Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 111 (2017) 31–36

Procedia Computer Science

www.elsevier.com/locate/procedia

8th International Conference on Advances in Information Technology, IAIT2016, 19-22 December 2016, Macau, China

The impacts of ERP systems on public sector organizations

Dahlia Fernandez*, Zaini Zainol, Hawa Ahmad

International Islamic University Malaysia, 53100 Kuala Lumpur, Malaysia

Abstract

The aim of this study is to investigate the impact of Enterprise Resource Planning (ERP) system on Public Sector Organizations (PSO) using two perspectives of the Balanced Scorecard (BSC) performance measurement framework; financial and customer. This study presents evidence based on questionnaires survey conducted with 52 local authorities in Malaysia which have implemented the system. Empirical evidence shows that the uses of ERP system in PSOs resulted in a positive financial performance and provide better services to the customer. The corresponding results from the survey signaling to the needs of an integrated system such as ERP to be implemented by other PSOs to enhance the financial and customer performance.

Peer-review under responsibility of the organizing committee of the 8th International Conference on Advances in Information Technology

Keywords: Accounting systems; Enterprise Resource Planning; Public Sector; Organizational Performance; Balanced Scorecard.

1. Introduction

Public sector organizations (PSOs) have a unique culture and they are encountering on a numerous of challenges due to their social responsibilities, complex legislative and higher public expectations[1]. In early 1980s, government all over the world began to experiment with various forms of governmental reform. A number of these efforts have tried to apply the basic management concepts in private sectors into the public sectors[2]. This type of reform can be coined using the phrase "new public management" (NPM)[3]. New public management (NPM) is a reformation of public sector to emulate the practices of the private sector to a significant degree[2]. One of the reformation is through Enterprise Resource Planning (ERP) system.

* Corresponding author. Tel.: 60182384123
E-mail address: dahliafernandez111@gmail.com

1877-0509
Peer-review under responsibility of the organizing committee of the 8th International Conference on Advances in Information Technology
10.1016/j.procs.2017.06.006

The initial use of ERP was to serve the manufacturing company. However, due to the tremendous benefits gained from the utilization of ERP, public sector has taken a big step by implementing this system in their organizations[2]. ERP has been used by the government globally due to the efforts to use information and communications technologies (ICT) to enhance the services to citizens, to have a smoother workflow, and to provide a better governance and transparency[4]. According to Davenport[5], among the reasons for government to adopt ERP systems is because it helps in reshaping government organizations as they promise to solve the challenges posed by portfolios of supposedly disconnected and uncoordinated applications. Furthermore, these integrated enterprise computing systems provide seamless integration of all the information flowing through an organization.[5,6]

This study is conducted to investigate the impact of ERP on PSO using two perspectives of the balanced scorecard (BSC) framework namely financial and customer. There are a growing body of scholars recommending that BSC could help evaluate the performance of the information system. Financial perspective computes the monetary effects of activities and is used as an indication whether the implementation of an ERP system adds to the improvement of the organization's financial position.[7] Whereas, customer perspective is referring to the degree of customer satisfaction[7] and creating superior value for the customer[8]. Thus, by employing this framework, it may provide a comprehensive understanding of the impacts of ERP on PSOs. Research questions (RQ) for this study are:

RQ1: What are the impacts of ERP towards the financial perspectives of the PSO?
RQ2: What are the impacts of ERP towards the customer perspectives of the PSO?

2. Literature review

2.1. Enterprise resource planning (ERP)

Enterprise Resource Planning (ERP) system is one of the most widely used applications that could provide a significant change in the organization[9]. It is a combination of several business procedures, applications, and departments in a single database and it provide real-time information to the companies[10]. There are several other definitions of ERP which are given by many scholars and one of them is: "ERP systems are computer-based systems designed to process an organization's transactions and facilitate integrated and real-time planning, production, and customer response" (O'Leary[11]). Based on this definition, the main feature of ERP system is, it is a system that helps to integrate all business functions in the organization into a single database system to present a holistic view of the business.

2.2. Impacts of ERP on organization

Various studies have been conducted to analyze the impacts of ERP system on organizational performance to prove the capability of ERP system. Mixed findings have been found and there are also several studies shown the ERP system implementation does not necessarily brings to enhancement in organizational performance[12,13,14,15,16,17]. For example, a study[12] to examine how ERP systems affect firm coordination and transaction costs by using economic and industrial organization theories. The results from a sample of 50 companies found no significant change in costs as a percentage of revenue and a significant reduction in costs only for the cost of goods sold as a percentage of sales. Besides, there were no significant decreases related to selling, general, and administrative costs scaled by revenues, and there was no enhancement in residual income[12]. Yet, there was a significant reduction in the employees number as a percentage of revenue. Another study which involved 193 companies in Greece, found that ERP system makes the data collected and processed easier and faster. However, there is no reduction of personnel which would bring to major cost benefits for the company[13]. A study in Bahrain[14] found that improving productivity, inventory reduction, customer responsiveness, and new improvement processes as the main benefits of ERP implementation. However, reducing the number of employees was found to be the least ranking in the study.

