

# Mining The Literature In Search Of IT Business Value

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## ABSTRACT

*On the topic of information technology (IT) business value, there has been great interest among IT researchers, IT vendors, and business managers in demonstrating what organisations can achieve with IT, thus providing reasons to justify investments in IT. To understand how organisations leverage IT to their advantage, this paper searched in three major electronic databases for journal articles that studied information technology or information systems success, performance, value, benefit, evaluation, payoff, productivity, effectiveness, and efficiency. Having summarized a vast number of past findings reported in the journal articles, this paper concludes that there is still much work to do on the topic of IT business value and recommends several future research directions. This paper is a timely effort to complement past literature reviews on IT business value, updating what has been reported since the early 2000s.*

**Keywords:** IT business Value; IT Investment; Information Technology; Information Systems; Literature Review

## INTRODUCTION

When business managers face a situation in which they have to make an information technology (IT) investment decision, they repeatedly ask the return-on-investment question. To answer the question, IT researchers and IT vendors have attempted to demonstrate business value of IT by documenting the benefits that organisations gained from investing in IT (Marshall et al., 2005; Mathrani & Viehland, 2009). Despite that, the question is far from being completely solved. There have been contrary findings reported in past studies as to what benefits organisations can realise from their IT investments.

Carr (2003) contends that widespread adoption of IT has resulted in IT becoming an infrastructural technology. Such IT characteristics as interconnectivity, interoperability, and standardization, coupled with dropping technology prices and emerging Web services technology, have encouraged proliferation of IT, further making IT an infrastructural technology. He argues that an infrastructural technology, unlike a proprietary technology which gives organisations a unique competitiveness, loses its ability to provide organisations with differentiated competitive capabilities. Unsurprisingly, Carr's assertion prompts rebuttals from IT researchers and IT vendors.

Marthandan and Tang (2010) suggest that there are five reasons for difficulty in fully capturing business value of IT: 1) ambiguous identity of IT business value, 2) blurred reflection of IT business value, 3) misunderstood value realization process, 4) poor business-IT alignment, and 5) complications from mediating factors. Gunasekaran et al. (2006) point out that there is need for a better approach to evaluating IT investments, not only because of the huge amount of investment money, but also to understand the strategic benefits that IT investments bring.

To categorize the vast IT benefits that are commonly used as surrogate measures of IT business value, IT researchers review extant literature so as to develop taxonomy of IT benefits. For example, DeLone and McLean (1992) suggest six groups of IS success measures: 1) system quality, 2) information quality, 3) use, 4) user satisfaction, 5) individual impact, and 6) organisational impact. Grover et al. (1996) group IS effectiveness measures into six major classes: 1) infusion, 2) market, 3) economic, 4) usage, 5) perceptual, and 6) productivity. Seddon et al. (1999) propose a two-dimension classification of IS success measures. Along the two dimensions, there are 30 possible classes of measures. Chan (2000) shows that both quantitative and qualitative measures are

used to assess IT value. Dehning and Richardson (2002) specifically examine accounting or market-based performance measures. Shang and Seddon (2002) classify 25 sub-dimensions of benefits within five major dimensions, i.e. operational, managerial, strategic, IT infrastructure, and organisational. Kohli and Devaraj (2003) present three groups of firm-level IT payoff measures: 1) productivity-based, 2) profitability-based, 3) or combined. Lim et al. (2004) describe two major categories; i.e., market measures and accounting measures.

It has been quite some years since the more recent literature review by Lim et al. (2004). There have been technological advances in IT over the years - faster network connectivity, more powerful computers, and advanced software development tools. As organisations become more IT-dependent, these advances have helped develop new business capabilities, connect strategic partners, enable new business models, encourage process innovations, and so on. Furthermore, IT has become a threshold technology and is critical to the survival of businesses in some industries - point-of-sales systems in large retail chains or flight scheduling systems in airlines companies. With improved accessibility to IT resources and better knowledge about IT use, today's business managers have a more complete view of IT. Thus, it would be interesting to investigate if these new developments have been reflected in the more recent IT business value studies. Has the study scope changed? Are there any changes in the study design? Are there any differences in the surrogate measures used?

