Research on IT/IS Evaluation: A 25 Year Review

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Abstract: The conduct of IT/IS evaluation and its associated approaches, techniques and methods have been the subject of IS research for many years, particularly in the last two decades. This paper reflects on the body of knowledge which has emerged over the past twenty-five years in order to identify where research efforts are focussed, what are the important issues in IT/IS evaluation research, and where future research efforts should be placed. This study presents a descriptive analysis of research on IT/IS evaluation over the last 25 five years, from 1986 to 2010, in five leading IS journals In total, 176 papers related to IT/IS evaluation are identified and reviewed in this study. Based on the Context, Content and Process model, IT/IS evaluation can be broken down to five interrelated elements: ***why*** evaluation is carried out, *what* is evaluated,*whenwhen* evaluation takes place, *how* evaluation is performed and *who* is involved in evaluation. Each of these elements are identified and classified in the sample research articles and based on this analysis, we propose a new perspective for classifying IT/IS evaluation approaches.

Keywords: IT/IS evaluation, literature review; Content, Context and Process (CCP) model, evaluation streams

1. Introduction

It is widely accepted that the application of information and communications technology has become critical to the success of business (Willcocks & Lester 1996). While there has been worldwide increasing expenditure on IT/IS over the past few decades (Ballantine & Stray 1999, Serafeimidis & Smithson 1999, Willcocks & Lester 1996), it is recognised that the successful deployment of IT/IS does not occur by default. On the contrary, it has been widely noted that a mismatch exists between the outcomes delivered and the benefits that are promised. This is often cited as the "productivity paradox" (Irani & Love 2008, Farbey et al. 1999c, Willcocks & Lester 1996). A perennial managerial task for organisations is therefore to be able to effectively evaluate the contribution of investments in information and communications technology. Given the importance of effective evaluation to managers, this paper reviews the research literature on IT/IS evaluation has developed over the past twenty-five years.

Evaluation is a process used to identify, measure, and assess the value of an object in a given context. Evaluation processes play a critical role in organisations' efforts to assess the success and payoffs of their investments in IT/IS. Consequently, in the research literature there have been extensive efforts to understand the nature of IT/IS evaluation and to develop improved approaches and techniques. Given that IT/IS evaluation has been an important and ongoing of domain of research interest, it is worth reflecting on how research in the area has evolved. Peer reviewed journals in the information systems discipline are, in theory, representations of current thinking and theoretical development. In order to understand the changes in development in thinking with respect to IIT/IS evaluation, this study conducts a rigorous, quantitative review of IT/IS evaluation literature in five leading IS journals over the last 25 years. As a starting point for our analysis we adopt the approach taken by Serafeimidis (2002) who briefly reviewed research on IS evaluation based on the concepts embodied in the Content, Context and Process (CCP) model. His analysis elaboratedthree different streams of IT/IS evaluation: the technical/functional stream, the economic/financial stream and the interpretive stream. Our aim is to updateSerafeimidis' study and further enhance the understanding of the three evaluation streams.

In the remaining sections of this paper, the framework that we use for analysis – the Content, Context and Process model – is first described followed by an outline of the research methodology and the analytical approach adopted. The data representing the published IT/IS research on evaluation is then analysed in accordance with the CCP model. The final sections of the paper discuss the findings of the analysis and show how the comprehensive analysis over 25 years provides an alternative classification to Serfieimidis' categories of research. Through a discussion of the critical features of

relationships between each stream of IT/IS evaluation research identified, we then suggest directions for future research in the domain.

2. Understanding IT/IS Evaluation Research– The Content, Contextand Process (CCP) Model

IT/IS evaluation is a multifaceted and complicated phenomenon which can be examined from multiple perspectives. As a domain of study it can be considered to be an interactive social system that is interwoven with different stakeholders, various resources and multiple decision-making processes (Irani & Love 2008, Farbey et al. 1999b). It is possible for example to examine the variety of techniques that can be applied during evaluation, the activities and processes involved in evaluation, as well as the layers of political motivations that drive the conduct of evaluations. In order to capture the breadth of research conducted in IT/IS evaluation we use a recognised and well-structured framework,(Irani & Love 2008, Farbey et al. 1999b), namely, the Content Context and Process (CCP) model. This model was first introduced to IT/IS evaluation research to investigate and analyse important elements in an IT/IS evaluation by Symons (1991). Subsequently, theCCP model has been successfully applied in several IT/IS evaluation studies (Huerta & Sanchez 1999, Avgerou 1995, Serafeimidis 2002, Stockdale & Standing 2006, Serafeimidis & Smithson 1999). In one such study, Serafeimidis (2002) conducted a brief review of research on IT/IS evaluation based on the concepts of CCP in order to draw out the themes of study in IT/IS evaluation. This work was valuable in orienting the focus of research at that time and the study described in this paper aims to extend this work with a further application of the CCP model as the framework for analysis.

