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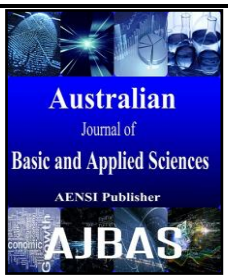

Factors of Managing the Realization of IT Benefits in Construction Companies

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ABSTRACT

Construction companies are spending large amounts of money being to realize IT. However, they are achieving less-than-expected benefits. This research identifies factors of managing the realization of IT benefits. This study uses a questionnaire that was designed and improved through the execution of a pilot survey to determine the final questionnaire form. This study focused on a population of 3,750 of Grade 7 (G7) construction companies. Although the calculated minimum required sample size is 98, about 21% of the population—805 companies—of the questionnaire were sent and, of those, 125 companies replied, representing about 15% of the sent questionnaires. Only 103 of the returned questionnaires were completed. This study used some methods to analyse the data, including Descriptive Statistics (DS), Factor Analysis (FA) and one-way Analysis of Variance (ANOVA). The established factors of managing the realization of IT benefits were awareness, successful planning for changes, exchanging viewpoints, documentation, viability of current system, etc.

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INTRODUCTION

IT Investment is increasing and requires management attention (Suwardy, T., 2003) therefore, the question of how to realize IT benefits in order to justify the high level of related expenditures is attracting the attention of both researchers and practitioners (Ballantine, J. and S. Stray, 1998; Lin, C. and G. Pervan, 2003). The mangers are often under immense pressure to find a way to measure their investments' contribution to business criteria, as well as to find reliable ways to ensure a realization of the business benefits from the investments. This issue has become more complex as the nature of IT investments and the benefits that can be delivered have evolved over time (Lin, C. and G. Pervan, 2003). IT benefits are not outcomes —they require management interference to be realized (Alshawi, S., 2003; Norton, D.P. 1995). Some IT benefits have direct tangible effects in productivity, while others have intangible results in terms of effectiveness and performance (Abdul kareem, H.I., 2009; Andresen, J., 2000). Suwardy et al. (2003) stated that a full investment of IT benefits requires management attention. Accordingly, the management have to play an important role in providing the factors of realizing IT benefits to recognize the achieved IT benefits. Company headquarters connect with other branch offices, vendors, and developers through the internet; they commonly use e-mail to communicate (Abdul kareem, H.I. and A.H. Abu Bakar, 2011).

Managing the realization of IT benefits is a process of organizing and managing so that the potential benefits from using IT are actually realized. The advantages of managing IT benefits are improving the integration of business staff with IT functions and maximizing the delivered benefits. Different methodologies for realizing IT benefits exist; these include the Cranfield process model of benefits management (Ward, J., 1996), the active benefit realization (ABR) model (Fink, D., 2003; Andresen, J., 2000; Lin, C. and G. Pervan, 2003), benefit realization model and the IT benefits measurement process [7]. The realization of IT benefits is affected by a number of factors which should be considered during the management process.

Research Questione:

What are the Factors that influence the realization of IT benefits in the construction companies?

Research Objective:

The research objective is to identify the Factors which influence the realization of IT benefits in construction companies.

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Concept Of Critical Success Factors:

The CSFs constitute a method of determining precisely what information is most required. The construction managers need access to the information which is related to their particular roles and responsibilities, therefore, the CSFs method adopted in a number of construction companies. In other words, the CSFs are a number of activities in which favourable results are absolutely necessary to achieve the goals of a construction company (Bullen, C.V. and J.F. Rockart, 1981).

According to Bullen and Rockart (1981), CSFs can define as a number of areas in which adequate results ensure successful competitive performance for construction organization. The CSFs took a place with the other basic terms which concerned with the management of a construction company because they constitute an effective method to view managerial information needs (Rockart, J.F., M.E. Treacy, 1980).