Kohli and Grover (2008) reckon that as business environment changes - heightened inter-firm collaboration, more intense use of data analytics, and increased business competition - IT business value research is even more important today. They suggest having more studies for better understanding of IT business value. In view of the contemporary business IT settings and to provide pointers for future IT business value research, they identify four research themes: 1) IT-based co-creation of value, 2) IT-embeddedness, 3) information mindset, and 4) value expansion. Recognizing that to examine IT value from a single firm perspective does not quite reflect the contemporary situation and that IT value creation can be a result of inter-firm collaboration, IT-based co-creation of value theme examines how firms can share a common structure and incentives to co-create value. IT-embeddedness theme understands that it is no longer feasible to consider IT as an investment to build business capabilities. Instead it is more appropriate to consider how business capabilities are embedded with IT today. Information mindset theme reckons that information provides great value, but how to derive value from information has not been studied enough. Thus, more studies are needed to examine how business capabilities can be created or improved by exploiting information. Value expansion theme suggests that by focusing only on economic benefits, full IT value has not been examined enough. Future studies should consider also intangible value, not just tangible value.

Responding to Kohli and Grover's four IT business value research themes, this paper intends to review the more recent IT business value articles published through July 2008 and update what have been reported since early 2000s. Thus, this paper is a timely effort to complement past literature reviews on IT business value. Specifically, this paper endeavours to inform if there are any significant changes in how IT business value is examined and if there are changes, how do they fit into Kohli and Grover's four IT business value research themes?

In the sections that follow, this paper provides a background on IT business value and presents several past literature reviews on this topic, explains the study design, describes and analyzes the study results, discusses study limitations, and lastly, recommends several future research directions.

## **EVALUATING IT BUSINESS VALUE**

Inconsistency in measuring IT business value is one of the main causes of the IT productivity paradox as the ways organisations measure IT inputs and outputs differ greatly (Brynjolfsson, 1993). Lin and Pervan (2001) agree that difficulties in measuring IT benefits have made justification of IT investments difficult. They further highlight several reasons for the difficulties, many of which match those suggested by Brynjolfsson (1993), most notably the ineffectiveness of IT evaluation methods and inability to trace IT benefits.

Sircar et al. (2000) argue that focusing only on IT productivity does not help to reveal real value of IT, but instead has resulted in inconsistent findings. Remenyi (2003) reckons that the real value lies where IT helps organisations to be more effective and efficient. The benefits organisations derived from their IT investments must be evaluated against what the systems are designed, looking not just at monetary benefits but also real business benefits.

However, different opinions exist on what the best approach is to evaluating IT business value. For example, too much emphasis has been placed on hard aspects, while ignoring the soft aspects (Arnold, 2006; Stockdale & Standing, 2006); a balanced evaluation of the effect of IS on firm performance should include both tangible and intangible measures that are linked to business strategy (Bajaj et al., 2008); IT benefits should be measured before and after implementation (McBride & Fidler, 2003); changes must be tracked to make sure the intended benefits, both financial and non-financial, are actually realized (Sherer et al., 2002); what to evaluate and how to evaluate (Cronholm & Goldkuhl, 2003); lagging effect should be considered and the benefits should be IT specific (Sircar et al., 2000); a comprehensive evaluation should include measures of different dimensions - just one or two measures are not good enough (DeLone & McLean, 1992, 2003); and the type of system under study must be specified so as to make meaningful evaluation (Seddon et al., 1999).

Marthandan and Tang (2010) suggest that the conventional approach to IT evaluation using financial metrics does not reflect real IT business value as there are areas that cannot be measured financially. They identify eight issues and challenges in IT evaluation: 1) evaluation scope, 2) evaluation timing, 3) unit of analysis, 4) level of analysis, 5) different perspectives, 6) different dimensions, 7) different measures, and 8) underpinning theoretical frameworks. Among the eight, stakeholder perspectives, evaluation dimensions, and evaluation measures are the top three issues and challenges.