In the CCP model, the *Context* dimension aims to capture *why* evaluation is carried out and *who* is involved in the evaluation. Context refers to both the internal and external environment of an organization (Avgerou 1995). Internally, it includes aspects such as the structure, business strategies, management procedures, and culture of an organization. Externally, it includes factors like technologies, market structures, and government policies. In each specific context, IT systems are designed and implemented to serve different purposes, to fulfil various requirements and deliver diverse benefits. The context dimension of the CCP model captures the internal and external context by assessing the underlying motivations for conducting evaluations and an exploration of the various stakeholders involved.

The *Content* dimension of the model is concerned with the subject/object of evaluation, the criteria that are used to assess the IT/IS, and any changes caused by the IS (Avgerou 1995). That is, this dimension addresses questions of *what* is being evaluated? Serafeimidis' study suggested that efficiency and effectiveness measures have been the most frequently applied criteria (Serafeimidis 2002) to evaluating the content dimension and in addition, this dimension is closely related to the context in which evaluation is carried out.

The third dimension of the CCP framework - the *process* dimension focuses on questions of *when* evaluation takes place, and how evaluation isperformed. In the framework, process refers to the actions, reactions, and interactions of the interested parties involved in the IT/IS evaluation. Again there is a strong relationship between this dimension and the content dimension of evaluation (Serafeimidis & Smithson 2000). In addition to the method of evaluation, the timeframe in which the evaluation occurs is also a critical issue. For instance Farbey (1992) suggests that evaluation can take place either at a point in time or it may be conducted continuously across the lifecycle of an IT/IS implementation.

Other frameworks or models are found in the literature for understanding IT/IS evaluation or implementation (Özkan et al. 2007, Farbey et al. 1999a), but the CCP model is applied in this research for understanding and discussion of evaluation for two reasons. First, there is a wide acceptance of the CCP model among leading contributors to IT/IS evaluation theory. Efforts of conducting or promoting CCP can not only be found in IT/IS research (Huerta & Sanchez 1999, Symons 1991, Avgerou 1995, Serafeimidis 2002, Stockdale & Standing 2006, Serafeimidis & Smithson 1999), but also other topics, such as organizational performance (Ketchen et al. 1996), openness to organizational change (Devos et al. 2007), and marketing strategies (Baines & Lynch 2005).

Secondly, the concepts contained within CCP are broad enough to accommodate the myriad ideas and arguments in this well-documented field, while still providing parameters for reviewing them

(Stockdale & Standing 2006). The CCP model breaks evaluation into a number of elements: purpose (why), the subject and criteria (what), timeframe (when), methodologies (how) and people (who). By doing so, the CCP model allows for the recognition of a wide scope of interrelated factors that need to be taken into account in an effective evaluation (Stockdale & Standing 2006, Serafeimidis 2002).

3. Research Method and Data Collection

In order to investigate the evolution of research in IT/IS evaluation, we examine research published in five premier IS journals spanning the period 1986-2010. Journal papers were selected as the source of data because by nature of their review and editorial processes they exhibit a higher reliability than other resources such as working papers, dissertations and conference proceedings. In total, 176 studies published in *European Journal of Information Systems (EJIS), Information Systems Research (ISR), Journal of Information Technology (JIT), MIS Quarterly (MISQ) and Journal of Management Information Systems (JMIS)* related to IT/IS evaluation were identified and included in this study. The five particular journals were selected because of their consistently high reputation and ranking across a range of indicators. Each of these journals for example are ranked as A* publications in the Australian Business Deans Council journal rankings as well as the Association of Information Systems Senior Scholars basket of journals.

In selecting papers from the journals, IT/IS evaluation papers were chosen according to keywords identified in the title and abstract. This approach therefore focussed analysis on those papers that included IT/IS evaluation as a primary subject of the article. For each paper reviewed, the purpose of the study, the organization sector in which the study was conducted, the unit of analysis and the research methodology were identified. This general analysis provided an overall perspective of the trajectory that IT/IS evaluation research has taken over the last 25 years.

For a more detailed analysis of IT/IS evaluation, concepts related to IT/IS evaluation in each paper were identified and categorized according to the underlying questions of the dimensions defined by the CCP model. Previous research has yet to identify a clear and comprehensive analysis of the purpose of evaluation. Therefore our analysis of understanding the question of *why* evaluation is conducted uses a grounded approach and relevant concepts are abstracted from each article and then categorised. To assess the content dimension of evaluation where the focus is on questions of *what* is being evaluated, our analysis was guided by the measures inherent in the DeLone and McLean IS success model (Delone and McLean 1992, 2003) because of its wide acceptance and recognition in the IS research field. To assess the important temporal dimension of evaluation we draw on Farbey's (1992) definition of IT/IS evaluation and abstract the evaluation timeframes identified and discussed in each of the papers. The classification used by Serafeimidis' (2002) study in identifying the methodologies, tools and approaches to evaluation, was used to assess *how* evaluation is performed.For questions of *who* was involved in evaluation which is important in assessing the context dimension of the CCP model, major players were identified directly from each paper and then categorised.

