

## System and Information Quality an Enabler for Assessing ERP Impacts on the Public Sector: The Case of ePBT in Malaysian Local Authorities

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### Abstract

The aim of this study is to investigate the impact of the Enterprise Resource Planning (ERP) system on public sector performance in Malaysia using the DeLone and McLean Information System (IS) success model and four perspectives of Balanced Scorecard (BSC) measurement model, financial, customer, internal business, and innovation and learning. This study presents evidence gathered from a questionnaire survey of 52 local authorities (LAs) in Malaysia that have implemented the system. The data was collected by an electronically distributed Google Form questionnaire. The findings indicated that system quality is positive as predicted and significant for all perspectives of BSC. It was also found that information quality is positively related and significant in the customer perspective, and positively related but not significant in financial, internal business, and innovation and learning perspective in Malaysia. The results also ascertained that the implementation of the ERP system in LAs organisations leads to improved performance, proving the suitability of the system vis-à-vis the public sector. The results are expected to encourage other public sector units to adopt a similar strategy in order to gain benefits similar to those enjoyed by LAs.

**Keywords:** ERP, public sector, local authorities, system quality, information quality, financial, customer improvement.

### 1. Introduction

Increasing concerns about the performance of the public sector in various developed nations have been linked to the need for an effective system. In a Malaysian context, as reported by Utusan Online (2008) that the majority of local authorities (LAs) which is one

of the public sector components in Malaysia, has failed to report its annual audit in a timely manner. It was reported that only 46% of LA Internal Audit Units nationwide have submitted their audit report annually. The preparation of the annual audit reports of LAs across the country is thus unsatisfactory. This is supported by the Auditor General's Report for 2014 on the audit of activities of the Federal Ministries/Departments and the management of the government companies by the National Audit Department Malaysia, who note that generally there are weaknesses, such as work, procurement, or services not meeting specifications, unreasonable delays, improper payment, wastage, and weaknesses in government assets and financial management. It is thus necessary to improve the quality of standards in the public sector.

The ePBT system is a product of ERP that has been implemented by the government of Malaysia in order to enhance the efficiency and effectiveness of LAs services. The Malaysian government has allocated RM15 million under the 9th Malaysia Plan towards the development of the ePBT system for LAs. In line with this, the objective of this study is to assess the impact of the ERP system on the performance of LAs in Malaysia from four perspectives of Balanced Scorecard (BSC) measurement model, financial, customer, internal business, and innovation and learning. In order to meet this objective, this study explored the following research questions:

- RQ1:** What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from a financial perspective?
- RQ2:** What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from a customer perspective?
- RQ3:** What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from an internal business perspective?
- RQ4:** What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from an innovation and learning perspective?

## 2. Literature Review and Hypotheses Development

There is a lack of empirical research on the impact of ERP in the public sector especially in Malaysia. In Malaysia, Local Authorities (LAs) are front-line agencies that often deal with people such as developers, traders, investors and the citizens. LAs have a direct impact on the quality of life, such as through roads, traffic lights, licensing, drains and drainage systems, and garbage collection systems. As a result, the services of LAs have always been a benchmark of efficiency and performance of government services. There are three types of LAs: city councils, municipal councils and district councils. In line with the aspirations and the needs of the people, ePBT was developed to strengthen the delivery of LAs via the use of ICT. This is in line with the public service commitment to provide a truly customer-oriented service and deliver solid corporate governance. The Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) and Local Government Department (Jabatan Kerajaan Tempatan) (JKT) implemented a pilot project called ePBT on 1st June 2004.

The ePBT system is seen as a revenue management system encompassing revenue management, accounting, and the reporting of complaints via combined client-server and web concepts. The system helps LAs run their day-to-day operations, especially for

revenue collection and processing financial and accounting transactions. The ePBT system is made up of five systems and 21 major subsystems that are intertwined for the specific purpose of generating statements and reports. Its large capacity has resulted in a complete, stable, and user-friendly application.

