Determinants of Success for ERP Data Governance Implementation in a Malaysian Utility Organization

Hidayah Sulaiman[1] and Maryana Abdullah Maamuom[2]

[1]Universiti Tenaga Nasional, Jalan Ikram-Uniten, 43000 Kajang, Selangor, Malaysia; hidayah@uniten.edu.my,
[2]Tenaga Nasional Berhad, Jalan Bangsar 59200, Kuala Lumpur; maryana@tnb.com.my

Abstract

As the world embraces and welcomes emerging technologies in managing businesses through big data initiatives and Internet of Things (IoT), one important aspect still remains and that is the data collated and analyzed. Data is no doubt an essential asset that has contributed to the success of this new approach, however, businesses and enterprises regardless of their size will need to ensure that their data is of high quality and reliable. Previous studies have indicated that huge investments are being made to collate and capture business data, however, the quality of data being captured and stored in many systems across the organization failed to address the issue of quality and reliability. There is a significant gap in the literature in ensuring that the business data are being properly managed and governed. With the introduction of data analytics embedded into the various facets of the organization's operations, the data governance aspect becomes more critical. An interpretivist qualitative case study was conducted in one of Malaysia's leading electricity utility company, which uses an Enterprise Resource Planning (ERP) solution to address the organization's business needs in relation to operational data. In-depth interviews were conducted in obtaining insights on the issues of data management and governance. As a result, a comprehensive enterprise data governance framework for the success of ERP is being considered to serve as a guideline for utility companies implementing Enterprise Data Governance.

Keywords: Data Governance, Determinants, Enterprise Resource Planning (ERP), Success, Utility

1. Introduction

Businesses have been adopting the enterprise software applications to improve business competitive advantage although the costs of this enterprise software continue to grow at an exponential rate. For any company within the electricity utility, there is no doubt that investing in IT is imperative and inevitable[5]. Electricity utilities have always been a capital and IT intensive companies. This fact is fueled even more with the industry going through a number of significant transformations such as introduction of smart meters, self-healing networks, smart grids, and improved service delivery to customers[12,17]. For the past number of years, electricity utilities are not only required to embrace these complex challenges and transformation which are translated to high capital expenditure investment, they also need to deal with a decline in revenue partly due to the disruption caused by renewable energy by the prosumers whilst also meeting the demands of its technology driven customers. Many organizations have opted for an ERP system knowing fully aware that the real business value may not be realized within a short-term period[14]. Organizations also understand that once they embarked on an ERP implementation, a lasting commitment is necessary due to the large amount of investment and the affect has begun to dawn upon many organizations[19,20]. For any IT implementation to succeed, emphasis has been placed on people, process and technology. However, one element overlaps across the people, process and technology that require serious attention and that is the data that will be used and stored in the ERP system. It is worth to note that many ERP implementation would take for granted the importance of data quality despite spending a significant amount of investment in procuring and implementing the system[13,20]. Although ERP may be able to resolve data quality problems faced

in the company's legacy systems, new data quality problems may still be introduced when adopting an ERP to replace the legacy system[4,14,19]. ERP may also be labelled as complex, rigid and inflexible which should actually be translated in having more data quality controls and highly competent personnel[19]. Lack of data quality controls can be disastrous in the ERP environment due to the integration of data which would flow from one module to another in the system whilst in a silo-ed environment system, it may just only require a minor adjustment or correction[14,19]. The quality of data will have an impact on business agility, productivity and survival likelihood. Data governance was a term that was not very familiar in the early days of IT implementation. However, it became a lexicon in the early 2000's when companies began to realize the importance of their data[5,7]. Consequently, the Sarbanes-OXley (SOX) Act was enforced in 2002 to establish standards and rules in ensuring the accuracy and reliability of corporate information by also withholding corporate executives to be accountable for their corporate data. Therefore, this study suggests that there is a need to identify the determinants of success in governing ERP data, as a requirement which has been overlooked in most electricity utility companies.