Gunasekaran et al. (2006) identify four types of IS evaluation studies: 1) general IS evaluation and justification concepts, 2) evaluation criteria for IS project justification, 3) techniques and tools for evaluating and justifying IS projects, and 4) evaluation of the implementation of IS projects. General IS evaluation and justification concept studies explore the relationship between IT investment and organisational performance. Evaluation criteria for IS project justification studies identify IS evaluation criteria. Techniques and tools for evaluating and justifying IS project studies examine IS investment evaluation techniques and tools. Evaluation of the implementation of IS projects studies focus on the evaluation of IS implementation process. Grover et al. (1996) summarize four IS effectiveness research streams: 1) criteria demonstration research, 2) measurement research, 3) criteria relationship research, and 4) antecedents of IS effectiveness research. Criteria demonstration research explores the choice of effectiveness criteria. Measurement research develops and validates effectiveness criteria. Criteria relationship research analyzes statistical correlation among the effectiveness criteria. Antecedents of IS effectiveness research examines the antecedents to IS effectiveness.

To build a cumulative understanding of IT business value, IT researchers review literature and summarize findings of past studies. Table 1 summarizes several of these literature reviews. Two of the earlier works are by DeLone and McLean (1992) and Grover et al. (1996). To summarize measures of IS success reported in past studies, DeLone and McLean (1992) review 100 articles published between 1981 and 1988 in seven leading IS publications. Having grouped the diverse range of measures into six categories – 1) system quality, 2) information quality, 3) use, 4) user satisfaction, 5) individual impact, and 6) organisational impact - they propose an IS Success model. Grover et al. (1996) propose a different classification scheme for IS effectiveness measures. Along the dimensions of evaluation referent, unit of analysis, and evaluation types, they suggest that IS effectiveness measures can be grouped into six major classes: 1) infusion, 2) market, 3) economic, 4) usage, 5) perceptual, and 6) productivity. To provide support for the proposed classification scheme, they review articles published between 1980 and 1994 in eight leading publications.

Seddon et al. (1999) point out that the IS Success model does not consider the different stakeholder perspective. Suggesting that different stakeholders have different views on how best to assess IT value, they develop a two-dimension IS Effectiveness matrix to classify IS success measures. The two dimensions are stakeholder and system. The stakeholder dimension is about the perspective an assessment is based on - independent observer, individual, group, management, and country. The system dimension is about the type of system under assessment - an aspect of IT use, a single IT application, a type of IT, all IT applications, an aspect of system development, and IT function. To evaluate the proposed matrix, they review 186 articles published between 1988 and 1996 in three leading IS journals.

More literature reviews appear in the 2000s. Chan (2000) reviewed 38 articles published between 1993 and 1998 in four leading IS journals, attempting to understand how these studies measure IT value. Study findings show

that both quantitative and qualitative measures are used to assess IT value at different levels of analysis - individual, group, organisation, industry, national, and international. Proposing that returns on IT investment should be evaluated at both business process and firm levels, Dehning and Richardson (2002) specifically examine accounting or market-based performance measures. To lend support to the proposed model, they review a total of 31 articles published between 1997 and 2001 in nine leading publications.

Unlike other studies which examine IT in general, Shang and Seddon (2002) choose to focus on a particular type of IT - enterprise systems. They use a different approach to study business benefits of enterprise systems, analyzing a total of 233 case studies retrieved from vendor websites. Within five major dimensions - operational, managerial, strategic, IT infrastructure, and organisational - 25 sub-dimensions of benefits are classified.

To understand the many aspects of IT payoff studies - data aggregation, data source, analysis method, and IT payoff measures - Kohli and Devaraj (2003) review 66 firm-level articles published between 1990 and 2000. These articles consist of published papers, doctoral dissertations, and working papers. Specifically, IT payoff measures at firm level are coded as productivity-based, profitability-based, or combined. They report that as profitability-based measures are more sensitive to external influences, productivity-based measures are better choices for IT payoff assessment.

A more recent literature review is by Lim et al. (2004). They review 15 firm-level articles, published between 1990 and 2002, that focus on market measures - cumulative average return (CAR) - or accounting measures - return on assets (ROA) and return on equity (ROE). They report that there is no support for a positive correlation between IT investment and firm performance and that the correlation is influenced by the types of measures used in these studies.

