MASTER DATA MANAGEMENT ADOPTION MODEL IN MALAYSIA LOCAL GOVERNMENT

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DEDICATION

Alhamdulillah

This thesis is dedicated to:

My beloved parents Mohamed Ali and Rahila Haneem
My beloved parents-in-law Basri and Warniah
My other half Muhammad Sufyan bin Basri and all my lovely children

For their endless encouragement, support and sacrifice which I owe them my all.

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ABSTRACT

Master Data Management (MDM) is an approach for effective management of shared master data across organizations. MDM consolidates and integrates master data from multiple organizations to the central platform and publishes the centralized data to the authorized applications across different organizations. In the Malaysian public sector, few MDM initiatives have been developed, however, the adoption by local government remains slow. In addition, there have been limited studies on the MDM adoption. Hence, research is needed to investigate determinants that influence the MDM adoption by local government. This research aims to develop a model of determinants that influence the MDM adoption by local government. The research started with the identification of problem and knowledge gaps by reviewing existing MDM literature and MDM adoption reports in Malaysia. Then, two Systematic Literature Review (SLR) were conducted to identify potential determinants influencing the MDM adoption by local government. Based on the SLR results and with the underpinning theory of Technology-Organization-Environment framework, Diffusion of Innovation and Fit-Viability Model, a conceptual model was developed and verified by five experts. Next, a survey instrument was developed through content validity test with eleven experts and was pilot test with 30 respondents. Subsequently, data collection was conducted from local government department units in Malaysia and 224 responses were analysed to validate the conceptual model using Partial Least Square-Structured Equation Modelling analysis. The model validation revealed that six determinants of technological (complexity, quality of master data), organizational (data governance, top management support, technology competence) and environmental (citizen demand) have significant effects on MDM adoption by Malaysian local government, with p-value < 0.05. Surprisingly, three determinants of technological (relative advantage, data security) and environmental (government policy) are found to have non-significant effects on the adoption of MDM by local government with p-value > 0.05. In addition, top management support appeared as a cornerstone of MDM technological competence, with p-value < 0.05. Moreover, this research also confirmed the positive relationship between citizen demand and MDM adoption by Malaysian local government will be stronger when citizen population density is high, with $p < 0.01$ and the moderating effect of 0.1. To evaluate the developed model, a set of guidelines and strategy of MDM adoption for the Malaysian public sector were then developed and reviewed by MDM practitioners. Overall, this research contributes to the theoretical, contextual and practical knowledge of MDM and information technology adoption in the context of local government.

ABSTRAK

Pengurusan Data Induk (MDM) merupakan pendekatan bagi pemusatan dan perkongsian data merentas pelbagai organisasi. MDM mengumpul dan mengintegrasi data-data induk daripada pelbagai organisasi ke platform pusat dan menawarkan data berpusat tersebut kepada aplikasi-aplikasi yang dibenarkan di pelbagai organisasi. Dalam sektor awam Malaysia, walaupun beberapa inisiatif MDM telah berjaya dibangunkan, namun kadar penerimagunaan oleh kerajaan tempatan menunjukkan kadar yang sangat perlahan. Tambahan pula, kajian tentang penerimagunaan MDM adalah terhad. Oleh itu, kajian untuk meyelidik penentu yang mempengaruhi penerimagunaan MDM oleh kerajaan tempatan amat diperlukan. Kajian ini bertujuan untuk membangunkan model bagi penentu yang mempengaruhi penerimagunaan MDM oleh kerajaan tempatan. Kajian ini dimulakan dengan penyataan masalah dan jurang pengetahuan dengan mengkaji kajian MDM terdahulu dan laporan-laporan penerimagunaan MDM di Malaysia. Kemudian, dua Sorotan Kajian yang Sistematik (SLR) telah dijalankan untuk mengenal pasti penentu yang mempengaruhi penerimagunaan MDM oleh kerajaan tempatan. Berdasarkan hasil SLR dan penggunaan teori kerangka kerja Teknologi-Organisasi-Persekitaran (TOE), Penyebarluasan Pembaharuan (DOI) dan Model Kebolehhidupan-Berpadan, model konseptual kajian telah dibangunkan dan disemak oleh lima orang pakar. Kemudian, instrumen soal selidik telah dibangunkan melalui ujian pengesahan kandungan oleh sebelas orang pakar dan ujian rintis bersama 30 orang responden. Setelah itu, pengumpulan data dilaksanakan ke atas pihak berkuasa tempatan di Malaysia dan 224 maklum balas telah dianalisis untuk mengesahkan model konseptual menggunakan Pemodelan Persamaan Berstruktur-Kuasa Dua Terkecil Separa. Pengesahan model mendapati bahawa enam penentu teknologi (kompleksiti, kualiti data induk), organisasi (tadbir urus data, sokongan pengurusan atasan, kecekapan teknologi) dan persekitaran (permintaan rakyat) mempunyai kesan yang signifikan ke atas penerimaan MDM oleh kerajaan tempatan Malaysia, dengan nilai $p < 0.05$. Manakala, tiga penentu, iaitu teknologi (kelebihan relatif, keselamatan data) dan persekitaran (dasar kerajaan) didapati mempunyai kesan tidak signifikan ke atas penerimagunaan MDM oleh kerajaan tempatan Malaysia dengan nilai $p > 0.05$. Di samping itu, sokongan pengurusan atasan dinyatakan sebagai asas kecekapan teknologi MDM, dengan nilai $p < 0.05$. Selain itu, kajian ini juga mengesahkan hubungan positif antara permintaan rakyat dengan penerimagunaan MDM oleh kerajaan tempatan Malaysia akan menjadi lebih kuat apabila ketumpatan populasi rakyat adalah tinggi, dengan $p < 0.01$ dan kesan moderasi sebanyak 0.1. Untuk menilai model yang telah dibangunkan, satu set garis panduan dan strategi penerimagunaan MDM untuk sektor awam Malaysia telah dibangunkan dan disemak oleh pengamal MDM. Keseluruhannya, kajian ini memberi sumbangan kepada teori, konteks, dan praktikal tentang penerimagunaan MDM dan Teknologi Maklumat dalam konteks kerajaan tempatan di negara membangun.