4. Data Analysis

An overview of the IT/IS evaluation research articles examined are provided in table 11 below. As can be seen, there was an increase in the number of published evaluation studies from late 1980s to early 2000s with a sharp decrease in the period 2006-2010. One possible reason for this decline is that IT/IS evaluation has more recently been seen as being embedded with broader managerial issues in IT/IS implementation (Irani & Love 2008, Huerta & Sanchez 1999). From our analysis of articles published in our journal sample, a large number of studies discussed concepts of IT/IS evaluation, but were not primarily focussed on evaluation per se. Therefore, these studies were not included in this review.

There was an almost even distribution of the number of papers across all journals. moredueMISQ and JMIS had relatively moredue to their longer publication history relative to the other journals. Most papers in the period 1986 to 1990 were published in these two journals whereas EJIS and ISR were first published in early 1990s. It was found that JIT had less focused on IT/IS evaluation compared to the other journals sampled.

Table 1.Papers Distribution by Journals and Years

	EJIS	ISR	JIT	MISQ	JMIS	Total

1986-1990	0	1	5	6	8	**20 (11.4%)**
1991-1995	4	3	9	14	9	**39 (22.2%)**
1996-2000	5	6	9	11	14	**45 (25.6%)**
2001-2005	10	14	5	6	14	**49 (27.8%)**
2006-2010	10	4	1	3	5	**23 (13.1%)**
Total	**29 (16.5%)**	**28 (15.9%)**	**29 (16.5%)**	**40 (22.7%)**	**50 (28.4%)**	**176 (100%)**

depict the research purpose, context, unit of analysis and research methods of paper reviewed by different journals and periods. For each of the papers analysed we aimed to identify the underlying research purpose in order to understand the objectives of each article. Six purposes were identified in this study:

Instrument/method development: these studies consider that evaluation tools or methods in use are either problematic or unable to fit into a specific context. Therefore, researchers attempted to develop new or modify current evaluation instrument or methods, either practically or theoretically.

Instrument/method validation: these studies examine the validity and reliability of the instruments and methods proposed in previous studies (not limited to 176 papers reviewed), and serves as an external validation.

Construct/measurement development: these studies attempt to develop evaluation criteria in a certain context or environment. About 22.2% papers studied serve this purpose.

Construct/measurement validation: these studies can be considered as external validation of constructs or measurements proposed by other studies and further examine their validity and reliability.

Study of evaluation practice: these studies analyze actual evaluation practices and report important finding(s) from them.

Carrying out an evaluation: in this group of studies, the authors are the ones who actually conduct the evaluation. They then report their evaluation process, outcomes and findings.

In general, a large portion of the studies focused on the development of evaluation instruments/methods (43.2%) and construct/measurement (22.2%) (see Table 2). However, relatively fewer studies further examined the reliability and validity of the instruments/methods developed (11.9%) or the constructs/measurement (5.1%) as an external validation. In addition, a number of articles examined completed evaluations in practice (12.5%), but only a few carried out an actual in-situ evaluation and reported on that process and the findings (5.1%). This finding was reflected in each journal separately. Most papers focused on instrument and construct development, but only a few efforts were put into other aspects. Nevertheless, JIT showed a special interest in study of evaluation practice. Moreover, the general trend did not change much over the years (see Table 3).

Table 2. Features of the Papers by Journals

		EJIS	ISR	JIT	MISQ	JMIS	Total
Research Purpose	***Instrument/method development***	12 (41%)	12 (43%)	9 (31%)	18 (45%)	25 (50%)	**76 (43.2%)**
	Instrument/method validation	3 (10%)	2 (7%)	0 (0%)	9 (23%)	7 (14%)	**21 (11.9%)**
	Construct/measurement development	6 (21%)	12 (43%)	6 (21%)	5 (13%)	10 (20%)	**39 (22.2%)**

	Construct/measurement validation	1 (3%)	0 (0%)	1 (3%)	4 (10%)	3 (6%)	**9 (5.1%)**
	Study of evaluation practice	5 (17%)	0 (0%)	**11 (38%)**	3 (8%)	3 (6%)	**22 (12.5%)**
	Carrying out an evaluation	2 (7%)	2 (7%)	2 (7%)	1 (3%)	2 (4%)	**9 (5.1%)**
Context	***General***	13 (45%)	13 (46%)	10 (34%)	17 (43%)	27 (54%)	**80 (45.5%)**
	Private	11 (38%)	14 (50%)	17 (59%)	23 (57%)	18 (36%)	**83 (47.2%)**
	Public	5 (17%)	1 (4%)	2 (7%)	0 (0%)	5 (10%)	**13 (7.4%)**
Unit of Analysis	***IT***	9 (31%)	11 (39%)	5 (17%)	12 (30%)	22 (44%)	**59 (33.5%)**
	IS	11 (38%)	11 (39%)	9 (31%)	17 (43%)	15 (30%)	**63 (35.8%)**
	Both	3 (10%)	1 (4%)	2 (7%)	7 (18%)	2 (4%)	**15 (8.5%)**
	IT/IS investment	6 (21%)	5 (18%)	13 (45%)	4 (10%)	11 (22%)	**39 (22.2%)**
Research Methods	***Survey***	5 (17%)	7 (25%)	7 (24%)	**18 (45%)**	15 (30%)	**52 (29.5%)**
	Case study and qualitative	12 (41%)	2 (7%)	**12 (41%)**	11 (28%)	16 (32%)	**53 (30.1%)**
	Concept description	**8 (28%)**	3 (11%)	5 (17%)	2 (5%)	9 (18%)	**27 (15.3%)**
	Secondary data (literature review)	1 (3%)	**10 (36%)**	4 (14%)	4 (10%)	8 (16%)	**27 (15.3%)**
	Experiments	1 (3%)	3 (11%)	0 (0%)	2 (5%)	2 (4%)	**8 (4.5%)**
	Combined methods	2 (7%)	3 (11%)	1 (3%)	3 (8%)	0 (0%)	**9 (5.1%)**