Several studies were also conducted in the context of public sector. A study conducted in Queensland, Australia with the aim to investigate the types of ERP system's impacts in 23 PSOs[17]. One of the findings indicated that users have a high satisfaction towards ERP, citing more positive impacts. The authors also made a conclusion that based on the study, majority of respondents indicated positive results on the overall productivity improvements[17]. Study in

a public healthcare[13] in Greece, found that there are many improvements caused by the implementation of ERP such as better data integrity, procedures and information quality, higher visibility and information timeliness, healthier communication among the nurses and the storage locations' personnel, automated generation of the clinic orders, lower transaction costs, standardized data definitions and procedures across departments, higher accuracy of billing procedures. While study conducted in India on the impact of ERP system in small and mid-sized PSOs[16] found that the main tangible benefits of implementing ERP systems are productivity enhancement, inventory management, and cash management. On the other hand, for the non-tangible benefits are value-added business processes, a decrease in operating and maintenance costs, process standardization and information visibility[16].

2.3. Public sector organization in Malaysia

The public sector is a major contributor to the economic development of a country. Various measures have been taken by the government to improve the quality and accountability of government agencies and its members so as to provide better services while ensuring greater transparency in financial management. The challenges of globalization have significantly amplified the force for a better public sector services in order to achieve competitive advantages and Malaysian public sector need to have a world-class performance and comprehend the international benchmarks.

In government context, the ERP via ePBT system is a system of revenue management, accounting, and reporting of complaints using a combination of the concept of Client-Server and Web. The system works to help local authorities (LAs) in their daily operations involves revenue collection, processing financial and accounting transactions. There are three objectives of ePBT. Firstly, is to improve the efficiency and effectiveness of the administration of LA in line with the progress of development of the country. Secondly, to improve the implementation of LAs service delivery system using updated ICT facilities. Lastly, is to improve the ability of LAs in providing the services according to customer requirements[18].

3. Research methodology

The sample selection comprised of accountants in LAs in Peninsular Malaysia which are using the ePBT system. Currently, there are 99 LAs in Peninsular Malaysia which include 10 from City Council, 32 from Municipal Council and 57 from District Council[23]. The data were collected through an electronic survey via Google Form questionnaire. The electronic technique is more convenient for the respondents to complete at any day/hour as compared to the traditional Paper-and-Pencil methods (PP) [19]. Besides, it provides more savings in terms of time and cost relevant to paper, envelopes, and stamps[20].

In this study, a structured questionnaire was designed and used for data collection. The questionnaire comprised of a set of questions to measures respondent's perception of the impact of ePBT towards the organizational performance. The questions items were adapted from previous studies and modifications were made to the questionnaire items in order to meet the research aim and to suit the ERP system setting in PSOs in Malaysia. This study used a five-point semantic Likert scale. The scale value is design as 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. In this study Statistical Programme for Social Sciences (SPSS) software version 20 was used to analyze the research variables.

4. Analysis of results

4.1. Demographic data

A total of 99 questionnaires were personally distributed to those agencies, 52 (52.53%) were returned back. 47.47% (47 questionnaires) were not returned back. As shown in Table 2, the years of working experience with the organization consist of 42.3% of respondents have more than 10 years of working experience, 38.5% of the respondents have 5 to 10 years of working experience, while about 19.2% have less than 5 years of working experience. Hence, it could be inferred that since the majority of the respondents are in their current positions for more than ten years, they are expected to have competency, skills and knowledge about their jobs, and thus, that

may increase the accuracy and reliability of their responses. In terms of the types of organization involved are city council (9.6%), municipal council (28.8%) and district council (61.5%). This shows that the sample was a mixture of all types of organizations in the LAs. With regard to years of ePBT implementation, 42.3% of the organizations have implemented ePBT for less than 3 years, and it is followed with 57.7% for more than 3 years. This indicated that majority of the LAs involved in this study have achieved the maturity level of ePBT implementation.