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LIST OF ABBREVIATIONS

AGFI	-	Adjusted Goodness of Fit Index
AVE	-	Average Variance Extracted
BLESS	-	Business Licensing Electronic Support System
CB-SEM	-	Covariance-based-Structural Equation Modelling
CFI	-	Comparative Fit Index
CMV	-	Common Method Variance
CVI	-	Content Validity Index
CVR	-	Content Validity Ratio
DAMA	-	Data Management Association
DGOB	-	Data Governance Oversight Board
DMBOK	-	Data Management Body of Knowledge
DOI	-	Diffusion of Innovations
ePBT	-	Electronic Pihak Berkuasa Tempatan
ERP	-	Enterprise Resource Planning
GDP	-	Gross Domestic Product
GFI	-	Goodness of Fit Index
HTMT	-	The heterotrait-monotrait ratio of correlations
ICT	-	Information and Communication Technology
IQR	-	Interquartile Range
IT	-	Information Technology
IS	-	Information Systems
MAMPU	-	Malaysian Administrative Modernisation and Management Planning Unit
MDM	-	Master Data Management
MOOCs	-	Massive open online courses
NFI	-	Normed Fit Index
OLS	-	Ordinary Least Squares
PLS-SEM	-	Partial Least Squares-Structural Equation Modelling
RMSEA	-	Root Mean Square Error of Approximation
ROI	-	Return on Investment

SE	-	Standard Error
SEM	-	Structural Equation Modelling
SLR	-	Systematic Literature Review
SPSS	-	Statistical Package for the Social Sciences
TOE	-	Technology-Organization-Environment
VIF	-	Variance Inflation Factor

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CHAPTER 1

INTRODUCTION

1.1 Overview

Recently, the volume of data in most organizations has increased dramatically due to the use of advanced technology to capture data in various formats. Most of the existing structured data formats can be classified into master data, transactional data, metadata, history data, and queue data. Among these categories, master data are the highest priority data to be managed. Master data contain valuable information about the organization (Nelke *et al.*, 2015). In the public sector, master data consist of core information of the organization, such as customer profiles, services and products, and service provider profiles. Usually, each government organization has its own master data stored in the database in silos and hard-coded in the integration layer for data exchange (Bonnet, 2013). This situation leads to the duplication of master data across various government organizations, which may negatively affect the organizations due to higher costs and data management complexity.