2.Literature Review

Data governance began almost 20 years ago when data emerged out of disparate legacy transactional systems where these systems are replaced with a more advanced software and the phrase data management was used widely[8,9]. Data management industry has marched forward through three significant eras[2] - Application Era (1960 – 1990), Enterprise Repository Era (1990 – 2010), Policy Era (2010 – Current). In the Policy Era, requirement of data became more complex and the volume continue to grow resulting to businesses opting for a more sophisticated tools and technology in combining, operating and analyzing with their data. Subsequently, enterprise repositories face problems in keeping abreast to business reality especially businesses that have gone through merger and acquisitions, as well as other strategic business expansion[7,6,8]. A policy-centric and process-centric approaches to data models are emphasized with data quality standards, data strategy and data lifecycle management defined. Governed platforms combined with enterprise data policies are required to manage the

enterprise repositories. The substance of data governance is to ensure data is available when it is needed ensuring the characteristics of the data is also appropriate to the suitable audience[10,16]. Hence, two important questions occur, what is the right data for a specific purpose and who are the right people or body who can define and govern these data standards. Based on related studies, Table 1 highlights the identified determinants of success to ERP data governance.

Table 1. Determinants of success to ERP data governance

Determinants	Description
Top management support	Top management support and project champion. Top management refers to executive level support[19]. The level of commitment by senior management to the project in terms of their own involvement and willingness to allocate valuable organizational resources[15]
Formalization of Data Governance Structure	Data governance includes establishing who in the organization holds decision rights for determining standards for data quality. Data governance specifies the framework for decision rights and accountabilities to encourage desirable behavior in the use of data[7,16]
Employee readiness	User involvement and change management. In an ERP system implementation the focus is very much on people, and in particular users, as well as on processes and technologies[4,5,9].
Data readiness	For an organization considering implementing ERP, it is essential that data quality issues be thoroughly understood. Data of high quality is a prerequisite to meet these changing business requirements and to achieve enterprise agility objectives[8,13].
Process	Inadequate and poorly managed processes will never realize the potential of one of their most important assets — their data[1,10]. Procedures provide a structure for reviewing and acting on requests for data access, data improvement, and other changes[8].
Technology integration	Data security will be the integration of data security protocols from within their data governance program. This integration will use access controls to enforce policy, address privacy, and compliance regulations[6,11,16].

The determinants identified will be used as a basis in conducting the in-depth interviews to data governance stakeholders in the utility company in order to obtain greater insights on the importance of data governance and the significance to the management of data.

3. Methodology

Interpretive research in Information Systems (IS) study is a well-accepted approach and has become an engrained part of the IS field[18]. This study adopts the qualitative interpretivist approach[18] in exploring the determinants for a successful data governance implementation. Key players of the utility company were approached through interviews and discussions. The interviewee ranged from middle management to the most senior management as depicted in Table 2.

Table 2. Interviewee profile

Inter-viewee	Division	Background and Experience
A	Transmission	Asset repository
B	Transmission	Transmission Operations Management - transmission maintenance
C	Distribution	Large power customers in the state of Selangor.
D	ICT	Heads the enterprise architect department of ICT Division.
E	ICT	Enterprise architect of ICT Division
SME V	International Consultancy Firm	Data Governance Projects in various industries
SME W		
SME X		
SME Y		
SME Z		

The use of thematic analysis was applied in the analysis of data in this study as it provides a structured way of understanding how to develop thematic codes and sense themes. The interviews were transcribed and themes were identified based on the determinants as illustrated in Table 1. However, emerging themes were discovered as sub-themes due to being extensively discussed during the interviews and were found to be relevant for data governance implementation.

4.Analysis and Discussion

This section elaborates on the interview analysis and focus group discussion in identifying the determinants of an ERP data governance implementation in an ESI.