**Table 1: A Summary of Literature Reviews on IT Business Value**

Authors	Sources of Articles	Number of Articles Reviewed	Article Selection Criteria
DeLone & McLean (1992)	Management Science, MIS Quarterly, Communications of the ACM, Decision Sciences, Information & Management, Journal of MIS, and ICIS Proceedings published between Jan 1981 and Jan 1988	180	Empirical studies (including labs, field studies, and case studies)
Grover et al. (1996)	Communications of the ACM, Decision Sciences, Information & Management, Information Systems Research, ICIS Proceedings, Journal of MIS, MIS Quarterly, and Management Science published between 1980 and 1994	n/a	Studies that examine criteria used to measure IS effectiveness
Seddon et al. (1999)	MIS Quarterly, Information Systems Research, and Journal of MIS published between 1988 and 1996	186	Empirical studies where IS effectiveness is the dependent variable
Chan (2000)	Communications of the ACM, Information Systems Research, Journal of MIS, and MIS Quarterly published between 1993 and 1998	38	Empirical studies (including secondary data sources, surveys, and case studies)
Dehning & Richardson (2002)	Journal of Information Systems, Communications of the ACM, Decision Sciences, Information Systems Research, Journal of MIS, Management Science, MIS Quarterly, Proceedings of the International Conference of Information Systems, and American Accounting Association Annual Meeting published between 1997 and 2001	31	Studies that use archival data and focus on accounting or market measures of firm performance (excluding studies that use field studies, surveys, and experiments)
Shang & Seddon (2002)	Customer case studies, between 1995 and 1999, retrieved from websites of enterprise system vendors – SAP, PeopleSoft, and Oracle	233 case studies	Case studies with sufficient details for further analysis
Kohli & Devaraj (2003)	Social Sciences Index, bibliographies of published review papers, Dissertation Index for doctoral dissertations, and working papers from IS researchers published between 1990 and 2000	66	Firm-level empirical studies (including surveys and secondary data sources)
Lim et al. (2004)	Seven electronic databases and major IS journals, i.e. Journal of MIS, Information System Research, MIS Quarterly, Communication of the ACM, and Journal of Information Systems published between 1990 and 2002	15	Firm-level empirical studies that focus on market measures or accounting measures

## STUDY DESIGN

Webster and Watson (2002) suggest that a literature review fulfills several purposes - knowledge advancement, theory development, and commonality and gaps identification. They describe two types of literature reviews. One type synthesizes extant literature with the purpose of proposing a conceptual model and the other type examines extant literature with the purpose of uncovering an underlying theory which can be helpful for further conceptual model development. As the objective is not to develop a theoretical model, but to synthesize the vast amount of past study findings so as to build a cumulative understanding of IT business value, this paper follows partially Webster and Watson's advice on how to write a good literature review.

In past literature reviews, Grover et al. (1996) develop a classification scheme which includes such aspects as evaluation referent, unit of analysis, and evaluation types to categorize a large number of IS effectiveness measures. Seddon et al. (1999) use a two-dimension IS Effectiveness matrix to classify IS success measures. The two dimensions are stakeholder and system. Chan (2000) examines quantitative and qualitative measures at individual, group, organisation, industry, national, and international levels.

Learning from Grover et al. (1996), Seddon et al. (1999), and Chan (2000), this paper developed a review template to facilitate a structured and systematic extraction of key details from past articles. The review template consisted of such fields as article source, level of analysis, IT type, stakeholder perspective, data source, measures used, and key findings.

This paper did not zoom in on a particular level of analysis, but to consider four levels of analysis - national, industry, organisation, and individual - thus allowing a broader study scope. Grover et al. (1996) and Seddon et al. (1999) emphasize the importance of specifying the stakeholder perspective, as well as the type of IT being evaluated in IS effectiveness studies. This paper examined an IT application (e.g. Microsoft Word), a type of IT (e.g. ERP), and overall IT. Past articles about an aspect of IT use (e.g. user interface), system development, and IT function were excluded. Slightly different from that of Seddon et al. (1999), this paper did not include the country perspective, but added in the IS personnel perspective. Thus, this paper focused on five different stakeholder perspectives - independent entity, individual users, group of users, management, and IS personnel.

### Preliminary Selection of Articles

To start the literature review process, this paper first searched for a preliminary set of articles relevant to the study scope in three major electronic databases - ProQuest, EBSCOhost and ScienceDirect - using two primary keywords - *information systems* and *information technology* - individually to pair with one of the following secondary keywords - *success*, *performance*, *value*, *benefit*, *evaluation*, *payoff*, *productivity*, *effectiveness*, and *efficiency*. At this preliminary stage, the search was limited to article abstracts. There was no constraint set on the year of publication. Also, to ensure that an article could provide the required details for further analysis, only articles with full-text availability were included. Table 2 summarizes the search results.