In such a construction company, the value of CSFs is to clarify the areas of activities which then can be used to assist in the planning process and the development of an IS. Accordingly, CSFs are of importance that these key areas of activities should be given a careful attention from construction management. The CSFs approach can be definitely aids construction companies in achieving both the data that top management feels they need and the access mechanisms that they desire, while careful thought must be given to both by top management if an implemented system is to be successful (Rockart, J.F., M.E. Treacy, 1980). The CSFs arise from five main sources, namely, industry, competitive strategy and industry position, environmental factors, temporal factors, and managerial position (Bullen, C.V. and J.F. Rockart, 1981).

Factors Of Managing The Realization Of It Benefits:

Many factors can influence the successful management of IT benefits realization in construction companies, these factors are CSFs. The last mentioned are a number of activities and managerial requirements related to the process of managing the realization of IT benefits in which the favourable results of the process are absolutely necessary to achieve IT benefits in construction companies. Some researchers have argued the CSFs for managing the realization of IT benefits such as (Fink, D., 2003; Schwegler, B.R., 2001; Smith, D.C.,2008; Dhillon, G., 2000). Accordingly, a number of CSFs to achieve adequate process for managing the realization of IT benefits have been modified to ensure successful realization of IT benefits in construction companies.

1. Awareness of a Need to Change and Improve:

The managements of construction companies should be aware of the needs for improving and developing efficiency, effectiveness and performance of the construction work. Also, they should be aware that the improvement and development can be achieved by implementing IT projects through implementing a number of required changes in work organization and process. Furthermore, they should be aware of the problems/opportunities that IT can solves/achieves and refocus their business and organizational objectives for IT investments according them. This factor constitutes the first factor to ensure the successful management of realizing the required IT benefits.

2. Successful Planning for Changes:

One of the basic requirements in managing the realization of the identified IT benefits is the successful planning for the required changes in work organization and process (Ward, J., 2007). Also the management should carefully plan for the specific actions required to achieve each benefit to deploy it successfully. In addition, the plan should identify who is responsible for delivering benefits and responsibilities for evaluating it.

3. Exchange of Viewpoints about Implementation:

During the implementation of IT benefits realization plan, it is important to open communications and discussions between all the identified individuals of IT stakeholder who are responsible for monitoring costs and benefits of IT implementation closely. This involves assessing the progress of the IT project itself. All stakeholders are able to develop views as to how the project is progressing and to exchange these views in open and constructive discussion.

4. Documentation for the New System:

To realize the benefits after IT implementation, there is a need to prepare formal documentation of the new implemented IT system to record all the information that could be a guide in evaluation process. Also, it is important to ensure that the professional business managers and expert IT users existing during the realization process of IT benefits (Dhillon, G., 2000; Fink, D., 2003).

5. Viability of a Previous System:

During the implementation of an IT system in the company, it is essential to make sure that the existing system is working well to ensure that there will not be any downtime in the work process (Fink, D., 2003, Smith, D.C., 2008) Furthermore, the availability of financial expertise during the implementation of an IT system is important factor to monitor and review the cash flow accurately (Schwegler, B.R., 2001; Lin, C. and G. Pervan, 2003).

6. Selection of a Proper Method of IT Evaluation:

Such evaluation methods as NPV, discounted payback, savings analysis, ROI, and technical requirements, are exist and adopted in the construction companies (Andresen, J., 2000; Ward, J.,

2007). The management have to select the appropriate methodology for IT evaluation and examine the compatibility of the expected IT benefits with business objectives to ensure successful realization of IT benefits.

7. Careful Consideration of IT Drivers and Expectations:

The company may have successful implementation for their IT projects when the drivers for investing in IT such as visualization and data collection, considered well. Also, the satisfaction of management about what they implemented of IT projects can be achieved through a well identification the expected benefits set according to their categories of tangible and intangible. Furthermore, the organizational mode of working should be carefully considered to ensure the implementation of required changes (Dhillon, G., 2000; Fink, D., 2003).