Therefore, one of the government initiatives to reduce the data duplication, increase data quality, enable broader data integration, and eliminate redundant integration activities is the establishment of Master Data Management (MDM) (Buffenoir & Bourdon, 2012; Gomede & Barros, 2013; Loshin, 2009; Shin, 2006). MDM involves identifying, consolidating, and integrating master data from multiple data sources from different organizations into central data repository (Anand *et al.*, 2014; Baghi, Schlosser, Ebner, Otto, & Oesterle, 2014). Using MDM, master data from multiple organizations, which potentially are valuable across government organizations are identified and consolidated in a central repository. This repository is served as a 'single source of truth' by many applications across organizations (Anand *et al.*, 2014; Baghi *et al.*, 2014; Spruit & Pietzka, 2014). Thus, government agencies do not need to capture and manage same master data in their own environment. They

can refer to the central repository that provides highly accurate and easily accessible information about citizens, organizations, employees, programs, and services as required by many government organizations for decision making and other government programs.

Relatively in the Malaysian public sector, several MDM initiatives have been established. However, the adoption rate by the Malaysian government organizations in sharing their master data to the MDM central data repository indicates a very slow progress, particularly by Malaysia local government. The slow adoption of the MDM possibly is due to the critical challenges that the organizations may expose during the adoption of MDM such as technological, organizational, and environmental challenges (Berson & Dubov, 2011; Haug, Arlbjorn, Zachariassen, & Schlichter, 2013; Silvola, Risto, Jaaskelainen, Kropsu-Vehkapera, & Haapasalo, 2011). Therefore, this research aims to develop, validate and evaluate a new model of determinants that influence the MDM adoption by Malaysia local government in order to understand what facilitates local government organizations in Malaysia to adopt MDM initiatives.

This chapter gives an overview and introduction of this thesis. First, the chapter provides a research background (Section 1.2, page 2) including the background of MDM, Malaysia local government, and MDM adoption scenario by Malaysia local government organizations. Second, it introduces the problem background (Section 1.3, page 13) and states the problem of the research (Section 1.4, page 15). Third, it then highlights research questions (Section 1.5, page 16) and research objectives (Section 1.6, page 17). Fourth, it outlines the significance of the research (Section 1.7, page 17) and the scope of the research (Section 1.8, page 20). Finally, the chapter describes the structure of the thesis content (Section 1.9, page 22).

1.2 Background of the Research

This section explains the research background, in particular, MDM background (Section 1.2.1, page 3) which include MDM in the body of the knowledge, the implementation of MDM in public sector, and MDM in the Malaysian Government

Online Services Gateway model. In addition, the section describes the Malaysia local government environment (Section 1.2.1, page 3).

1.2.1 Master Data Management (MDM)

According to the Data Management Body of Knowledge (DMBOK) by Data Management Association (DAMA), MDM is classified as one of the data management key functions (DAMA, 2009), which refers to the overall management of shared data across disparate business units or organizations. Figure 1.1 shows the MDM position in DMBOK (DAMA, 2009). MDM is not just a technology; it comprises technology, people, and processes to create, maintain and manage the master data at a central level (Dreibelbis *et al.*, 2008). MDM is an emerging Information Systems (IS) research topic which experiencing a hype phenomenon similar to other technologies, such as Enterprise Resource Planning (ERP) and Data Warehouses (Scheidl, 2011).

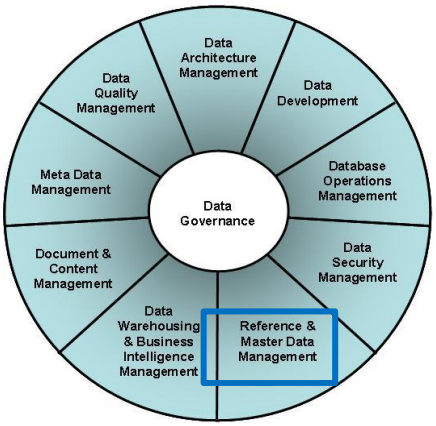

Figure 1.1 MDM in DMBOK (DAMA, 2009)

Technology Priority Matrix of Hype Cycle for Enterprise Information Management by Gartner (2015) stated that the MDM implementation gives a high benefit to the organization. Figure 1.2 depicts the Technology Priority Matrix of Hype Cycle for Enterprise Information Management. It is noteworthy that the organization commonly requires from five to ten years to adopt MDM after the technology being introduced.