According to the CCP model, context determines the reason for an evaluation which then further influences the evaluation content and process (Stockdale & Standing, 2006). Therefore, evaluation cannot be understood in isolation from its context (Symons, 1991). A large proportion of the research reviewed was focussed on the *general context* (45.5%), in which researchers did not or were unable to distinguish the differences between public and private organisations. About 47.2% of the studies conducted in a *private context*. Very few of them specifically targeted at the IT/IS evaluation in the *public sector* (7.4%). One important change over the last 25 years was anan increasing proportion of papers related to the public sector, as shown in Table 3. This implies an increasing interest in IT/IS evaluation in public organizations including hospitals and government agencies in which management need to be accountable to the taxpaying public.

Table 3. Features of the Papers by Years

		1986-1990	**1991-1995**	**1996-2000**	**2001-2005**	**2006-2010**	**Total**
Research Purpose	***Instrument/method development***	10 (50%)	18 (46%)	16 (36%)	22 (45%)	10 (43%)	**76 (43.2%)**
	Instrument/method validation	2 (10%)	3 (8%)	8 (18%)	5 (10%)	3 (13%)	**21 (11.9%)**
	Construct/measurement development	4 (20%)	5 (13%)	11 (24%)	13 (27%)	6 (26%)	**39 (22.2%)**
	Construct/measurement validation	0 (0%)	6 (15%)	1 (2%)	1 (2%)	1 (4%)	**9 (5.1%)**
	Study of evaluation practice	4 (20%)	4 (10%)	8 (18%)	6 (12%)	0 (0%)	**22 (12.5%)**

	Carrying out an evaluation	0 (0%)	3 (8%)	1 (2%)	2 (4%)	3 (13%)	**9 (5.1%)**
Context	***General***	7 (35%)	21 (54%)	21 (47%)	22 (45%)	9 (39%)	**80 (45.5%)**
	Private	13 (65%)	17 (44%)	21 (47%)	23 (47%)	9 (39%)	**83 (47.2%)**
	Public	0 (0%)	1 (3%)	3 (7%)	4 (8%)	5 (22%)	**13 (7.4%)**
Unit of Analysis	***IT***	4 (20%)	8 (21%)	15 (33%)	21 (43%)	11 (48%)	**59 (33.5%)**
	IS	9 (45%)	18 (46%)	15 (33%)	14 (29%)	7 (30%)	**63 (35.8%)**
	Both	2 (10%)	5 (13%)	2 (4%)	5 (10%)	1 (4%)	**15 (8.5%)**
	IT/IS investment	5 (25%)	8 (21%)	13 (29%)	9 (18%)	4 (17%)	**39 (22.2%)**
Research Methods	***Survey***	5 (25%)	11 (28%)	9 (20%)	20 (41%)	7 (30%)	**52 (29.5%)**
	Case study and qualitative	8 (40%)	13 (33%)	16 (36%)	8 (16%)	8 (35%)	**53 (30.1%)**
	Concept description	2 (10%)	10 (26%)	4 (9%)	7 (14%)	4 (17%)	**27 (15.3%)**
	Secondary data (literature review)	2 (10%)	2 (5%)	11 (24%)	20 (20%)	2 (9%)	**27 (15.3%)**
	Experiments	2 (10%)	3 (8%)	1 (2%)	1 (2%)	1 (4%)	**8 (4.5%)**
	Combined methods	1 (5%)	0 (0%)	4 (9%)	3 (6%)	1 (4%)	**9 (5.1%)**