Research Methodology:

Quantitative study was conducted to collect quantitative data; this approach was chosen because it is representative of the population and can guarantee that the study will cover a wide range of construction companies in Malaysia (Sekaran, U., 2003). Furthermore, the study offers empirical investigation of quantitative data from respondents. The quantitative data were collected to explore the approaches or procedures for realizing IT benefits. The quantitative study consists of developing a draft questionnaire based on the literature review, then testing and modifying it to finalize the questionnaire that will be used to conduct the survey of the G7 Malaysian construction companies. The directory of the Construction Industry Development Board (CIDB) of 2008–2009 recorded that the number of active and new G7 construction companies totalled 3,750. The present study has a homogeneous population because all respondents are G7 construction companies. As a result, the sample was randomly selected. Moreover, the proper sampling method used was stratified random sampling to ensure that the survey covers the whole area of study (Sekaran, U., 2003). The CIDB (2008) classifies the Malaysian territory into five regions: central region, northern region, east coast, southern region, and East Malaysia (Borneo). In the present research, the questionnaire was designed according to the findings of the literature review. According to Sekaran (2003), the questionnaire must comprise close-ended questions by asking respondents to choose one or more among a set of alternatives given as options for answers. Around 805 questionnaires were distributed to the same number of G7 construction companies in Malaysia. The total number of returned questionnaire was 125, representing 15% of the total number of questionnaire distributed. From the returned questionnaire, 22 were incomplete and have been ignored; thus, only 103 of the returned questionnaires from different regions were used to obtain data. The analysis of the quantitative data uses descriptive statistics (DS), factor analysis (FA), and one-way analysis of variance (ANOVA) to obtain and discuss the results.

Results, Findings And Discussions:

The background information of the respondents and companies are presented in Table 1. The respondents were 29 (28%) project managers, 31 (30%) managing directors, 55 (53%) degree holders, and 52 (50%) individuals with more than 10 years of experience in construction. The construction companies comprise 42 (41%) companies from the category of building and civil engineering, and 45 (44%) from the central region (e.g., Kuala Lumpur and Selangor). The best fit to technical requirements was a common method of IT evaluation in companies, and 42 (41%) of the companies used this method. Furthermore, 72 (70%) companies invest $\leq$ 5% of their total investments in IT, while 47 (46%) have invested RM 2,500–12,000. The low percentage and amount of IT investment may be due to the low cost of updating or improving an IT system or a network when an IT system is already in place. Accordingly, the respondents gave an indication that the use of IT in construction companies is low. About 42 (41%) respondents depend on the best fit to technical requirements to evaluate IT projects. However, the methods of IT evaluation in 24 (23%) companies were undefined. About 10 (10%) companies failed to define the percentage of their IT investments, while 12 (13%) did not indicate the amount of IT investment. The undefined areas gave an indication of the lack of awareness regarding IT investment issues in these companies.

The DS analysis of the factors provided mean values for awareness about need for changes, successful planning for changes, exchanging viewpoints about implementation, documenting a new system, ensuring viability of the previous system, selecting proper methodology for IT evaluation, and carefully considering IT expectations, as shown in Figure 1. The mean Likert scale values of these factors were 3.86, 3.93, 3.93, 3.88, 3.84, 3.82, and 3.83, respectively, which are between 3.51 and 4.50 on the Likert scale, which means that the respondents accepted these factors.

Seven items of the factors were subjected to assess the suitability of data for FA using SPSS software. To aid in the interpretation of FA components, only one component was extracted which represent the factors, so the solution could not be rotated. Consequently, all the factors combined in one factor (i.e., one group) by using FA with a mean Likert scale value of 3.87, as shown in Table 2. This confirmed the results of DS analyses.