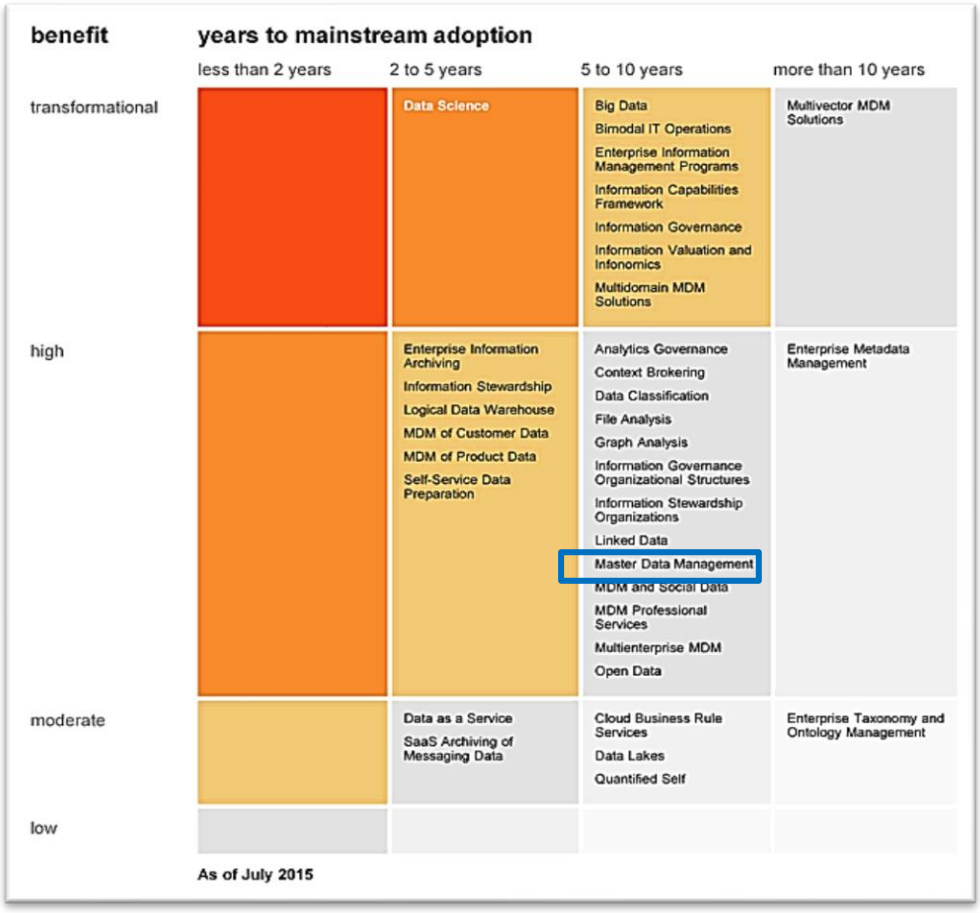

Figure 1.2 MDM in Technology Priority Matrix (Gartner, 2015)

The important role of MDM has been acknowledged when the amount of data has promptly increased, and they are often managed independently in various systems and databases. Many organizations stored the same master data in their various systems and database. This situation leads to data quality problems such as duplication, inaccuracy, and incompleteness (Smith & McKeen, 2008). With MDM that serve as 'single reference of truth', the benefits of the implementation is inevitable. Shin (2006) argued that MDM implementation would give four major advantages to the organisation such as; 1) improve the organisation's ability to adjust to the rapidly changing business requirements, 2) improve the operational efficiency by streamlining the business processes and improving the data quality, 3) improving information management efficiency by enabling broader and more complex data integration, eliminating redundant data management practices and eliminating redundant integration activities, and 4) improve decision-making by enabling data quality improvements and simplifying data integration.

Realizing the advantages of MDM, several MDM initiatives have been developed in public sector to achieve the highest level of e-government, i.e. horizontal integration. According to Layne and Lee (2001), e-government initiatives should be derived and implemented based on four stages: cataloguing, transaction, vertical integration, and horizontal integration. The highest stage of e-government can only be accomplished by horizontally integrating government services across different functions, such as business units and organizations. Thus, data from different databases will be shared across the public sector, so that information obtained by one organization will circulate throughout all government functions. To achieve the highest level of e-government, the public sector in developed countries have established various MDM initiatives, such as Australian Business Licence and Information Service (https://ablis.business.gov.au), New Zealand Education Services Single Windows (http://services.education.govt.nz), and Health Patient Single Portal (https://www.health.govt.nz/our-work/ehealth/other-ehealth-initiatives/patient-portals), among others. MDM is established in the UK Public Sector, in which the National Health Service has funded an MDM project in 2016 to encourage data connection across various related organizations within healthcare domain (Mathieson, 2017).