**Table 2: Search Results – Number of IT/IS Article Abstracts Downloaded**

Database	ProQuest		EBSCOhost		ScienceDirect	
	IT	IS	IT	IS	IT	IS
Keyword						
Success	658	689	323	376	242	422
Effectiveness	321	516	195	255	147	415
Performance	969	1790	559	497	428	768
Value	951	888	514	408	322	923
Benefit	774	785	576	507	335	668
Evaluation	435	781	186	341	287	963
Payoff	41	28	22	17	8	6
Productivity	380	272	318	127	189	222
Efficiency	316	363	186	152	199	342
Investment	644	392	547	209	271	180
Total	5489	6504	3426	2889	2428	4909

Note: \* As at July 2008

\* IT: information technology; IS: information system

\* Only articles with full-text availability were included

In addition, considering the popularity of enterprise systems in recent years, this paper intentionally searched for articles about enterprise systems. The abstract of these articles might contain such terms as enterprise system or enterprise resource planning, instead of information systems and information technology. Thus, to search for relevant articles, two primary keywords - *enterprise system* and *enterprise resource planning* - were used individually to pair with any one of the secondary keywords. Table 3 summarizes the results.

**Table 3: Search Results – Number of ERP/ES Article Abstracts Retrieved**

Database	ProQuest		EBSCOhost		ScienceDirect	
	ERP	ES	ERP	ES	ERP	ES
Keyword						
Success	94	14	33	7	36	10
Effectiveness	15	10	10	2	11	4
Performance	76	31	26	10	35	11
Value	71	27	19	14	14	8
Benefit	86	24	39	15	33	10
Evaluation	40	12	9	3	13	8
Payoff	1	1	1	0	0	0
Productivity	14	4	7	2	9	2
Efficiency	30	8	11	3	12	2
Investment	42	12	19	12	15	6
Total	469	143	174	68	178	61

Note: \* As at July 2008

\* ERP: enterprise resource planning; ES: enterprise system

\* Only articles with full text availability were included

### First Review Round

The abstract of individual articles was then read to determine if an article should be included for further review. Using the following selection criteria, articles that did not fit into the study scope were excluded. In total, 553 articles were retained for a second review round.

- Articles should be empirically-based, applying a quantitative method and using primary or secondary data sources. The reason to consider only empirically-based articles was because these articles provided the necessary details required by the review template. Articles that followed qualitative methods - interview, case study, or experiment - discussed only theoretical frameworks or described general IT benefits and generally did not contain the details required by the review template. Thus, these articles were excluded.
- Articles should use IT as the independent variable, examining its correlation with some dependent variables. These dependent variables could be effects, impacts, outcomes, or consequences as a result of IT implementation. Articles that had moderating variables were included. However, articles that examined critical success factors of IT were excluded.
- As the study scope was about business value of IT, articles about sectors or organisations that were not business-focused and profit-oriented - government, education institutions, or not-for-profit organisations - were excluded.
- As the study scope was about post-IT implementation, articles about system planning, design, implementation, or project management were excluded.
- Although e-commerce involved IT, e-commerce studies had quite a diverse set of success measures from that of business systems. Thus, e-commerce related articles were excluded.
- As articles about business-IT alignment or task-technology fit were not suitable for the study scope, these articles were excluded.
- The same article that appeared in more than one of the three electronic databases was included only once.
- In cases where a delete decision could not be made about an article because of lack of sufficient information in the abstract, the article was retained for the second review round.

### Second Review Round

In the second review round, full text of the articles that were retained in the first review round were downloaded and read. Applying the same set of selection criteria as in the first review round, irrelevant articles

were removed. In total, 194 articles were retained for further analysis. Using the review template, required details were then extracted from these articles.

**STUDY RESULTS**

**Distribution Frequency**

Table 4 presents the frequency of articles that were published in different publications. Top five popular publications were Journal of Management Information Systems, Information & Management, Information Systems Research, MIS Quarterly, and Management Science.

