

Information Systems in Thai Businesses

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The main objective of this study is to examine information available from the current enterprise information systems of Thai manufacturing companies and to determine whether the systems meet the information requirements of users. The thrust of the investigation was to discover the nature and quality of the detailed information required and generated, not the technicalities of the systems. The purchasing function of these firms was selected as the source of data as prior research had indicated that it was likely to be the most common and the most complex. The three-ring model was developed to examine the information situation from three aspects: the academic and trade association best practice; user requirements; and currently available from the existing information systems. The survey method was considered an appropriate method and was conducted with 246 large Thai manufacturing companies listed on the Stock Exchange of Thailand and seventy-nine questionnaires were returned generating a 31.44% response rate. The SPSS program version 17 was used to analyse the quantitative data. The results show that there are gaps among the three aspects of information and the best practice aspect is quiet similar to the level of information required from the information consumer's view but the level of information available is significantly lower than both the other two aspects. The theoretical contributions of the study are; the development of a model to assess the nature and quality of information produced by information systems; the identification of the information actually provided; and the identification of shortcomings. The practical contribution is the development of guidelines for systems designers and their clients. The system designers could apply this framework and the best academic and trade association practices in system development processes to help users identifying their information needs more clearly.

As the study was limited to a survey of the purchasing departments of the large Thai manufacturing companies, there is thus an opportunity to conduct research to test the model with other industry sectors and to extend the study to other business

1. The Organisation of the Paper

This paper is organised as follows. Section II presents the background of study. Section III shows the literature review. The research problem can be found in Section IV. Section V provides the method of study. The research propositions are presented in Section VI. Section VII, Research Design, contains the detail about construction of the questionnaire, sample, data collection and data collection problems. Section VIII shows the research findings. Section IX provides the limitations of the research and Section X is the Summary and the implications for the future research.

2. Background

Information technology and information systems are playing an important role in society, especially in the business world. Businesses are using information systems to handle business data and some are totally dependent on the information system from the start to the end of business processes.

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Similarly, Thai businesses have adopted information systems to help them handle the data and information tasks of their organisations as have other businesses around the world. A previous study about the adoption of information systems in Thai businesses reported that half of the large Thai organisations had adopted electronic information systems (Arunthari 2005). The businesses believe that the enterprise information systems can enhance their ability to manage information and provide them with valuable information which can be used to gain competitive advantage.

Many types of information system are available on the market which makes it hard to choose the system to match the needs of business requirements. The major consideration with the electronic information systems is the benefit they can bring from investment in them. However, the main objective of every information system is to meet the requirements of its users which leads to the success or failure of the system itself.

The information systems, like the communication process of which the transaction data are the input, process the data and produce a piece of information as the output of the system. In general, the information systems are designed and developed by the information system experts by gathering the data and information needs from the systems' users as the basic requirement of the systems and failure to identify the needs could cause the systems to be abandoned. This study attempted to examine the availability and required level of information provided from current adopted enterprise information systems of Thai businesses and also the potential of the best academic and trade associations' practices to be a reference to the system experts to identify the users' information requirements.

3. Literature

Information was defined in different ways such as information is data that have been organised in a manner that gives them meaning for the recipient (Turban, Aronson & Liang 2005). Information was defined as a product or service from the information system (Kahn, Strong & Wang 2002). Information in this study also follows the definition of information as a product from the information system.

Information systems in businesses are developed to suit different business requirements. Moreover, the classifications of information systems in businesses were based on many factors such as the size of the system, for example, Enterprise Information System (EIS); the specific task or function handled by the system such as Point of Sale System (POS), Accounting Information System (AIS), Marketing Information System (MkIS); and the level of management supported by the system such as Management Information System (MIS) and Executive Information System (EIS). Since the 1990s, the trend of adopting an enterprise information system was emerging and continually growing in the number of users in the business world (Davenport 1998). The term Enterprise System (ES) was used interchangeably with Executive Information System (EIS),

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enterprise-wide information system and Enterprise Resource Planning (ERP) by both academics and information system professionals.

Davenport adds that the definition of ERP is a commercial software packages integration of all the information flowing through a company which normally covers the processes of financial and accounting information, human resource information, supply chain information and customer information. Much of the literature mentioned failures and problems of information systems which has drawn the attention of academics and professionals to discover how to prevent such a situation as an information system takes a long time from planning to operation and also costs a huge amount of money to implement.