4.1 Determinant 1: Top Management Support

All interviewees and SMEs validate that top management support plays an important role and is indeed significant in any IT related project. *"The support can be categorized into 2 aspects. The first one is support during championship of the data governance implementation in terms of approval, budget and resources. The second support will be the sustainability of the data governance and data quality themselves. That support will come from the people".* [SME W, Consultancy Firm]. This statement is aligned with the input obtained from interviewee B whom noted that the support actually needs to come from all levels of the organization including people in at the operational level: *"You must get the support from not only the people at the top but also at the ground level as those at the ground level are the one who is in contact with these data on a daily basis".* [B, Transmission]. On the other hand, Interviewee A who has just completed a data cleansing exercise on the asset's financial and contract information also admitted that her job gets easier as she gets the full support from her Senior General Manager himself: *"The SGM raises the need for the cleansing of the data himself and that is currently still on going. So that helps a lot".* [A, Transmission]. Therefore, it can be concluded that top management support and the line of business support from the operations is critical. The top management will assist the project team to achieve the primary objectives of the project by setting a clear vision and project charter aside from providing the resources needed in terms of financial requirement, human resource and motivation. Whereas the line of business support is considered a sub-theme for this determinant in ensuring that the resources from the operational level are also involved in the data governance initiative. This is also agreed by SME V, SME Z, interviewees B and D.

4.2 Determinant 2: Formalization of Data Governance Structure

Formalization of data governance structure is pertinent in any data governance initiative and all SMEs validate that

the right model structure with the right people and consistent drive and motivation are 2 key ingredients when forming the structure. This is due to data governance implementation, which can be a lengthy process and tedious. SME V highlighted: "*Data governance framework covers 5 domains: data principles, data access, data quality, data lifecycle and metadata. So a governing body needs to be established first and it is them who has the decision rights and is held accountable for an organisation's decision-making about its data assets.*" [SME V, Consultant]. SME Z whose consulting firm has established a global Maturity Model for Data Governance Council stated that: "*The structure formalisation will be an enabler and is a pre-requisite to enable a governance success*". [SME Z, Consultant] Interviewee D mentioned the need to have a formalized data governance council in the company not only to address on the data quality but to address data sharing between different business owners: "*Another reason is because data is owned by the business owners but some of these data needs to be shared across. When this happens, having a governance body or council to discuss and agree will be most useful*". [D, ICT]. Hence, a data steward is required in administering the data in ensuring no compliance violation will occur with the data policy and regulatory requirement. The Executive Sponsorship is also equally important and taken as a sub-theme, where a Data Governance Steering Committee or Council who are the senior executives, ensure that the project team's progress is aligned with the intended objective and portfolio direction. Therefore, it can be concluded that formalization of data governance structure is critical due to data governance being cross-functional.

4.3 Determinant 3: Employee Readiness

Employee readiness in this study refers employee willingness, which can only be obtained if the employee can appreciate the perceived benefits of a project. This statement is supported by SME X who believes that: "*Good governance must be designed. It cannot be mandated. The iterative process of engaging the business and "thinking it through" develops ownership and commitment*" [SME X, Consultant]. This is also supported by the statement made by interviewee A: "*There are always people that are trying to beat the system. They will try to find a shortcut and maybe that is why the cleansing is also important and being repeated*" [A, Transmission]. Part of employee readiness is having a comprehensive change management which

needs to cover all layers in the organization. Interviewee D concurred: "*We need them to treat the data as an asset by itself…What happened is people don't see the importance of that data and that is sad*" [D, ICT]. Employee's involvement from implementation right down to using the system is crucial in ensuring the success of any project. Therefore, it can be concluded that employee readiness is relevant and a sub-theme on top-down support should also be included as part of the effort in getting employees ready for data governance.

4.4 Determinant 4: Data Readiness

Data readiness for this study relates to data cleaning. The eminent goal is to have the assurance of the usefulness of the data by eliminating errors, duplications and redundancy to ensure the accuracy, consistency, completeness and reliability. SME V highlighted that "*There is not much point to pursue data governance if you are not going to ensure your data quality is up to a certain mark.*"[SME V, Consultant] Three (3) of the interviewees, A, B and C are acutely aware on the state of the data in their Divisions and concur that data cleaning is much needed. Interviewee B recalled how his department wanted to clean the equipment data and they had to carry out a drastic measure: "*Trying get the data equipment correct was definitely a painful experience. We actually have to lock the master data controller in a room for 14 consecutive days*" [B, Transmission]. SME Y who is also involved in one of the Division Analytics project indicated that "*The fundamental basic for the company's analytic blueprint and roadmap to succeed will definitely be cleaned data*". [SME Y, Consultant]. With this statement, cleaned data will definitely contribute to a more accurate and faster analytics results. Hence, improvement on data quality will reduce the costs when carrying out analytics projects. Therefore, it can be concluded that data readiness is unarguably important especially when implementing a data governance project.