**Table 4: Frequency of Articles in Publications**

<b>Publication</b>	<b>Frequency</b>
Journal of Management Information Systems	15
Information & Management	14
Information Systems Research	11
MIS Quarterly	10
Management Science	9
Information Resources Management Journal	6
Journal of Operations Management	6
Omega	7
Industrial Marketing Management	5
International Journal of Accounting Information Systems	5
Journal of Business Logistics	5
Journal of Computer Information Systems	5
Decision Sciences	3
Decision Support Systems	3
International Journal of Operations & Production Management	3
International Journal of Service Industry Management	3
Journal of Business & Industrial Marketing	3
Journal of Enterprise Information Management	3
Journal of Information Systems	3
American Economic Review	2
European Journal of Information Systems	2
Information and Software Technology	2
International Journal of Hospitality Management	2
Journal of Engineering and Technology Management	2
Journal of Global Information Technology Management	2
Journal of Information Technology Theory and Application	2
Logistics Information Management	2
Organisation Science	2
Others	57
Total	194

Note: \* As at July 2008

\* The table shows only those publications with more than one article. Publications with only one article are grouped as "Others"

Table 5 presents the frequency of articles in terms of level of analysis. There were nine articles at the 'national' level, ten 'industry', 16 'individual', and 159 'organisation'. The numbers clearly indicated that the focus of past studies had been on organisations.

**Table 5: Frequency of Articles at Different Levels of Analysis**

<b>Level of Analysis</b>	<b>Frequency</b>
National	9
Industry	10
Individual	16
Organisation	159
Total	194

Note: \* As at July 2008

**Past Studies at National Level**

There were nine national-level studies. At this level, these studies used secondary data sources. However, using secondary data had made it difficult to differentiate the type of IT and identify the stakeholder perspective in these studies. These studies used mainly productivity and gross domestic product (GDP) as surrogate measures of IT value.

Of the nine studies, four compared across countries and five focused on a single country. Findings reported in these studies varied. Five reported positive findings - IT contributed to positive productivity growth (Timmer and van Ark, 2005); two reported mixed findings - IT contributed positively and significantly to GDP growth of developed countries but not developing countries (Dewan and Kraemer, 2000); and two reported no evidence - no evidence was found between IT and productivity growth (Rei, 2004).

**Past Studies at Industry Level**

There were ten industry-level studies. Similar to national-level studies, at industry level, the studies used mostly secondary data sources. Thus, they had the same issues as those of the national-level. One exception was the study by Reardon et al. (1996) which collected survey responses from retail store owners or managers. Surrogate measures of IT value varied across studies. The more common ones were productivity and financial measures.

Of the ten studies, one did an across-country comparison and the other nine focused on a single country. The United States (US) was the most popular country. Of the ten studies, eight of them did an across-industry comparison and two focused on a single industry. Findings reported in these studies also varied. Six reported positive findings - there was a robust link between IT and productivity gains (Stroh, 2002). Four reported mixed findings, although there was a positive correlation between IT expenditure and industry net profit or ROA; but the same was not evident between IT and ROE (Navarrete and Pick, 2002).

**Past Studies at Individual Level**

There were 16 individual-level studies. At the individual level, some studies specified the type of IT under study. Of the 16 studies, 13 identified the type of IT - sales force automation systems, executive information systems, knowledge management systems, or enterprise resource planning systems, while the remaining three did not identify the type of IT.

Unlike studies at the national or industry level, studies at the individual level did not rely solely on secondary data sources. Among the 16 studies, 12 of them used primary data sources - questionnaire survey. Four followed a triangulation approach - a combination of primary and secondary data sources. Secondary data came from such sources as company records or external data providers. At the individual level, it was possible to identify the stakeholder perspective. Of the 16 studies, 14 of them examined the perspective of individual users. The remaining two examined the perspective of management. Surrogate measures of IT value varied across studies. Multi-item scales were common. Eight of the 16 studies did an across-organisation comparison, while the remaining eight focused on a single organisation.

Findings reported in these studies also varied. Eight reported positive findings - IT acceptance had a positive significant effect on perceived individual impact (Igbaria and Tan, 1997). Six reported mixed findings - there was a significant and positive correlation between hotel performance and front office applications, but the same was not evident between hotel performance and guest-related applications (Ham et al., 2005). Two reported no evidence - CRM application was not significantly associated with salespeople performance (Avlonitis and Panagopoulos, 2005).