The information systems in Thai businesses were studied in various aspects such as system design and development techniques, the adaptation factors and success and failure of the information systems. Arunthari (2005) reported that accounting softwares were the most commonly adopted by Thai businesses and more than half of the adopters faced problems to find the right software product that met their requirements. The author added that the inventory module of ERP packages is the most adopted in Thai businesses. Most of the studies examine the systems in technical and engineering terms rather than focusing on the outcomes from the systems.

The information system success and failure model was developed and tested by many researchers, for example, the DeLone and McLean Information System success model (D&M IS success model) was one of the popular models adopted by many scholars since 1992.

4. Research Problem

This study aimed to examine the ability of current enterprise information systems adopted in Thai businesses to meet the information requirements of the management of the company. The term information requirement is one of the most important components of information systems needed to make them workable but the information requirement could be interpreted in different ways depending on whose point of view adopted. Information is considered as an output from the information or a message in the communication system which can be measured at different levels from the technical level, to the semantic level and to the effectiveness level (DeLone & McLean 1992). The information requirement from the view of the information users is most important and ideally needs to be discovered in the real world. Much literature suggested that the information users do not know what information they require (Wetherbe 1991). The information system experts treat the information requirement as the target of their final information system products but the set of information requirements needs to be gathered from the information users. The information quality and information type are quite common variables to measure the output of an information system (DeLone & McLean 1992; Fredenberger, Dethomas & Ray 1993). The information quality was used to measure the output of many information systems such as data warehouse, Executive Information System (EIS), websites, Customer Relationship

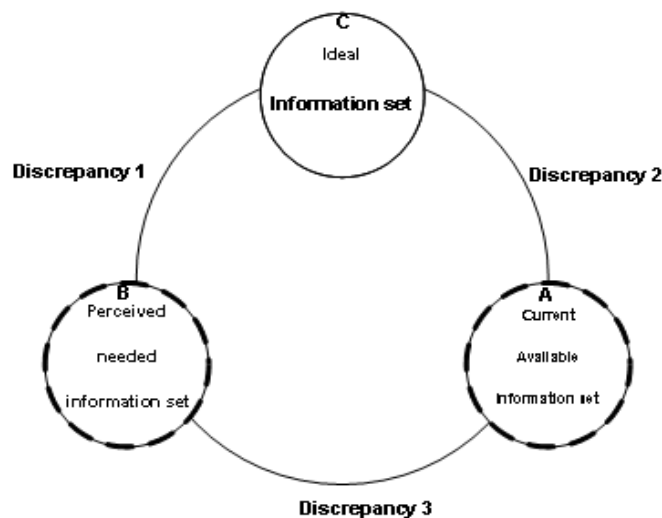
Management (CRM) (Gerke 1997; Hill, Geogory 2004; Katerattanakul & Siau 1999; Khalil & Elkordy 2005).

The information requirement in the real Thai business environment is very broad and hard to obtain. We decided to gather the information requirement list from the academic and trade associations literature which is the ideal set of the information requirement. As mentioned, the information requirement in the real business is very broad and this lead to down-sizing the scope of the investigation from the entire organisation to focus on one decision-making issue which is the buying decisions of purchasing managers in Thai businesses.

5. Method of Study

In order to examine whether the current enterprise information systems of Thai businesses are adequate to provide information for their users, the three-ring model (Figure 1) was developed to test the adequacy of information available from enterprise information systems of Thai business. This model examines the information requirements of Thai businesses information systems in two dimensions, information quality and information type, from three perspectives. These three perspectives of information are: A, the currently available information set; B, the perceived needed information set; and C, the ideal academic and trade association suggested information set.

Figure 1: The Three-ring model



The statistics for the A and B information sets came from the data gathered from a mailed-questionnaire while the best practice information set score is based on that used in the Baldrige National Quality Program; one of the world quality programs that has been accepted as excellent performance criteria for both non-profit and business organisations. Information quality represents measures of information systems output. The scoring and interpretation of the Baldrige criteria are set well

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and adopted by many quality award programs such as the Thailand Quality Award (TQA). One category of the Baldrige National Quality Program and TQA is data and knowledge management under which the scoring and interpretation of scores are set as an effective, systematic approach, fully responsive to the multiple requirements of the items at 90%, 95% or 100% from the total score. This study adopts the 90 percent of total score or 6.3 and above score as the level of best practice. This is because even though the best practice term was used in many areas of management and academic study, most of the best practices in both academic and trade associations are available in terms of guidelines but the measurement of the level of success is not available.