4.2. Descriptive profile of financial perspective

Financial perspective is measured using five items: *ePBT reduces documentation cost (i.e. paper usage), ePBT reduces administrative cost, ePBT increases the frequency of collection (i.e. tax collection, compound, rental, licensing and various receipts), ePBT reduces procurement cost (i.e. cost of acquiring, buying goods, services or works from an external source), and ePBT reduces technology cost (i.e. IT cost).*

Table 1. Descriptive profile of financial perspective

Construct	N	Min	Max	Mean	Std. Deviation
ePBT reduces documentation cost (i.e. paper usage).	52	2	5	4.0385	0.76598
ePBT reduces administrative cost.	52	2	5	3.9615	0.76598
ePBT increases the frequency of collection (i.e. tax collection, compound, rental, licensing and various receipts).	52	3	5	3.9615	0.68489
PBT reduces procurement cost (i.e. cost of acquiring, buying goods, services or works from an external source).	52	2	5	3.7885	0.66676
ePBT reduces technology cost (i.e. IT cost).	52	2	5	3.7500	0.83725
Total				3.9000	0.74417

As shown in Table 1, the highest mean score is ePBT reduces documentation cost (mean score 4.0385) and followed by reduces administration cost (mean score 3.9615), increases the frequency of collection (mean score 3.9615), and reduces procurement cost (mean score 3.7885). The lowest rank is ePBT reduces technology cost with a mean score of 3.7500.

4.3. Descriptive profile of customer perspective

There are four measurement items in customer perspective which are: *'Sistem Aduan' improves service quality through customer direct feedback, 'Sistem eSubmission' and 'Sistem Aduan' provide a platform for more interactive customer service, 'Sistem eSubmission' and 'Sistem Aduan' manage to enhance responsiveness to customers, and ePBT helps to reduce the number of customers' complaint*.

Table 2: Descriptive profile of customer perspective

Construct	N	Min	Max	Mean	Std. Deviation
'Sistem Aduan' improves service quality through customer direct feedback.	52	1	5	3.5385	0.91740
'Sistem eSubmission' and 'Sistem Aduan' provide a platform for more interactive customer service.	52	1	5	3.2692	0.93127
'Sistem eSubmission' and 'Sistem Aduan' manage to enhance responsiveness to customers.	52	1	5	3.1731	0.94394

ePBT helps to reduce the number of customers' complaint.	52	1	5	3.1731	0.83363
Total				3.2885	0.90656

As shown in Table 2, the accountants are mostly agreed with the item *'Sistem Aduan' improves service quality through customer direct feedback* (mean score of 3.5385). The least agreed item is *ePBT helps to reduce the number of customers' complaint* (mean score of 3.1731).

5. Discussion

The results indicated that the implementation of ePBT system in the local authorities' organization leads to a beneficial impact towards its performance which flag a good system implementation in the public sector organization. The result indicated that ePBT system leads to a positive financial performance in the LAs organization. Since ERP technology is expected to provide more timely and accurate enterprise-wide information for decision-making, the documentation cost and the administrative cost of the organization has been reduced. Besides that, since the features of ePBT is paperless, firms could reduce the costs by streamlining processing and eliminating clerical duties that are automated[12]. Moreover, the high sophistication of this system has been proven to reduce the procurement cost and search costs due to the comfortability and user-friendliness of this system. Therefore, this result is consistent with other study regarding the effect of ERP system towards at least some items in the financial performance[15,16,21].

In terms of customer perspective, the result indicated that this system managed to provide a platform for more interactive customer service, improved service quality through customer direct feedback, augmented the responsiveness to customers and consequently reduce the number of customers' complaint. This is due to the fact that this system managed to provide a more accurate, relevant, and timely information to the LAs staff, which was able to eliminate delays and errors in filling customers' businesses. The result of this study supported the prior researches that have showed the impact of ERP implementation towards the customer perspective[14,22,17].

6. Conclusion

This study provides a better understanding and contribution in the literature regarding the impact of ERP implementation in the context of local authorities in Malaysian public sector. This research has managed to prove that by applying the latest system in the public sector organization, it has become one of the efficient strategy in order to enhance the effectiveness and efficiency of the performance of the public sector organization. Hence, the results of this study should encourage the public sector to inaugurate similar strategies with the purpose of achieving similar results shown by local authorities in Malaysia.

Despite its contribution, this study faces certain difficulties and limitations that could limit its scope and reach. Firstly, the respondents of this study are dominated by accountants. Since ERP involved various functions within the organization, future research might want to look on other personnel in public sector. Secondly, there is a limitation to questionnaire surveys. Future research might want to conduct a case study analysis or qualitative research. Thirdly, this study only focus on one type organization which is local authority. Future studies can be conducted on other department of public sector or other types of organizations such as private sector, small and medium enterprises (SMEs), and non-profit organizations.