4.5 Determinant 5: Process

When an organization decided to embark on data governance, a full assessment of the current lifecycle will need to be relooked to decide at which juncture, the governing process needs to come in. Another reason why a review of the current process is very much needed is to find out why "bad" data is still going into the repository. Most of the respondents highlighted that the governing process

when incorporated in the flow should not be complicated and must be kept simplified as much as possible but not compromising its objective. There is a need to perform an assessment between Data Management and Data Quality procedures. This assessment is to identify the gap in order to produce a data lifecycle identification process as a form of control. On the strategic side, a business process integration plan will also need to be considered to ensure that the process assessment is done in a holistic approach and not silo-ed. Interviewee C highlighted an existence of a gap between new customer's registration process and the installation of the meter where the updated meter information is not pushed into the Device Master record accordingly despite the meter installer has updated the information in meter services: *"What happen is, when the people in the meter has done their job, their service order is completed in their system but somehow, the meter information is not updated accordingly."[C, Distribution].* Hence, there is a need to have an assessment on the data flow between the portal and the ERP system to ensure the integrity of the data is still being maintained throughout the data exchange. Therefore, it can be concluded that the determinant for process is indeed important as it explains the link and the flow of data.

4.6 Determinant 6: Technology

The use of technology or tools is definitely needed to ease the governance process of any organization. Making the right choice is important in order to ease the implementation to the existing ERP systems. SME W who was responsible in the data governance framework and tool implementation in electricity utility in India claims: *"For an electricity utility, you cannot escape from considering the technology as the complexity of running a utility should not be under estimated."[SME W, Consultant].* Interviewee A agrees on having a technology to be incorporated in the data governance implementation plan: *"Technology will play the biggest role because I think with technology, like I was telling you about the automated version instead of the hard copy version right, the moment we have that automation right, the adherence is actually higher."[A, Transmission].* Interviewee C concurred with the opinion of the previous interviewee with his statement: *"By having technology which is easy to use and friendly, it will be a subsequent effect. And it will also detect any human error as well as it is automated." [C, Distribution].* The interviewees agree that a governance tool will assist to ensure the data quality

is adhered. However, these tools or technology must be used with caution. Therefore, it can be concluded that this determinant is critical with having a sub-determinant on business process integration and data lifecycle identification partly due to the sheer size of the ERP system owned by company and the number of portals which also need to be integrated in the governance model.

4.7 The Determinants of Success for ERP Data Governance

From the qualitative analysis, a model is developed incorporating the most important aspect and attributes of the determinants. Diagram below illustrates the determinants of success to ERP Data Governance incorporating findings from the qualitative analysis (Figure 1).
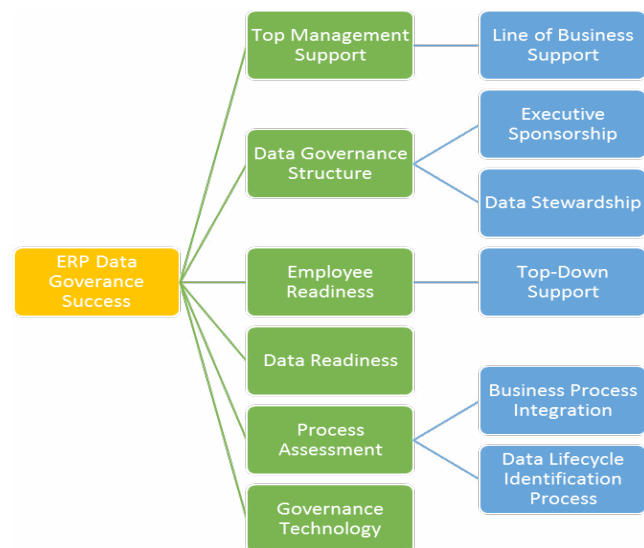

Figure 1. Electricity utility ERP data governance model.