These three information sets were gathered from the literature and mail survey questionnaire then analysed with the discrepancy analysis as shown in Figure 2.

Figure 2: The three discrepancy of this study

Discrepancy 1 = C - B
Discrepancy 2 = C - A
Discrepancy 3 = B - A
A = the currently available information set;
B= the perceived needed information set; and
C= ideal academic and trade associate suggested information set

Discrepancy 1 will present the difference between what academics and trade associations think is relevant information for specific tasks and its quality and the information perceived to be needed by managers in Thai manufacturing companies. This discrepancy is the gap between the academic and trade organisation view and the real needs of managers in Thai manufacturing companies.

Discrepancy 2 will show the difference between 'ideal' information needs and 'available' information which is the gap between the ideal information set and the characteristics of information provided by the current enterprise information systems. This discrepancy could be used to benchmark the current enterprise information system against the best practice.

Discrepancy 3 will show the difference between the available information set and the information perceived to be needed by managers in Thai manufacturing companies. This will be presented as the area of improvement required in current enterprise information systems.

6. Research Propositions

Three propositions were set to answer the main research question of this study.

Proposition 1: There are gaps between the ideal information set and that perceived to be needed by managers in Thai manufacturing companies.

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The ideal information based on the best practices in academic and trade associations mentioned and that perceived to be needed by managers in Thai manufacturing companies are expected not to match in terms of qualities of information and types of information.

Proposition 2: There are differences between the ideal academic and trade associations suggested information set and the information available from the current enterprise information systems.

The ideal academic and trade association suggested information set and the information available from the current enterprise information systems are expected to be different in terms of nature of information and quality. Many authors have found that information systems tend to mismatch with user expectations.

Proposition 3: There are differences between the information perceived to be needed by managers in Thai manufacturing companies and the currently available information set.

The information set perceived to be needed by managers in Thai manufacturing companies and the currently available information set available from current enterprise information systems are expected to be different in both nature of information needed and quality of information.

The research method of this study is the survey method using a mailed questionnaire to investigate the current enterprise information systems in Thai business. The mailed questionnaire was constructed based on the literature review and the items in previously published questionnaires dealing with the information quality and information required in buying decisions.

7. Research Design

Construction of the questionnaire

After completion of the literature review, the survey questionnaire was designed as a set of 12 questions in 3 sections. Section 1 was designed to seek characteristics of the individual, company and information systems of the participants. Therefore, questions 1.1- 1.6 are about the personal information of participants, such as gender, age, country where degree obtained, education level, years of experience in current position and level of management. Question 1.7 asks the industry group of the company. The next question (question 1.8) asks the type of information software used to produce the decision-support information.

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Table 1: The list of detailed questions in the questionnaire

Question 2.1	What types of information are available from your current enterprise information system?
Question 2.2	What are the types of information you require to make a good purchasing decisions?
Question 3.1	Which of the following quality characteristics of information can be found from the buying related information produced from your enterprise information system?
Question 3.2	Which of the following ideal quality characteristics of information do you think you need in your buying decision-making?

In section 2, two questions were designed to gather the types of information available from the current enterprise information systems to make buying decisions (as presented in Table 1). Both questions contain 23 items of information types suggested to be useful in buying decisions from the current enterprise information system and were constructed from the academic and trade associations literature. They include Names and addresses of potential suppliers, Reputation for on time delivery, Capacity to supply, Relationship with suppliers, Agreements and contracts with suppliers, Suppliers payment terms, Suppliers after sales service and warranty offers, Products and services specifications, Patterns of products and services demands, Quality standards e.g., industrial standards, material standards, Total Cost of Ownership: TCO, Safety stock requirements, Economic Order Quantity (EOQ), Receiving and inspection of products and services, Purchase requisitions, Purchasing survey, Market analysis Material studies and analyses, Environmental factors e.g., government and economic factors, International trade agreements, Purchasing budget, Analysis of sourcing options, and Flow of materials. Those types of information will be examined by use of the seven-point Likert scale to measure the level of availability of types of information from 1 = not at all to 7 = completely available.