### **Past Studies at Organisation Level**

The most number of studies was observed at the organisation level. There were a total of 159 studies of which 74 focused on a type of IT - management information systems, supply chain management system, or enterprise resource planning system, while the remaining 85 did not identify the type of IT.

Studies at this level collected data from primary or secondary sources and, in some cases, a combination of both sources. Of the 159 studies, 50 of them used primary data sources, 96 used secondary data sources, and the remaining 13 used both. Survey questionnaire was the most commonly used method to collect primary data, while external data providers - Compustat, PR Newswire, InformationWeek - supplied mostly the secondary data. Studies also varied in terms of stakeholder perspective. Of the 159 studies, 96 of them adopted an independent entity perspective, five individual user perspective, one group of users, 47 management, and ten IS personnel. Surrogate measures of IT value varied greatly from financial to perceptual, quantitative to qualitative, and objective to subjective. These studies used scales that consisted of just one or multiple items.

Of the 159 studies, 85 reported positive findings - investment in customer-related IT improved customer satisfaction and yielded positive abnormal shareholder return (Dardan et al., 2006/2007). Sixty-seven reported mixed findings - there was a significantly positive correlation between IT and ROE, but also a significantly negative correlation between IT and ROA, as well as profit efficiency (Beccalli, 2007). Six reported no evidence - no support was found between IT and supplier relationship value (Ryssel et al., 2004). Only one reported negative findings - IT investments had a significant negative impact on the market value of the firm (Hunter, 2003).

### **DISCUSSION AND CONCLUSION**

Past studies examine IT business value at different levels of analysis. The biggest concentration is at the organisation level (82%), followed by individual (8.2%), industry (5.2%), and national (4.6%). As IT researchers and IT vendors attempt to demonstrate to business managers what and how IT investments can benefit organisations, it is likely that most studies focus on the organisation level.

At the nation and industry levels, examining IT in aggregate form makes it difficult to differentiate the type of IT. As a result, attributing benefits to a specific type of IT is infeasible in these studies. However, at the individual and organisation levels, it is possible to identify specifically a type of IT. By specifying the IT type, these studies can provide a deeper understanding of the benefits from a specific IT. Despite that, there are some individual (18.8%) and organisation-level studies (53.5%) that do not identify the IT type.

At the national and industry levels, it is also infeasible to identify the stakeholder perspective. However, this is not the case at the individual and organisation levels. At the individual level, it is common to find a large percentage of studies (87.5%) concerned about individual user perspective and a small percentage (12.5%) about management perspective. At the organisation level, a large percentage of studies, especially those that use secondary data, adopt an independent entity perspective (60.4%), followed by management (29.6%), IS personnel (6.3%), individual users (3.1%), and groups of users (0.6%). Management as a project sponsor and the key investment decision maker, its perspective has become a focal point in past organisation-level studies.

Data are collected from different sources - primary, secondary, or mixed. At the national and industry levels, studies use mainly secondary data sources. At the individual level, primary data sources are the most common (75%), while the remaining uses mixed primary and secondary data sources (25%). At the organisational level, secondary data sources are also the most common (60.4%), followed by primary (31.4%), and mixed (8.2%). While secondary data are commonly objective and tangible, primary data can be subjective and perceptual. Relying heavily on secondary data, the intangible aspect of IT business value might be overlooked.

At the national and industry levels relying solely on secondary data, studies use productivity, gross domestic product, and financial-related measures. At the individual and organisation levels, as studies use both primary and secondary data, a vast number of measures exist. These studies use single-item or multiple-item scale in which measures can be quantitative or qualitative. Frequently, tangible measures are used while ignoring those

intangible. Using a wide selection of measures, on the other hand, makes comparison of results across studies difficult and conflicting at times. In addition, some studies use a few limited, sometimes single, conveniently chosen measures. By doing so, these studies do not consider the multi-faceted characteristics of IT business value and also ignore the reliability and validity of the measures used.