We make a distinction between the concepts of IT and IS as the unit of analysis in evaluation, with the emphasis of IT evaluation being focussed on the objective characteristics of hardware and software deployment (Nagm 2008) as opposed to evaluation of IS in which the technologies are evaluated in the context of the wider business processes and activities in which they are embedded (Ammenwerth et al. 2003). Some research also discussed *both* IT and IS evaluation or did not make a distinction between the concepts. Moreover, some research focused on the evaluation of *IT/IS investment* rather than the IT/IS projects themselves. In total, 33.5% of the studies clearly stated their units of analysis to be the evaluation of IT and 35.8% focused on IS. In addition, a noticeable number of studies (22.2%) focused on the evaluation of investment in IT/IS rather than the IT/IS projects themselves, and fewer discussed IT or IS evaluation in general without a distinction. .In terms of different journals, EJIS and MISQ were slightly more oriented to IS, and JMIS seemed to be more focused on IT. JIT on the other hand published a greater proportion of articles related to IT/IS investment. In term of the changes over time, it was interesting to notice that the evaluation of IT increased in the last 25 years, whereas papers investigating IS evaluation decreased. One possible reason for this is that when considering IT/IS evaluation, the concepts of IT, IS and IT/IS investment were often mixed and it was not possible to clearly differentiate an emphasis on IT, IS or IT/IS investment.

In relation to the research methods that were used in the analysed studies, surveys (29.5%) and case studies (30.1%) were the most frequently used approaches. The theoretical or logical development of concepts (15.3%) and secondary data (15.3%)%) including analyses literatures were also widely employed methods in IT/IS evaluation research. Only a few studies used experiments (4.5%) or combined methods (5.1%). Different journals tended to have preferred research methods. For instance, EJIS had more papers using concept description than average, ISR preferred using secondary data, JIT used case studies and other qualitative methods more often and MISQ used more surveys. No specific findings were found when considering research methods in different years.

4.1 Conceptualization of Evaluation Research using Content, Context and Process Dimensions

As noted previously, the CCP model lends itself to addressing a series of questions in relation to IT/IS evaluation. That is, by asking "*why, what, how, when and who"* in relation to IT/IS evaluation, the three dimensions of content, context and process can be assessed. The following analysis addresses each of these questions in relation to the sample research articles examined.

4.1.1 Why evaluation is carried out

Evaluation can serve a number of purposes. Serafeimidis (2002) addressed the usefulness of evaluation in his review of IT/IS evaluation literature, and found the major purposes or reasons for an evaluation were related to efficiency in terms of technical performance and control of resources; a desire to achieve predetermined outcomes. Our research however finds that the reasons for evaluation go beyond Serafeimidis' findings. Furthermore, previous research provides only a limited perspective of the underlying purpose of evaluation. Our findings suggest that evaluation purpose can be delineated into three categories: conceptual purpose, instrumental purpose, and political purpose. Conceptual purpose (21.0%) refers to evaluations that are carried out to discover and understand issues related to IT/IS implementation. This purpose for evaluation primarily enables understanding of IT/IS value (14.2%) to the organisation to be identified. This includes not only the identification of the benefits, costs or risks of IT/IS (10.8%), but also the appraisal of such value (3.4%). Evaluation can also improve the understanding of the performance or problems related to IT/IS projects (3.4%), as well as the use of such projects (2.8%). In addition, a few researchers also suggested that evaluation could improve the understanding of other issues (1.7%), such as stakeholders' interests. Instrumental purpose (38.6%) refers to the decisions made or actions that are taken based on evaluation. Information generated from evaluation can be used for IT/IS project planning (13.64%), including resource control, alternative prioritization, IT/IS investment decisions and system deployment. Further, effective using evaluation findings is believed to be able to improve IT/IS usage (4.55%) and organizations' business/management process (7.39%). Political purpose (1.1%) refers to the political impacts of evaluation on people involved, including user acceptance/resistance of the project, empowerment of stakeholders, gaining commitment and improved communication or discourse among stakeholders. However, there was little evidence of such a purpose found in this study. A number of articles were found with mixed purposes to conduct an evaluation (8.0%). Despite the various roles evaluation played in an organisation, a noticeable portion of research did not specify the purpose to carry out an evaluation (31.3%).

4.1.2 What is evaluated

DeLone and McLean's IS Success Model (1992, 2003) identifies definitions of IS success and their corresponding measures, and classifies them into six major categories: Information Quality, System Quality, Service Quality, System Use, User Satisfaction and Net Benefits. IT/IS business value (35.8%) is the most frequently cited consideration in evaluation, including strategic (2.3%), tactical (1.1%) and operational (20.5%) values. A specific classification of those values is provided by Irani et al (2005). Comparing to system (7.4%) and service (7.4%) quality, information or system outputs (3.0%) receives a lower attention. Large efforts has also been put into the examination of IT/IS use (9.1%) and user satisfaction (8.0%). Moreover, some research has mixed focuses (11.9%), while a number of researchers argued that the content of evaluation should be context based (9.1%).

Table4: WHY evaluation is carried out?