Section 3 of the questionnaire comprises 2 main questions concerned with the quality characteristics of information useful to decisions related to buying (as presented in Table1). Question 3.1 is concerned with the quality characteristics of information that can be found from the buying related information produced from enterprise information systems. The quality characteristics of information were presented in a seven-point Likert scale from 1= not at all to 7 completely. Question 3.2 involves the quality characteristics of information purchasing managers think they need in their buying decisions. The lists of information quality dimensions were varied for the system and types of information tested in the studies such as the information quality dimension of the International Accounting Standards Board (IASB) for financial accounting information. The quality dimensions used in this section are adopted from the InfoQual framework of Price and Shanks (2004) which comprises 10 main quality dimension (20 sub-dimensions) which are: Data obeys business and other integrity rules, Reliable (Correct, Unambiguous, Meaningful, Non-redundant), Complete, Understandable, Accessible (Easy-to-access, Quick-to-access), Secure, Flexible Presented, Suitably Presented (Timely, Suitably formatted, Suitably precise, Suitably measured), Relevant, Valuable (Price & Shanks 2004). More detail about InfoQual framework can be found in Hill (2004), Price & Shank (2004, 2005) Hill, Price& Shank (2006).

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Sample

Thai businesses currently adopting enterprise information systems is the population of this study. However, not every Thai business is able to adopt enterprise information systems. This leads to focusing the sample of Thai businesses on to large businesses in the manufacturing industry listed on the Stock Exchange of Thailand (SET). This was considered to be suitable to represent the population of Thai businesses currently adopting enterprise information systems.

A total of 246 survey packages was mailed to 246 large Thai manufacturing companies based on the addresses obtained from the SET database. The first 181 survey packages were completed and ready to mail-out on 26 August 2009 and the second lot of 65 packages was mailed on 1 September 2009. The 246 recipients were to be reminded via postcards 2 weeks after the date that the survey packages were posted.

The Data Collection

The completed questionnaires started to arrive at the collection base in the University of Tasmania on 9 September 2009. Although, the due date stated on the questionnaire is 25 September 2009, the cut-off date of this study was set to be the 7 October 2009 because the survey packages and the returned questionnaires were subject to the delays in the international mail system from Thailand to Australia.

Data Collection Problems

In this study the data collection problems can be described in two stages: mailed-out and waiting-for-return stage; and after return of the questionnaire stage. At the mailed-out and waiting-for- return stage, some survey problems had been discovered which are:

1. the loss of questionnaire packages during the mail- out process;
2. delay of the postal system;
3. missing data in the respondent's questionnaire; and
4. Non-response bias.

In this study, the non-response bias was tested by comparing company characteristics of early and late respondents using the compared means independent-sample t-test. The early and late respondents were grouped using the date of return on the postal date stamp by Thailand Post which, for the early respondents, is from 9 September 2009 to 25 September 2009 and the for late respondent from 26 September 2009 to 7 October 2009. The statistical data are provided in Table 2. The result from the test shows that the characteristics of the early and late respondents are statistically similar because all significance values are above the alpha level of .05. Therefore, the non-response bias does not exist

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and it is expected that the 72 respondents in this study are representative of the whole selected sample.

Table 2: Non-response bias analysis

	Group	N	Mean	Std. Deviation	Significance*
Industrial group	Early	31	3.35	1.603	.298
	Late	41	3.02	1.351	
number of Employee	Early	31	2.77	.425	.705
	Late	41	2.80	.459	
Type of IS	Early	31	4.03	1.197	.272
	Late	41	3.93	1.311	

Note: * At the .05 level of significance.

The current information system adopted in large Thai industrial companies is presented in Table 3. The majority of large Thai industrial companies, 82% or 59 companies, adopted enterprise information systems (52.8 % of the Enterprise Resource Planning (ERP) and 29.2% in-house developed enterprise information systems.