The significance level was set at $p < 0.05$ for a one-way ANOVA test, to investigate the hypothesis that there was no significant difference between the

mean values of the scores for the factors with regard to the specifications of respondents and companies, as shown in Table 3. According to (Pallant, J., 2001), the variances are homogeneous if the significant values of Levene's test are greater than 0.05. For the factors test, since the significant values were greater than 0.05, the homogeneity of variance assumption was not violated. The results of the one-way ANOVA test showed that there were no significant differences between the answers of the respondents no matter what are their positions, education levels or experiences. For instance, the project managers answered the same way of the IT users. This result indicated that the project managers have not qualified properly to be professional in the factors that influence the realization of IT benefits and did not get sufficient education and knowledge about IT matters. This result matches with the findings of some previous researches, such as, (Ramayah, T., 2003; Jaafar, M., 2007a; Jaafar, M., 2007b; Hussan, F.G., 2008). Furthermore, there were no significant differences according to the work category or region of the construction companies because they represent a homogeneous sample and undergoing the same IT experience and knowledge. This result is compatible with the findings of (Yusuf, S. and O. Osman, 2008) and (Yoke, L.M., 2002).

Table 1: Background information of the respondents.

Variable	Frequency (n=103)	Percentage (Total=100%)
Occupation		
IT User	27	26.2
Engineer	16	15.5
Managing Director	31	30.1
Project Manager	29	28.2
Education level		
Diploma	29	28.2
Bachelor	55	53.4
Post graduated	19	18.4
Experience		
<5	20	19.4
5 -10	31	30.1
>10	52	50.5
Category of company		
Mechanical and Electrical	9	8.7
Building	25	24.3
Civil Engineering	17	16.5
Building and Civil Engineering	42	40.8
Building, Civil Engineering and Mechanical and Electrical	10	9.7
Region		
Central	45	43.7
Northern	25	24.3
East Coast	11	10.7
Southern	11	10.7
Borneo	11	10.7
Method of IT evaluation		
Cash Flow Analysis	14	13.6
Best Fit to Technical Requirements	42	40.8
Fit to Investment Requirements	23	22.3
Undefined	24	23.3
Percentage of investment %		
<1	36	35.0
1 - 5	36	35.0
6 - 10	13	12.6
11 - 20	8	7.8
Undefined	10	9.7
Amount of investment		
RM < 2,500	7	6.8
RM 2,500 - 12,500	47	45.6
RM 15,000 - 25,000	14	13.6
RM 27,500 - 50,000	10	9.7
>RM 50,000	13	12.6
Undefined	12	11.7

The respondents confirmed the importance of the processes of both an awareness of the need for changes and the successful planning for changes, because these represent key factors of achieving benefits. Moreover, the respondents approved of exchanging viewpoints about implementation, documenting for new systems, and ensuring the viability of the current system because these represent factors of implementing and monitoring the IT project so as to lead to a realization of IT benefits. The respondents agreed with both selecting proper methodology for IT evaluation and carefully considering IT expectations. These represent crucial factors for evaluating and realizing IT benefits. All

these results of CSFs are consistent with the previous studies of [15,13,10,14]. However, in general, the results of this study indicate that the respondents in G7 construction companies have an awareness of the need for management interference in the realization process of IT benefits. However, the respondents approved the critical success factors because they believe that a benefit might not be realized automatically and it may require management interference to provide the success requirements [4,5].

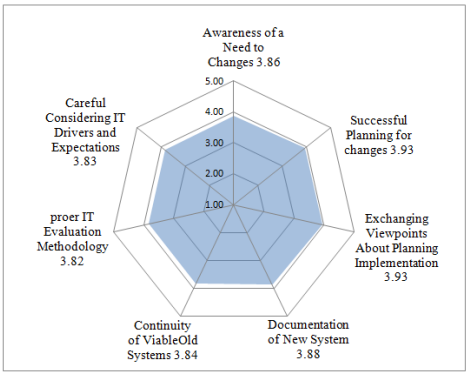

Fig. 1: The factors for Realizing IT Benefits.