Findings vary across studies. At the national level, five report positive findings (55.6%), two mixed (22.2%), and two no evidence (22.2%). At the industry level, six report positive findings (60%) and four mixed (40%). At the individual level, eight report positive findings (50%), six mixed (37.5%), and two no evidence (12.5%). At the organisation level, 85 report positive findings (53.5%), 67 mixed (42.1%), six no evidence (3.8%), and one negative (0.6%). Overall, of the 194 studies, only one reports negative findings (0.5%), while 104 report positive findings (53.6%), 79 mixed (40.7%), and 10 no evidence (5.2%). Looking at the percentage of studies that report positive findings, it is a clear sign that IT investments bring positive returns. The combined percentage of studies that report negative or inconclusive findings is negligible. However, it is important to note that about slightly more than 40% of studies report mixed results, which is an indication that findings can be contrary and confusing to business managers as to what the real value of IT is.

This paper informed how the topic of IT business value has been examined in the past studies. It can be concluded that the four IT business value research themes suggested by Kohli and Grover (2008) are not commonly observed in past studies, including the more recent studies. In the search for answers to the IT business value question, past studies have used different study designs. As study design varies across studies, study findings are influenced by such issues as study scope, unit of analysis, level of analysis, stakeholder perspective, and measurement scale. In addition, past studies often conceptualize and operationalize the construct of IT business value without an underlying theoretical framework. The lack of use of theoretical frameworks in IT business value research has resulted in conflicting opinions on how best to evaluate business value of IT. As business managers continue to spend more on IT, the business value of IT remains a hot topic.

### **LIMITATIONS OF THE STUDY**

To provide the details needed by the review template, this paper does not include studies that are of qualitative nature in selecting the articles for review purposes. The consideration to exclude qualitative studies is to fit with the overall study design requirements, but not to imply that qualitative studies are inferior. However, by excluding qualitative studies, this paper might ignore insights that are useful from these studies.

To identify a preliminary list of articles, this paper uses several pre-decided key terms to search in article abstracts. Although using these key terms helps to search more precisely for relevant articles, there are possibly articles that are relevant but do not contain any of these key terms in their abstracts to be excluded; i.e., an article might use the term customer relationship management system in place of information system or information technology.

As this paper searches only in three electronic databases, articles that are not indexed in these databases are excluded. Also, this paper only reviews those articles with full-text availability. Thus, relevant articles that do not have full text available might be excluded.

### **DIRECTIONS FOR FUTURE RESEARCH**

Learning from past studies and Kohli and Grover's (2008) four IT business value research themes, this paper suggests the following future research directions.

Past studies have, in general, focused on a single organisation rather than on how organisations work together to create a synergy exploiting IT. Future studies can examine across-organisation IT business value as a result of such synergies. What are these across-organisation IT business values? How different are these across-organisation IT business values from that of within-organisation? Are these across-organisation IT business values a level higher than that of within-organisation? What are the conditions or critical success factors for such synergies to exist?

Study subjects in past studies are mostly a single IT application or a type of IT. As IT and business are inseparable in today's digital economy, instead of studying a stand-alone IT application or IT type and its correlation with business performance, future studies can examine how organisations benefit from IT-embedded business capabilities or business processes. Examining business value of IT at the level of business capability or business process provides a more defined and detailed picture of how IT helps.

In addition to examining business value of IT at the level of business capability or business process, future studies can also examine how organisations benefit from the information generated by IT. As good quality information contributes to improved efficiency, better decision-making, enhanced coordination, and so on, examining business value of IT at the level of information presents a deeper understanding of the intra and inter-organisational role of information.

Economic and financial benefits are commonly used as surrogate measures of IT business value in past studies. Tangible measures may be appropriate for operational IT, but not necessarily so for strategic IT. In view of the strategic dimension of IT, there are benefits that cannot be measured tangibly. As pointed out by Brynjolfsson & Yang (1996), with the increased number of intangible benefits conventional approaches not able to capture, IT researchers face a higher level of measurement problem. Depending on the study scope, to provide a more complete view of IT business value, future studies can consider expanding the list of measures beyond tangible, objective benefits to include also intangible, subjective benefits.

Future studies should consider carefully such study design issues as study scope, unit of analysis, level of analysis, stakeholder perspective, evaluation dimensions, evaluation measures, and underpinning theoretical frameworks. In considering the study scope, it should clearly define the IT type. Not specifying the type of IT not only leads to difficulties in attributing IT value, but also does not help improve the understanding of the business value of a particular IT application or type at a more detailed level.

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