## 2.1 Hypotheses Development

This study included a balanced scorecard (BSC) measurement model based on the IS success model to measure organisational performance. The study adopted the integrated IS success model (Delone and McLean, 2013) and BSC, as per Lin et al. (2006), where they assumed that BSC is correlated with organisational impact. Similar study by Shen et al. (2016) also used BSC for ERP performance measurement. System quality emphasises the performance characteristics of ERP systems, such as ease of use, response time, reliability, and flexibility. Bradley et al. (2006) found that system quality is positively linked to organisational impact and enriched internal coordination among functional areas, which will consequently enhance internal organisational efficiency. The ERP system, with its large degree of flexibility and integration capabilities, also has the potential to help businesses grow (Shang and Seddon, 2002). Thus, the first hypothesis is:

*System quality is positively related to financial perspective (H1a), customer perspective (H1b), internal business perspective (H1c) and innovation & learning perspective (H1d).*

Information quality focuses on relevance, timeliness, accurateness and the understandability of information produced by an information system. Chen et al. (2012) asserted that the successful implementation of ERP helps enhance the quality of information being generated, which consequently improves the decision-making process. Thus, the second hypothesis is:

*Information quality is positively related to financial perspective (H2a), customer perspective (H2b), internal business perspective (H2c) and innovation & learning perspective (H2d).*

## 2.2 Research Method

The sample for this study comprised accountants from each LA in Peninsular Malaysia, currently using the ePBT system. Accountants were selected as the respondents because they are the main users of the ePBT system. Based on the LA website, questionnaires were sent to the head of the accounting department in each LA. Currently, there are 99 LAs in Peninsular Malaysia, which includes nine from the City Council, 33 from the Municipal Council, and 57 from the District Council. The figures were obtained from the Official Portal of the Local Government Department (2015). The data was collected through an electronic survey via a Google Form questionnaire.

### 3. Results and Discussion

#### 3.1 The Results

Using the LA listings, respondents were selected from all LAs in Peninsular Malaysia. A total of 99 questionnaires were personally emailed to those respondents, and 52.53% (52 questionnaires) were returned, while 47.47% (47 questionnaires) were not returned. The response rate was considered moderate, due to the survey being entirely voluntary. The multiple regression test was adopted to assess the efficacy and effectiveness of the proposed dimensions in explaining organisational performance.

Firstly, on financial perspective. Our statistical analysis shows that the  $R^2$  value is 0.391. This meant that 39.1% of the variance in the financial perspective dependent factor is explained by system quality and information quality. It can be seen from the coefficient test that the t-value shows positive values (system quality =3.198, information quality = 1.637) which support the correlation results. The p-value for system quality ( $p = 0.002$ ,  $<0.05$ ) shows a significant relationship from a financial perspective. H1a is accepted, however, the strength of the relationship for the information quality ( $p = 0.108$ ,  $>0.05$ ) is not significant. Thus, the H2a hypothesis is not accepted. Secondly, on customer perspective, our result shows that the  $R^2$  value is 0.392. This means that 39.2% of the variance in the dependent factor customer perspective was explained by system quality and information quality. It can be seen from the coefficient table that the t-value showed positive values (system quality =2.743, information quality = 2.153) which supports the correlation results. The research model reached statistical significance of  $p=0.008$  for system quality and  $p=0.036$  for information quality, meaning both  $p<0.05$ . Thus, the H1b and H2b hypotheses were accepted. Thirdly on internal business perspective, from the multiple regression analysis carried out, the  $R^2$  value was found to be 0.351. This means that 35.1% of the variance in the dependent factor internal business perspective was explained by system quality and information quality. It can be seen from the coefficient test that the t-value showed positive values (system quality =3.176, information quality = 1.213) which supports the correlation results. The p-value for system quality ( $p = 0.003$ ,  $<0.05$ ) shows a significant relationship with internal business perspective, thus H1c is accepted, however, the strength of the relationship for information quality ( $p = 0.231$ ,  $>0.05$ ) is not significant. Thus, H2c hypothesis is not accepted. Finally, on innovation & learning perspective, our statistical finding shows that the  $R^2$  value is 0.289. This means that 28.9% of the variance in the dependent factor innovation and learning perspective was explained by system quality and information quality. It can be seen from the coefficient test that the t-value showed positive values (system quality =2.319, information quality = 1.557) which support the correlation results. The p-value for system quality ( $p = 0.025$ ,  $<0.05$ ) shows a significant relationship with innovation and the learning perspective. H1d is thus accepted, however, the strength of the relationship with information quality ( $p = 0.126$ ,  $>0.05$ ) is not significant. Thus, H2d hypothesis is not accepted.

#### 3.2 Discussion

The remainder of this section is about the impact of the system and information quality of ERP on the four perspective of BSC, financial, customer, internal business, and innovation and learning perspectives.