Table 3: Type of enterprise information system in purchasing department

Type of Information system	N	Percentage
Manual system	5	6.9
In-house developed software for department only	2	2.8
In-house developed enterprise information system	21	29.2
Commercial software package	6	8.3
Enterprise Resource Planning	38	52.8
Total	72	100.0

8. Research Finding

The gaps analysis findings

Table 4: The three aspects of information types and the gaps analysis

Type of information	Available (A)	Required (B)	Best practice (C)	Discrepancy		
				1 (C – B)	2 (C – A)	3 (B – A)
Names and addresses of potential suppliers	6.53	6.17	6.30	0.13	-0.23	-0.36
Purchasing survey	4.40	5.42	6.30	0.88	1.90	1.03
Market analysis	3.95	5.29	6.30	1.01	2.35	1.34
Material studies and analyses	4.07	5.43	6.30	0.87	2.23	1.36
Environmental factors	3.63	4.93	6.30	1.37	2.67	1.31
International trade agreements	3.51	4.81	6.30	1.49	2.79	1.31
Analysis of sourcing options	3.85	4.97	6.30	1.33	2.45	1.12

Table 4 presents statistics and gap analysis among the three aspects of information types. In general, information suggested to be available and required in buying decisions were reported at the abundant and plentiful levels. For example, the names and addresses of potential suppliers is the only information

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item from the list of 23 information items reported to be available at the abundant level while the rest are available at plentiful level (5.50-5.49 mean score) and somewhat plentiful level (4.50-6.49 mean score). While, the suggested strategic support level information is available at average level (mean scores lower than 5.00) such as “Purchasing survey”, “Marketing analysis”, “Material studies and analysis”, “Environmental factor”, “International trade agreement” and “Analysis of sourcing options”.

Table 5: The three aspects of information quality the gaps analysis

Information quality	Available (A)	Required (B)	Best practice (C)	Discrepancy		
				1 (C – B)	2 (C – A)	3 (B – A)
Reliable:	5.90	6.27	6.30	0.03	0.40	0.37
-Correct	6.09	6.41	6.30	- 0.11	0.21	0.32
-Unambiguous	6.00	6.41	6.30	- 0.11	0.30	0.41
Suitably Presented	5.38	6.10	6.30	0.20	0.92	0.72
- Flexibly Presented	5.21	6.05	6.30	0.25	1.09	0.84
- Appropriate for you use	5.26	6.19	6.30	0.11	1.04	0.93
- Timely	5.50	6.31	6.30	-0.01	0.80	0.81

Table 5 shows the mean scores of the three sets of information quality and the gap analysis among the aspects. The gaps of each information quality are negative which means that in some cases the purchasing managers required a higher degree of quality than the best practice level such as “Correct”, “Unambiguous”, “Complete”, “Understandable” and “Timely”. The gap between the best practice level and available level of information quality can be found in information presentation characteristics such as flexibly presented and appropriate for use.

The data from the second survey are reported in tabular form using frequency, mean and percentage. Then, the data are analysed to find relationships among variables with sample-pair t-test and One-way ANOVA test and the summarised results are reported in Figures 3-5.

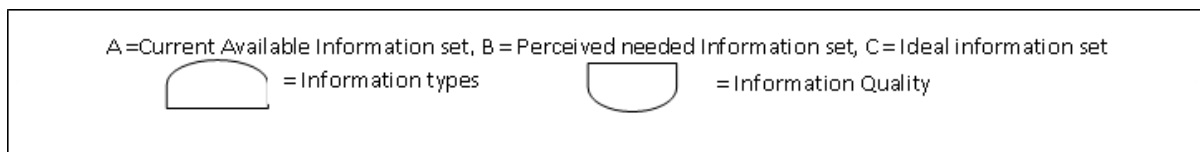
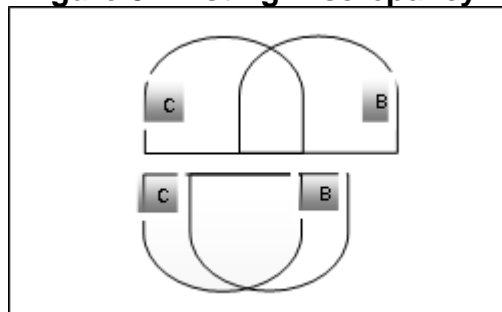


Figure 3 Existing Discrepancy 1



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Figure 3 presents the pattern of discrepancy 1, the gap between the ideal information set and the required information set in existing Thai manufacturing companies. This discrepancy was reported as significant in some information types and on almost every information quality criterion.