WHY evaluation is carried out?		Number (%)	
Conceptual Purpose*	**IT/IS Value**	25 (14.2%)	In total 37 (21.0%)
	Identification of the value	19 (10.8%)	
	Appraisal of the value	6 (3.4%)	
	IT/IS Project	6 (3.4%)	
	IT/IS Use	5 (2.8%)	
	Other	3 (1.7%)	
Instrumental Purpose*	**-IT/IS planning and implementation**	24 (13.6%)	In total 68 (38.6%)
	-Decision making	17 (9.7%)	
	-Improved IT/IS Usage	8 (4.6%)	
	-Improved management & business	13 (7.4%)	
	-Other	8 (4.6%)	
	Benefits realisation	4 (2.3%)	
	Improved IT/IS service	2 (1.1%)	
	Benchmarking	2 (1.7%)	
Political Purpose		2 (1.1%)	
mixed		14 (8.0%)	
Not discussed and specified		55 (31.3%)	

* indicates an overlap

Table 5.WHAT is evaluated?

WHAT is evaluated?	Number (%)
IT/IS value	**63 (35.8%)**
Strategic Value	*4 (2.3%)*
Tactical Value	*2 (1.1%)*
Operational Value	*36 (20.5%)*
Mixed	*21 (11.9%)*
System quality	**13 (7.4%)**
Outputs quality	**7 (3.0%)**
Service quality	**13 (7.4%)**
IT/IS use	**16 (9.1%)**
User satisfaction	**14 (8.0%)**
Context based	**16 (9.1%)**
Mixed	**21 (11.9%)**
Not discussed or specified	**13 (7.9%)**

4.1.3 When is evaluation carried out

According to Farbey et al. (1992), evaluation can take place either at the specific point of time or continuously through the system development life cycle. The former includes both evaluation conducted before the implementation or ex-ante (18.8%), and after the implementation or ex-post (59.7%). The later suggested evaluation is an ongoing process, and it can be carried out at various stages (8.5%) in the IT/IS development and implementation. In our sample, 11.4% of articles do not specify when evaluation should take place.

Table 6.WHEN evaluation takes place?

WHEN evaluation takes place?	Number (%)
ex-ante	**33 (18.8%)**
ex-post	**105 (59.7%)**
ongoing/various stages	**15 (8.5%)**
Not discussed or specified	**20 (11.4%)**

4.1.4 How evaluation is performed

Serafeimidis (2002) identified and categorised a number of evaluation methods and tools in his study. In assessing the IT/IS value to business, finance (11.4%) and economic (19.9%) based techniques, such as Net Present Value (NPV), Return on Investment (ROI) and Cost-Benefits Analysis (CBA) are the most frequently reported or studied methods in the articles reviewed. Behaviour driven (21.0%) methods, such as SERVQUAL (Van Dyke et al. 1997), are the major method carried out to understand IT/IS use and user satisfaction. A number of survey instruments (10.2%) are developed for understanding IT impacts. Technical standards (6.8%) are used to assess IT/IS system quality, including software metrics and outcome comparison methods. A few studies discussed mixed methods in evaluation (4.5%), and other 6.3% of authors argued the method selected should depend on the context. A significant number of the articles did not specify the evaluation methods (19.9%).

4.1.5 Who is involved in evaluation

Evaluation is a process that different people involved to either provide or analyse information related to IT/IS. Almost half of the papers reviewed (47.7%) does not specify clearly who should be responsible for the evaluation. For the ones specified people, evaluation is majorly carried out at the senior management level, where IT staff (18.2%) and financial department (28.4%) are the major evaluators. Top management (9.7%) support is believed to be critical to an effective IT/IS evaluation. Users (36.4%) are reported to be the major stakeholders who provided information for evaluation. Only 8.0% of the research states that multiple stakeholders should be involved in evaluation rather than solely IT or finance department.

Table 7.HOW is evaluation performed?

HOW evaluation is conducted?	Number (%)
Technical standards	**12 (6.8%)**
Finance based	**20 (11.4%)**

Table 8.WHO is involved in evaluation?

WHO is involved in evaluation?		Number (%)
Senior Managers*		
	*IT**	32 (18.2%)

Economic based	**35 (19.9%)**
Behaviour driven	**37 (21.0%)**
Survey method	**18 (10.2%)**
Mixed	**8 (4.5%)**
Context based	**11 (6.3%)**
Not discussed or specified	**35 (19.9%)**

*Finance**	50 (28.4%)
Top Manager	**17 (9.7%)**
User*	**64 (36.4%)**
Other	**4 (2.3%)**
Multiple stakeholders	**14 (8.0%)**
Not discussed or specified	**84 (47.7%)**

* indicates an overlap

5. Discussion

5.1 A Respecifiction of Evaluation Streams

From this review, we have found that current IT/IS evaluation research still places excessive emphasis on the technological (e.g. software standards) and financial (e.g. discounted cash flow techniques) aspects of evaluation at the expense of the organisational and social dimensions. However, the role of IT/IS in organisations can be seen as a movement from automating to supporting decision-making, and more recently to transformation (Ballantine et al. 1996). The traditional technical/financial evaluation techniques are widely reported to be problematic and unable to cope with these changes (Serafeimidis & Smithson 1999, Irani & Love 2008, Symons 1991, Avgerou 1995). Therefore, research focusing on traditional evaluation streams contributes to one piece of the picture but is not comprehensive enough to describe the complexity of IT/IS evaluation. To overcome this problem, many researchers (e.g. Smithson & Hirschheim 1998, Symons 1991, Farbey 1999) suggest that IT/IS evaluation would be improved by "interpretive" alternatives, which take perceptions of multiple stakeholders into consideration.