*RQ1: What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from the financial perspective?*

The results indicated that only system quality is significant in the context of the financial perspective. Because ERP technology is expected to result in punctual and accurate enterprise-wide information for decision-making, the documentation and administrative cost of the organisation has been reduced. Since ERP is paperless, LAs could reduce costs by streamlining processing and getting rid of automated clerical duties (Poston and Grabski, 2001). This result is consistent with other studies on the effect of the ERP system on financial performance (de Castro Silva and de Oliveira, 2015, Shohet and Nobili, 2016).

The results regarding information quality are in contrast to prior studies (de Castro Silva and de Oliveira, 2015; Shohet and Nobili, 2016). The information quality result was not significant, but the direction of the result was still as predicted. It is consistent with Poston and Grabski (2001) who pointed out that there is no significant impact from an ERP system on the selling, general, and administrative costs scaled by revenues, and residual income

*RQ2 What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from the customer perspective?*

In terms of the customer perspective, the results indicated that both system and information qualities are significant. This demonstrated that this system can provide a platform for more interactive customer service, improved service quality through direct customer feedback, and augmented responsiveness to customers, and consequently decrease the number of customer complaints. This is possibly because this system managed to provide accurate, relevant, and timely information to the LA staff, which was able to eliminate delays and errors in filing customer businesses. The results of this study supported prior research showing the impact of ERP implementation on the customer perspective (see Kamhawi, 2008)

*RQ3 What are the impacts of the ERP system (system quality and information quality) on the performance of LAs in Malaysia from the internal business perspective?*

Only system quality signified positive relationships from an internal business perspective. The quality features of this system, such as reliability, flexibility, fast response time, accurate information, and relevant information, help facilitate and augment the productivity of the staff, which consequently boosts the internal process of the organisation. This is consistent with the findings of ERP researchers, such as de Castro Silva and de Oliveira (2015), Kanellou and Spathis (2013) and Kamhawi (2008). The study found that this system helps improve the quality of generated reports, which is consistent with Chen et al. (2012). The information quality result was not found to be significant in this study, but the direction of the result was still as predicted. In contrast with the findings made by Gorla et al. (2010), the high quality of information, regarding relevance, accuracy, and completeness, does not enable organisations to improve the efficiency and effectiveness of internal business processes. The result is also inconsistent with the studies conducted by Chen et al. (2012) and Kamhawi (2008). The result showed that when the information is not conveyed punctually, or if the information does not meet the needs of the users, it

will weaken the effectiveness of the work processes and consequently affect the internal process of the organisation.

*RQ4 What are the impacts of ERP system (system quality and information quality) on the performance of LAs in Malaysia from the innovation and learning perspective?*

On the other hand, the results indicated that system quality is positively related to innovation and the learning perspective. It was found that ERP supports organisational growth by helping LAs to be more efficient and effective in delivering services; supports the 'Local Agenda 21', which are strategies set up by the government to boost the performance of the public sector; and helps facilitate the organisational strategy by providing more consistent policies. This is in line with Mirbagheri and Khajavi (2013) and, Shang and Seddon (2002), who found that due to a high degree of flexibility and integration, ERP managed to support business growth. It was also found in this study that the creativity of employees is enhanced by the implementation of ERP, which enables the staff to create new ideas on the job.

#### **4. Conclusions**

Applying the DeLone and McLean IS success model and BSC measurement model, the objective of this study was to assess the impact of the ERP system on the performance of PSO in Malaysia from four perspectives, financial, customers, internal business, and innovation and learning. The study found that system quality is positively and significantly related to the financial perspective, customer perspective, internal business perspective, and innovation and learning perspective. This finding implies that a system with a good functional quality from a technical perspective has an excellent impact on organisational performance in the public sector. On the other hand, the study discovered that information quality was positively but not significantly related to financial perspective, internal business perspective, and innovation and learning perspective. Information quality was positively and significantly related to the customer perspective, which indicated that the ERP system managed to provide accurate, relevant, and timely information to the LA staff, who were able to eliminate delays and errors in filing customer businesses. This study analyses the impact of ERP from multiple perspectives instead of focusing only on the traditional aspects of operational or technical impacts. This suggests new guidelines for ERP's adopters, educators, researchers and vendors. There is also a limited number of studies on the impact of ERP, specifically in the Malaysian public sector, and therefore this study provides better understanding, and makes a contribution in the literature regarding the impact of ERP implementation in the context of LAs in the Malaysian public sector.

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