Figure 4 Existing Discrepancy 2

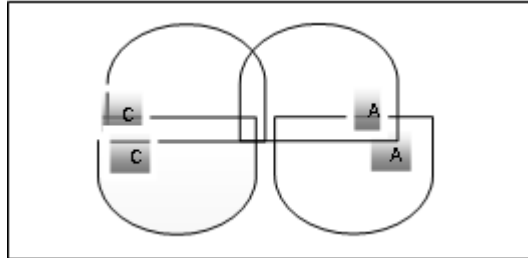


Figure 4 presents the discrepancy between the ideal information set and the currently available information set which has differences in information type and information quality in Thai manufacturing companies. The gaps are total difference in the information quality aspect but some shared similarities in some information types.

Figure.5 Existing Discrepancy 3

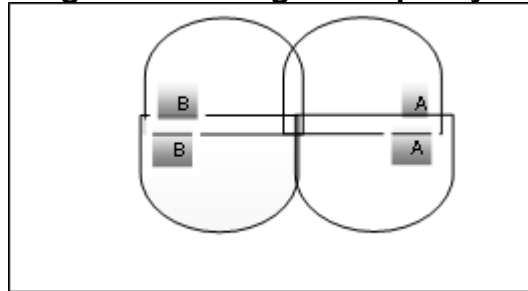


Figure 5 shows the discrepancy between the currently available information set and the required information in the aspects of both information type and information quality. The information quality is different in the two information sets while similarity can be found in some information types.

Gaps between best practice level and perceived to be needed by managers in Thai manufacturing companies

Proposition 1 stated that there are gaps between the ideal information set and that perceived to be needed by managers in Thai manufacturing companies.

The current information requirements practices of Thai manufacturing companies were assessed against the best practice guidelines, that is, the responses in the tenth decile. Significant differences in both information type and information quality dimensions were found.

Gaps between best practice level and information currently available from enterprise information system of Thai manufacturing companies

Proposition 2 stated that there are differences between the ideal academic and trade association information set and the information available from the current enterprise information systems. Benchmarking to test the proposition showed significant differences between the available levels and the best practice levels of information in both type and information quality dimensions, in Thai manufacturing companies.

Gaps between information perceived to be needed by managers in Thai manufacturing companies and currently available from enterprise information systems

Proposition 3 stated that there are differences between the information perceived to be needed by managers in Thai manufacturing companies and the information actually available from the current enterprise information system. The test of this proposition indicated significant differences between required level and available level of information both in type and quality dimensions, in Thai manufacturing companies. The test showed that the current information systems in Thai manufacturing need to be improved to meet the information requirements of the users.

9. Limitation

Sample coverage

The study was limited to a survey of the purchasing departments of the large Thai manufacturing companies listed on the Security Exchange of Thailand (SET). However, the enterprise information systems covered almost all departments of the companies.

Response rate

A thirty-one percent response rate is considered low in survey research but the non-response bias analysis was conducted to make sure no bias existed. This led to the belief that the data collected from the survey can be used to represent the population of the study. A number of strategies was implemented to boost the response rate. However, the University letter head and the reminder letter, etc were not sufficient to encourage a higher response rate.

10. Summary

This study examined a function of the enterprise information system in Thai industrial companies and the results confirmed that there is an issue of information requirements that do not match with the needs of the systems users. This implies that the other functions of business might have the same problem with information available from the enterprise information system as well. This could draw the

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attention of information technology experts and management to improve the ability of their information systems to meet the needs of their users.

Implication for Further Research

The area of information use still lacks in-depth study. This research framework and the method of study have the potential to be applied to assess the ability of information systems to provide information and could be used to evaluate the information requirements from the users' perspective and the best -practice perspective. However, the framework needs to be tested on different types of information system, populations and decision topics. Moreover, future adopters need to be aware of the limitations and the possible weaknesses of the framework as well.

The system designers could apply this framework to the system development process by gathering the information requirements based on the user requirements and the best academic and trade association practices in order to have the potential to help users to identify their needs more clearly.

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