5. Conclusion

Reliable and high quality data will make electricity utilities smarter and more efficient. Just like any other organizations, data is fundamental to the highly complex operation of utilities. Improved customer service, lower operating costs, and more decisive and accurate decision-making are part of the after effect from simple changes and improvements in data. Organizations must not overestimate the quality of their data and underestimate the cost of their quality errors. A data governance framework can be a good start in allowing organizations to acknowledge their data quality issues especially from people, process and technology perspective. This study

can be further empirically explored to test the determinants and sub-determinants through a quantitative study. Companies that plan to migrate their current ERP business data into a more advanced big data solutions may also use the model as a basis in incorporating data governance for the implementation.

6. Acknowledgements

7. References

1. Botelho B. (2017, June). Big data governance looms large. Business Information Systems.
2. Chen W. (2010, June 25). A brief history of data governance, Magnitude. http://magnitude.com/blog/a-brief-history-of-data-governance/.
3. Demarquet G. (2016). Five key reasons enterprise data governance matters to finance, The Journal of Corporate Accounting and Finance. 27(2):47-51. DOI: 10.1002/jcaf.22121. Crossref.
4. Edwards M. (2008, July). ERP to grow in utilities, says Deloitte, ComputerWeekly.com. http://www.computerweekly.com/opinion/ERP-to-grow-in-utilities-says-Deloitte.
5. Egelstaff R, Wells M. (2013). Data governance framework and change management. PubMED. 193:108–19. https://www.ncbi.nlm.nih.gov/pubmed/24018513.
6. Haug A, Arlbjorn JS. (2010). Barriers to master data quality, Journal of Enterprise Information Management. 24(3):288–303. Crossref.
7. Khatri V, Brown C. (2010). Designing data governance, Communications of the ACM. 53(1):148–52. DOI: Crossref. https://dl.acm.org/citation.cfm?doid=1629175.1629210
8. Marsh J. (2005). Drowning in dirty data? It's time to sink or swim: A four-stage methodology for total data quality management, Journal of Database Marketing and Customer Strategy Management. 105–12. Crossref.
9. Mayer-Schonberger V, Cukier K. (2013). Big data: A revolution that will transform how we live, Work and Think. London: John Murray. https://www.amazon.in/Big-Data-Revolution-Transform-Think/dp/0544227751
10. Mosley M. (2013, Feb). The Data Management Association. Functional Framework, DAMA International News. www.dama.org.
11. Petter S, DeLone W, McLean E. (2013). Information systems success: The quest for the independent variables, Journal of Management Information System. 7–61. Crossref
12. Aymen Salah A El-Enien. (2013). Efficient electricity markets. IEEE Explore Digital Library. DOI: Crossref http://ieeexplore.ieee.org/document/6652391/
13. Seddon P. (2005). Are ERP systems a source of competitive advantage, Strategic Change. 14(5):283–93. DOI: 10.1002/jsc.729. Crossref.
14. Sklenka-Gordon K. (2017, May 16). Understanding 7 key risk areas when optimizing your ERP implementation. ERP News. www.erpnews.com
15. Smallwood R. (2015). Information governance: Concept, strategies and best practices. Wiley Smith S. (2016). Deloitte. Deloitte center for energy solutions. www.deloitte.com/us/energysolutions.
16. Sucha M. (2014, June). Beyond the hype: Data management and data governance. Canadian Library Association.
17. Valasai GD, Uqaili MA, Memon HU. Samoo SR. Mirjat NH, Harijan K. (2015). Overcoming electricity crisis in Pakistan: A review of sustainable electricity options, Renewable and Sustainable Energy Reviews. 734–45.
18. Walsham G, Sahay S. (2006). Research on information systems in developing countries: Current landscape and future prospects, Information Technology for Development. 12(1):7–24. Crossref
19. Xu H, Horn Nord J, Brown N, Nord G. (2002). Data quality issues in implementing ERP, Industrial Management and Data Systems. Crossref
20. Yeh C.-H, Xu Y. (2013). Managing critical success strategies for an enterprise resource planning project, European Journal of Operational Research. 604–14. Crossref