References

1. Kumar, V., Maheshwari, B., & Kumar, U. ERP systems implementation: Best practices in Canadian government organizations. *Government Information Quarterly* 2002;**19(2):**147-172.
2. Rosacker, K. M., & Rosacker, R. E. Information technology project management within public sector organizations. *Journal of Enterprise Information Management* 2010;**23(5):**587-594.
3. Hood, C. A public management for all seasons?. *Public administration* 1991;**69(1):**3-19.
4. Kumta, G. A. E-Government and ERP: Challenges and Strategies. *Handbook of Research on Enterprise Systems: Concepts, Methodologies,*

Tools and Applications 2009;112-127.
5. Davenport, T. H. Putting the enterprise into the enterprise system. *Harvard Business Review* 1998;**76(4)**:121-129.
6. Markus, M. L., Axline, S., Petrie, D., & Tanis, S. C. Learning from adopters' experiences with ERP: problems encountered and success achieved. *Journal of information technology* 2000;**15(4):**245-265.
7. Lin, H. Y., Hsu, P. Y., & Ting, P. H. ERP systems success: An integration of IS success model and balanced scorecard. *Journal of Research and Practice in Information Technology* 2006;**38(3):**215-228.
8. Porter M, Millar V. How information gives you competitive advantage. *Harvard Business Review* 1985;**65(4):**149–160.
9. Rashid, M. A., Hossain, L., & Patrick, J. D. *The evolution of ERP systems: A historical perspective, Enterprise Resource Planning: Global Opportunities & Challenges*. Idea Group Publishing, Hershey; 2002.
10. Stefanou, J. C. Accounting information systems (AIS) development/acquisition approaches by Greek SME. In *European Conference on Accounting Information System (ECAIS), Copenhagen, Denmark;* 2002.
11. O'Leary, D. E. *Enterprise Resource Planning Systems: Systems, Life Cycle, Electronic Commerce, and Risk*. UK: Cambridge University Press; 2000.
12. Poston, R., & Grabski, S. Financial impacts of enterprise resource planning implementations. *International Journal of Accounting Information Systems* 2001;**2(4):**271–294.
13. Kanellou, A., & Spathis, C. Accounting benefits and satisfaction in an ERP environment. *International Journal of Accounting Information Systems* 2013;**14(3):**209-234.
14. Kamhawi, E. M. Enterprise resource-planning systems adoption in Bahrain: motives, benefits, and barriers. *Journal of Enterprise Information Management* 2008;**21(3**):310-334.
15. Stefanou, C. J., & Revanoglou, A. ERP integration in a healthcare environment: a case study. *Journal of Enterprise Information Management* 2006;**19(1):**115-130.
16. Singla, A. R. Impact of ERP systems on small and mid sized public sector enterprises. *Journal of Theoretical and Applied Information Technology* 2008;**4(2):**119-131.
17. Gable, G., Palmer, A., & Sedera, D. Enterprise Resources Planning Systems Impacts: A Delphi study of Australian public sector. Pacific Asia Conference on Information Systems (PACIS), Tokyo, Japan; 2002.
18. Malaysian Administrative Modernisation and Management Planning Unit (MAMPU). *Memperkasa penyampaian perkhidmatan PBT menerusi penggunaan ICT*; 2013. Retrieved from http://www.mampu.gov.my/documents/10228/18683/ePBT+book+2013_04_13.pdf/ebb84712-cc5b-44ad-88ed-c787f44ada8a
19. Stanton, J. M., & Rogelberg, S. G. Using internet/intranet web pages to collect organizational research data. *Organizational Research Methods* 2001;**4(3):**200-217.
20. Dillman, D. A. *Mail and Internet surveys: The tailored design method--2007 Update with new Internet, visual, and mixed-mode guide*. John Wiley & Sons; 2011.
21. de Castro Silva, S. L. F., & de Oliveira, S. B. Planning and Scope Definition to Implement ERP: The Case Study of Federal Rural University of Rio de Janeiro (UFRRJ). *Procedia Computer Science* 2015;**64:**196-203.
22. Shang, S., & Seddon, P. B. Assessing and managing the benefits of enterprise systems: the business manager's perspective. *Information Systems Journal* 2002;**12(4):**271-299.
23. Local Government Department. ePBT; 2015. Retrieved from http://jkt.kpkt.gov.my/english.php/pages/view/51