Table 2: Average Mean Values of the factors for Realizing IT Benefits.

	No. of respondents	Avg. Minimum Mean	Avg. Maximum Mean	Avg. Mean	Avg. Std. Deviation
CSFs	103	3.82	3.93	3.87	0.66

Table 3: Results of ANOVA Tests for the factors with Regard to Demography.

Demography		N	Mean	Std. Deviation	Results of ANOVA
Respondent Position	IT User	27	27.11	3.39	F(4.83, 14.15) = 0.34 P = 0.80
	Engineer	16	27.94	4.39	
	Managing Director	31	26.97	3.34	
	Project Manager	29	26.79	4.14	
	Total	103	27.11	3.73	
Respondent Education	Diploma	29	26.00	3.58	F(25.22, 13.65) = 1.85 P = 0.16
	Bachelor	55	27.47	4.12	
	Post graduated	19	27.74	2.28	
	Total	103	27.11	3.73	
Respondent Experience	< 5	20	28.00	2.55	F(19.55, 13.77) = 1.42 P = 0.25
	5 - 10	31	27.52	4.04	
	>10	52	26.52	3.87	
	Total	103	27.11	3.73	
Company Category	Mechanical and Electrical	9	26.67	4.66	F(1.85, 14.37) = 0.13 P = 0.97
	Building	25	26.76	2.95	
	Civil Engineering	17	27.18	5.82	
	Building and Civil Engineering	42	27.31	2.99	
	Building, Civil Engineering and Mechanical and Electrical	10	27.40	3.60	
	Total	103	27.11	3.73	
Company Region	Central	45	26.91	4.33	F(2.01, 14.36) = 0.14 P = 0.97
	Northern	25	27.36	3.20	
	East Coast	11	27.18	3.31	
	Southern	11	27.64	1.43	
	Borneo	11	26.73	4.56	
	Total	103	27.11	3.73	

Conclusion:

The DS and FA showed that the factors were awareness about need for changes, successful planning for changes, exchanging viewpoints about implementation, documenting a new system, ensuring the viability of the previous system, selecting proper methodology for IT evaluation, and carefully considering IT expectations. The DS analysis confirmed the processes of realizing IT benefits, such as identifying problems, preparing a feasibility study and planning for realizing IT benefits. The FA confirmed two main processes, namely, identifying IT benefits and planning for realization of IT benefits, and implementing a plan and evaluating IT benefits.

Construction companies' managements are aware of the factors. However, management awareness constitutes a significant factor in ensuring successful IT implementation because, without the approval of the senior management, IT cannot proceed even if employees recognize that they need it. In addition,

companies must plan for the required changes to achieve successful IT implementation. Moreover, the senior management should be aware of their needs before they decide to implement a new system or software. In addition, factors that influence the management of the realization of IT benefits include identification and discussion of the viewpoints of IT stakeholders regarding the IT implementation, proper selection of IT measures to satisfy accurate measurements for IT benefits, and ensuring viability of the current system during IT implementation to prevent downtime.

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REFERENCES

Suwardy, T., J. Ratnatunga, and A.S. Sohal, 2003. IT projects: evaluation, outcomes and impediments. *Benchmarking: An International Journal*, 10 (4): 325-342.

Ballantine, J. and S. Stray, 1998. Financial appraisal and the IS/IT investment decision making process. *Journal of Information Technology*, 13(1): 3–14.

Lin, C. and G. Pervan, 2003. The practice of IS/IT benefits management in large Australian organizations, *Information & Management journal*, 41: 13–24.

Alshawi, S., Z. Irani and L. Baldwin, 2003. Benchmarking information technology investment and benefits extraction. *Benchmarking: An International Journal*, 10: 414- 423.

Norton, D.P. 1995. Managing benefits from information technology, *Information Management & Computer Security*, 3: 29-35.

