPSB Framework be considered as conceptually malleable and suggestive; its present intellectual value is to mainly serve as a tentative structured agenda for further theoretical investigation. As Ho (1995) put it: "… MPSB frameworks could…. be considered as meta-structures of knowledge, which are ready to be challenged (and are encouraged to be challenged) and negated by alternative and better ones…" Also, it is conceptually feasible to operationalize this MPSB Framework by drawing on the ideas from Critical Systems Thinking and related methodologies, such as the Total Systems Intervention methodology of Flood and Jackson (1991) and MPSB Research of Ho (1996). Such an intellectual attempt to develop more concrete methodological

guidelines for this MPSB Framework makes up a potential research venture.

Concluding remarks

By reviewing the literature on IS/IT project appraisals, this paper summarizes the main ideas from the Information Systems, Project Management and Systems Thinking literature. A synthesis of the ideas into a Multi-perspective, Systems-based (MPSB) Framework on IS/IT appraisal is then made. Such an academic endeavor can be seen as part of the ongoing MPSB Research, see Ho (1996). The full justification of the rationale underlying the MPSB Framework in this paper can be found in some other publications, e.g. Ho (1996) and Jackson (2000). The MPSB Framework constructed in this paper can be considered as an illustrative example on MPSB Framework, which is described as a "meta-framework to review management disciplines that is multi-perspective." In this paper, the topic of IS/IT appraisal methods does not make up a management discipline (Ho, 1995). From this exercise, it is more appropriate to state that this kind of meta-framework can review a management discipline or a management topic that is multi-perspective. The MPSB Framework on IS/IT project appraisal is currently being applied by a Master Degree student in a Hotel company as his dissertation project, under the supervision of this writer.

By identifying a range of IS/IT project appraisal methods and relating them to various theoretical perspectives, the writer shows a rough intellectual landscape on IS/IT project appraisal, inviting theorists to sustain their venture into this intellectual terrain in a cross-disciplinary and trans-disciplinary research mode. The resultant MPSB Framework indicates that some of the IS/IT project appraisal concerns, such as differences of stakeholders' expectation from IS/IT projects, high complexity of some of the IS/IT projects and lack of

consensus of appropriate combination of IS/IT appraisal methods to use, have been and will further be addressed in IS/IT appraisal research. To be specific, Table 1 suggests that certain IS/IT project appraisal methods are more capable to deal with complexity arising from the systems dimension or the participants dimension, or both. In addition, the MPSB Framework indicates the relative strengths and weaknesses of various IS/IT project appraisal methods, thus informing the choice of appropriate combination of appraisal methods to use. From the exercise here, the paper also shows that much more research works still need to be done on the academically and practically important topic of IS/IT project appraisal. Specifically, many ideas and methods noted in Tables 1 and 2 need more research efforts.

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