The aforementioned "technical", "financial" and "interpretive" approaches are accepted classification of IT/IS evaluation streams in IS research. . These classifications reflectededdifferent evaluation strategies and were significant in identifying and understanding issues related to IT/IS.. Serafeimidis (2002) briefly reviewed literature and investigated the important features of each stream based on the concept of CCP model. Our current study extends Serifeimidis' work and reinforces his findings with enhancements to the current classification of IT/IS evaluation.

The technical, financial and interpretive evaluation classification streams that Serafeimidis identified indicate a clear separation between three discrete evaluation categories. However, our analysis found that "technical" factors are always embedded to some degree within a "financial" evaluation context. In addition, because it aims to understand different interests of various stakeholders, "interpretive" evaluation tends to include both "technical" and "financial" considerations to some extent. Evaluation strategies have evolved with the development of IT. The evolution of IT/IS in organizations can be seen as a movement from automating to informing, and more recently to transformation (Ballantine et al. 1996) and as the role of IT/IS has changed from one of support to one of strategic importance, the focus of evaluation has also evolved from efficiency to effectiveness, and further to understanding (Irani & Love 2008, Huerta & Sanchez 1999). Therefore, while Serafeimdis' classification is a useful starting point for orienting understanding of approaches to IT/IS evaluation, the delineation between his categories is not as defined as these classifications suggest.

In addition, the terminology Serafeimidis used for different approaches implies its underlying evaluation content and method. For instance, "technical" evaluation indicatess a focus on IT/IS system quality, and technical standards might be the major evaluation methods. However, in Serafeimidis' (2002) discussion, technical evaluation also includes other criteria such as cost reduction and manpower savings. His financial evaluation not only focussesfocusses on IT/IS business value, but also examinesIT/IS use and user satisfaction. A number of behaviour driven techniques are also included and discussed in addition to financial or economic techniques.

Based on our analysis of the literature, we believe that Serafeimidis' classification should be revised so that classification is based on the context of the evaluation being performed. From this perspective evaluation can be viewed as efficiency-*driven* evaluation, effectiveness-*driven* evaluation, or *understanding-driven* evaluation. The terminology was derived from the underlying assumptions of evaluation identified in Serafeimidis' (2002) review. Detail of each approach is summarized in Table 9.

Using this revised classification scheme, only 10.2% of the articles reviewed are in the efficiency-driven evaluation category and the majority of these were published prior to 1995.In contrast, most understanding-driven evaluation articles were published after 2000, representing only 11.4% of the

176 papers reviewed. Effectiveness-driven evaluation drew the most attention in the literature with 68.2% of the papers can categorised in this group fairly evenly distributed over the 25 year periodpeiod of the sampled research. A small number of articles (10.2%) provided a general discussion on issues related to IT/IS evaluation and were not classified into any of the revised streams.

This revised classification scheme overcomes the aforementioned problems of previous studies. Firstly, the terminology used clearly implies the focus of each evaluation stream. Secondly, rather than being treated as discrete categories, the relationship between the three evaluation streams is evolutionary. To be more specific, efficiency-driven evaluation implies that its focus is on the quality of the system under analysis and its direct outputs. From this perspective when managers are confident of the efficiency of evaluation of IT/IS quality, they can shift their focus to effectiveness considerations of IT/IS outcomes, impacts and IT/IS-human interactions. The effectiveness of IT/IS is the primary concern for any organization. However, various interpretations of effectiveness might be held by different stakeholders. Thus, based on the assessment of different stakeholders' interpretation of IT/IS effectiveness, *understanding-driven* evaluation includes both efficiency-driven and effectiveness-driven evaluation. This evolutionary approach to understanding IT/IS evaluation overcomes three problems faced by managers as identified in the literature. Firstly, it amelioratestheir neglect of intangible, qualitative and in-direct objectives, and their inability to measure them (Serafeimidis & Smithson 1999). Secondly, It accounts for the IT/IS effects which organizations are most interested in assessing but are subject to change and traditional techniques are unable to cope with (Avgerou 1995). Thirdly, it accounts for multiple stakeholders involved within the IT/IS investment process, with their own set of objectives and expectations, a fact neglected by thattraditional techniques with a limited financial or technical (Irani & Love 2008, Huerta & Sanchez 1999).