Being a developing country, with a significant progress made in the development and utilization of various Information and Communication Technology (ICT) agendas, Malaysia highly supports the MDM initiatives. This is shown in the Malaysian Government Online Services Gateway Model (MAMPU, 2016a) initiated by the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) acting as a leading agency for public sector's transformation, through the ICT best practices. The MDM has been positioned in the heart of the Malaysian Government Online Services Gateway model (MAMPU, 2016a) to allow horizontal information sharing and integration across multiple organizations. Master data centralization and integration from various sources takes place through data sharing between data provider organizations (e.g. central, state, and local government) and MDM repositories. The centralized master data in MDM are consumed by multiple data consumers' applications (e.g. business, education, and health clusters) through data brokers for the establishment of government online services. Figure 1.3 presents

the elements of the Malaysian Government Online Services Gateway model (MAMPU, 2016a).

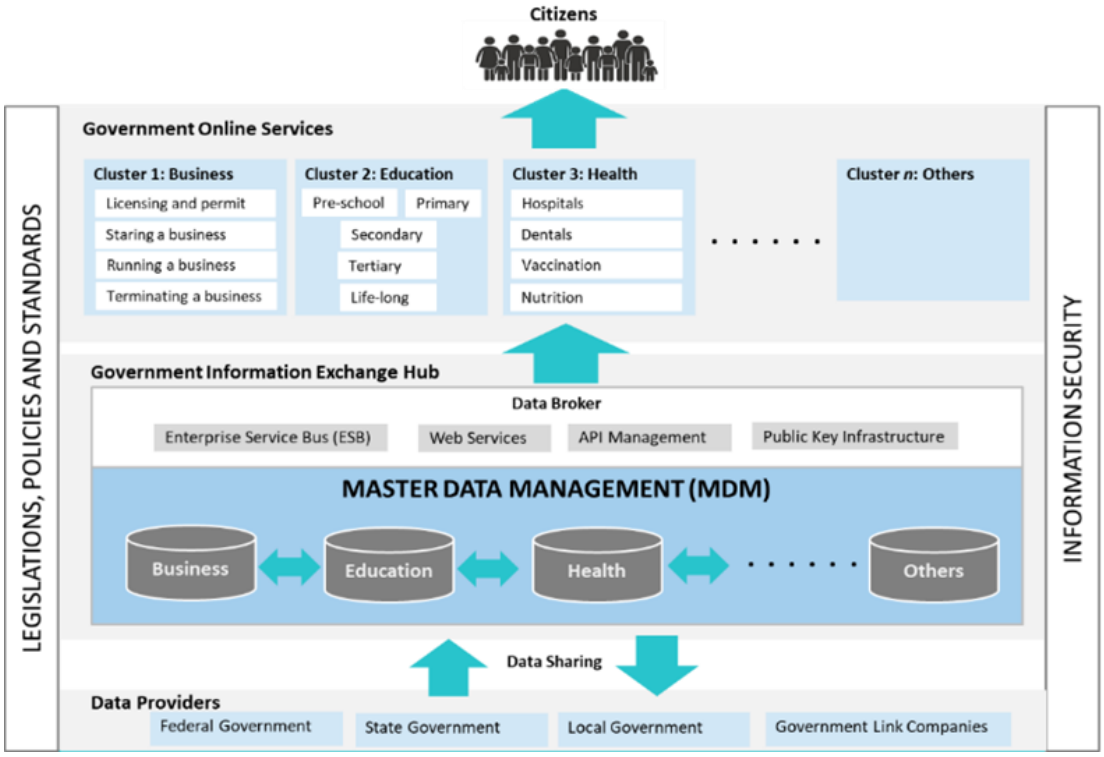

Figure 1.3 Malaysian Government Online Services Gateway Model (MAMPU 2016a)

Previous MDM initiatives, namely Business Licensing Electronic Support System (BLESS) and Electronic Pihak Berkuasa Tempatan (ePBT) have been developed in Malaysian public sector involving the local government as the main data provider. BLESS is an MDM initiative developed for the business cluster by the Malaysian Implementation Coordination Unit in 2008, which aims to provide a one-stop center for firms or individuals to apply for business licenses in Malaysia (ICU, 2017). Master data for business licensing information from licensor agencies are consolidated into BLESS to facilitate services, wherein any application and inquiry from the citizen about business licensing can be made via a single portal. On the other hand, ePBT is an MDM initiative developed by the Ministry of Urban Wellbeing, Housing and Local Government of Malaysia in 2007 to consolidate data about accounts, taxation, application submission and complaints services from Malaysia local government organizations (KPKT, 2017b). The ePBT aims to simplify the

processes for citizens by providing a single access to online services across local government in Malaysia. Master data from participating local government are consolidated into the ePBT so that any inquiry, application, and complaint from the citizen can be made via a single access.