Abdul kareem, H.I., A.H. Abu Bakar and M. Abbas, 2009. Perception of work problems and related roles of IT among selected professionals in construction in Malaysia. *International Journal of Management Perspectives (IJMP)*, 1(3): 72-92.

Andresen, J., A. Baldwin, M. Betts, C. Carter, A. Hamilton, E. Stokes and T. Thorpe, 2000. A Framework for Measuring IT Innovation Benefits. *Journal of Information Technology in Construction*, 5: 57-72.

Abdul kareem, H.I. and A.H. Abu Bakar, 2011. Identifying IT benefits for Malaysian Construction Companies. *Journal of Information Technology in Construction (ITcon)*, 16: 477-492.

Ward, J., P. Taylor and P. Bond, 1996. Evaluation and realization of IS/IT benefits: an empirical study of current practice. *European Journal of Information Systems*, 4: 214-225.

Fink, D., 2003. Case analyses of the "3 Rs" of information technology benefit management, Realise, retrofit and review. *Benchmarking: An International Journal*, 10-4.

Bullen, C.V. and J.F. Rockart, 1981. *A Primer on Critical Success Factors*. Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology.

Rockart, J.F., M.E. Treacy, 1980. Executive Information Support System. *Working Paper No. 65*, CISR, Cambridge, Massachusetts.

Schwegler, B.R., M.A. Fischer, M.J. O'Connell, H. Reijo and L. Jarmo, 2001. Near-, Medium-, & Long-Term Benefits of Information Technology in Construction, *Center for Integrated Facility Engineering*, Stanford University.

Smith, D.C., H. Dombo, N. Nkehli, 2008. Benefits Realisation Management in Information Technology Projects. *PICMET Proceedings*, 27-31 July, Cape Town, South Africa, 1442-1455.

Dhillon, G., 2000. Interpreting key issues in IS/IT benefits management. *Proceedings of the 33rd Hawaii International Conference on System Sciences*, 1-9.

Ward, J., S. De. Hertogh and S. Viaene, 2007. Managing Benefits from IS/IT Investments: an Empirical Investigation into Current Practice. *Proceedings of the 40th Hawaii International Conference on System Sciences*.

Sekaran, U., 2003. *Research methods for business*. 4th edition. John wiley & Sons, Inc. United State of America.

Pallant, J., 2001. *SPSS survival manual: a step by step guide to data analysis using SPSS for Windows, (Version 10)*. Buckingham: Open University Press.

Ramayah, T., M. Jantan, R. R. Mohd R. Siron, 2003. Technology readiness of owners/ managers of SME's, *Int J Knowl Culture Change Manage*, 34: 75–86.

Jaafar, M., A. Abdul Aziz, T. Ramayah and B. Saad, 2007a. Integrating information technology in the construction industry: Technology readiness assessment of Malaysian contractors. *International Journal of Project Management*, *25:* 115-12.

Jaafar, M., A. Abdul Aziz, T. Ramayah and B. Saad, 2007b. Technology readiness among managers of Malaysian construction firms, *Engineering, Construction and Management*, Emerald group publishing Ltd. *14:* 180-191.

Hussan, F.G., A.R. Khalim and A. Ismail, 2008. An empirical investigation for exploring Information Technology factors and firm performance in Malaysia construction sector. *Proceedings of the Fourteenth Pacific Rim Real Estate Society Conference*, Istana Hotel, Kuala Lumpur, Malaysia, 1-9.

Yusuf, S. and O. Osman, 2008. An evaluation of the use of Information Technology in the Malaysian construction industry. *proceeding of ICoPM*, University of Malaya, Kuala Lumpur, 710-718.

Yoke, L.M., A. Abdul Aziz, A.N. Cheng, W.Y. Chee and W.L. Shiau, 2002. A survey of internet usage in the Malaysian construction industry, *IT con*, *7:* 259-269.