Table 9. Streams of IT/IS Evaluation

Type	**CCP elements and details**		**Number (%)**
Efficiency driven	Why	To understand and improve IT/IS efficiency	18 (10.2%)
	What	IT/IS quality, outcomes quality, cost reduction, etc.	
	When	ex-ante or ex-post	
	How	Technical standards, Software metrics, Outcome comparison	
	Who	IT Department, Senior Managers, Data collected from Users	
Effectiveness driven	Why	To understand and improve IT/IS effectiveness	120 (68.2%)
	What	IT value, IT use, User satisfaction, Service quality, etc.	
	When	ex-ante or ex-post, some ongoing	
	How	Finance-based, economic-based, behaviour driven	
	Who	Top management support, Senior managers, IT and Finance department, data collected from users	
Understanding driven	Why	To improve understanding of different interests and perceptions	20 (11.4%)
	What	Stakeholder interests, mixed focuses, often dependent on the context	
	When	On-going process	
	How	Interpretive methods, often context-based	
	Who	Multiple stakeholders needed to be involved	
General	General discussion on issues related to IT/IS evaluation, e.g. the ethical issues		18 (10.2%)

5.2 Gaps in IT/IS Evaluation Research

There has been a significant amount of research on IT/IS evaluation in the last 25 years. Our review of the sample literature based on the CCP model identifies several gaps in the published literature in relation to IT/IS evaluation.

Firstly, nearly a third of all articles examined ignore the purpose of evaluation (31.3%) and nearly half did not identify stakeholders (47.7%) whereas the other dimensions were usually accounted for and rarely left out of the discussion of evaluation - only 7.9% of studies neglected content, 11.4%% neglected timeframe and 19.9% neglected methods.Given that only 10.2% of papers are classified as "general discussion", the neglect of evaluation purpose and people involved is considerable. This underestimation of the importance of purpose of evaluation suggests that evaluation is frequently being used in a ritualistic manner (Nijland & Willcocks 2008). For instance, ex-ante evaluation usually is used as a means to gain project approval (Nijland & Willcocks 2008), and ex-post evaluation has been used to formally complete or sign-off the task and disengage the IT/IS department from a project (Jones 2008). Also, the neglect of people involved in evaluation suggests that researchers often fail to

take into consideration the impacts that different stakeholders have on evaluation, or alternatively, the impact of evaluation on stakeholders.

Secondly, there is an unbalanced focus in each element of evaluation in research. In terms of evaluation purpose, there appears to be little published research which reflects the political aspects of evaluation.When evaluating the value an IT/IS project, most research focuses on the operational level but underestimates its strategic and tactical value. More attention has been paid to ex-post evaluation than either ex-ante or ongoing evaluation. Traditional finance/economic based techniques and user satisfaction survey methods remain predominant approaches to evaluation. Hence, IT and finance departments tend to be the major players in evaluation and IT/IS users are the primary source of data. As a consequence, not all interested stakeholders are involved in evaluation and therefore they have little opportunity to shape further development.

Thirdly, this study indicates a mismatch between IT/IS evaluation research and practice. For instance, regarding the timeframe of IT/IS evaluation, more research pays attention to ex-post than ex-ante. Nevertheless, ex-ante evaluation is found to be more prevalent than ex-post evaluation in practice (Avgerou 1995, Nijland & Willcocks 2008, Al-Yaseen et al. 2008). Also, a large number of evaluation methods have been developed in research, but very few of them have been seen in practice. Moreover, while evaluation research is currently shifting from the efficiency and effectiveness-driven approaches to understanding-driven (Serafeimidis, 2002) and comprises various interpretive or informal evaluation methods (Avgerou 1995, Irani & Love 2008, Symons 1991),IT/IS evaluation in practice still focuses on the assessment of the efficiency and effectiveness of the system (Serafeimidis 2002, Nijland & Willcocks 2008).

6. Conclusion

This study reviewed 176 papers in five leading IT/IS research journals over the last 25 years. Concepts of evaluation in all papers were analysed based on the CCP model. Based on findings from this research, we propose that the classification of IT/IS evaluation should be respecified as an evolving continuum of efficiency-driven evaluation, effectiveness-driven evaluation ,and and understanding driven evaluation. we suggest that According to CCP model, people are the core of any evaluation. It is people who make decisions on what is evaluated, when evaluation takes place and how evaluation is done. Thus, the stakeholders involved in evaluation are critical to an effective evaluation. The study of human factors in evaluation also consists with the shift from traditional evaluation to understanding-driven stream. Further research can be carried out to investigate different stakeholders involvement strategies and their impacts on the evaluation process and outcomes.

This study also suggests that the evaluation can serve a number of conceptual, instrumental or political purposes. However, in practice evaluation is often carried out in an *ad hoc* or ritualistic manner. The potential usefulness of evaluation outcomes and processes is underestimated. Therefore, further research can focus on how to make the evaluation outcomes and processes effectively used.

Lastly, the mismatch between research and practice indicates a long distance from developing evaluation methods to put them in actual use. Particularly, the calls for interpretive methods seem rarely being heard by practitioners. Researchers therefore need to address the obstacles between research and practice, communicate the problems or risks of using those methods and to identify ways to promote the evaluation methods we have developed to decision makers in practice.

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