1.2.2 Malaysia Local Government

Local government is one of the organizations in the public owned and run by the government besides federal, provincial and state. In the Malaysian public sector, local government organizations play an important role as data providers to the MDM initiatives. Malaysia local government is responsible for serving the Malaysians on public utilities, enforcement, businesses licensing, public health, cleaning and waste management, social services and development, and environmental issues. In Malaysian context, local government also known as local authority, is the lowest level of public administration within a specific state (United Nations, 2005). Malaysia has a total landmass of 330,803 square kilometers, separated by the South China Sea into two similarly sized regions, namely Peninsular Malaysia, and East Malaysia including Sabah and Sarawak. Currently, there is a total of 155 Malaysia local government organizations which include 13 city councils, 39 municipal councils, 97 district councils and 6 special councils (Johor State Government 2017, KPKT Selected Statistics 2015). City councils typically have more than 500,000 people, municipality councils have between 150,000 and 500,000 people, and district and special councils have less than 150,000 people. Table 1.1 presents the number of local government organizations in each Malaysian state, based on city, municipality, district, and special council.

Table 1.1 Number of local government organizations in Malaysia

State	City Council	Municipality Council	District Council	Special council	Total
Johor	1	6	8	2	17
Kedah	1	3	7	1	12
Kelantan	0	1	11	0	12
Malacca	1	3	0	0	4
Negeri Sembilan	0	3	5	0	8
Pahang	0	3	8	1	12
Penang	1	1	0	0	2
Perak	1	4	10	0	15
Perlis	0	1	0	0	1
Terengganu	1	2	4	0	7
Selangor	2	6	4	0	12
Sabah	1	2	21	0	24
Sarawak	3	3	20	0	26
W.P Kuala Lumpur	1	0	0	0	1
W.P Labuan	0	0	0	1	1
W.P Putrajaya	0	0	0	1	1
Total	13	39	97	6	155

Malaysia local government organizations are defined according to Local Government Act 1976 for Peninsular Malaysia, Local Governments Ordinance 1996 for the state of Sarawak, and Local Government Ordinance 1961 for the state of Sabah. For Peninsular Malaysia, local government refers to “any City Council, Municipal

Council or District Council, whereas the Federal Territory refers to the Commissioner of the City of Kuala Lumpur appointed under section 4 of the Federal Capital Act 1960 [Act 190]" (Malaysia, 1976). Local government in Sarawak refers to "(a) a City Administration as identified in Part I of the First Schedule; (b) a Municipal Council as identified in Part II of the First Schedule; and (c) a District Council as identified in Part III of the First Schedule; Bintulu Development Authority has been inserted in the above-mentioned sub-section (b)" (Malaysia, 1996). While local government in Sabah refers "any District Council, Town Board or Municipal Council established under the provisions of Section 3" (Malaysia, 1961). The distribution of local government locations on Malaysia's map is presented in Figure 1.4. The full list of 155 Malaysia local government organizations by state is presented in Appendix A.

Malaysia local government organizations in each state are generally under the purview of the state government and are also subjected to the purview of Ministry of Urban Wellbeing, Housing, and Local Government. In contrast, three local government organizations in federal territories are exclusively subjected to the purview of Ministry of Rural and Regional Development. Figure 1.5 shows the reporting structure of local government organizations in Malaysia. With regards to the core businesses, Malaysia local government typically consists of four core functions in their organizations: corporate management, town planning and development, engineering and maintenance, and town service. These core businesses are handled by one or more departments in the organization, depending on the number of citizens in the local government. Corporate management involves human resource management, valuation and financial, information management, corporate planning and administration matters. Town planning is responsible for city planning, building control, infrastructure planning and economic planning. Engineering and maintenance include engineering, project implementation, landscape and quantity surveying. Town service comprises of enforcement, business licensing and petty traders, health and environment, culture and tourism.

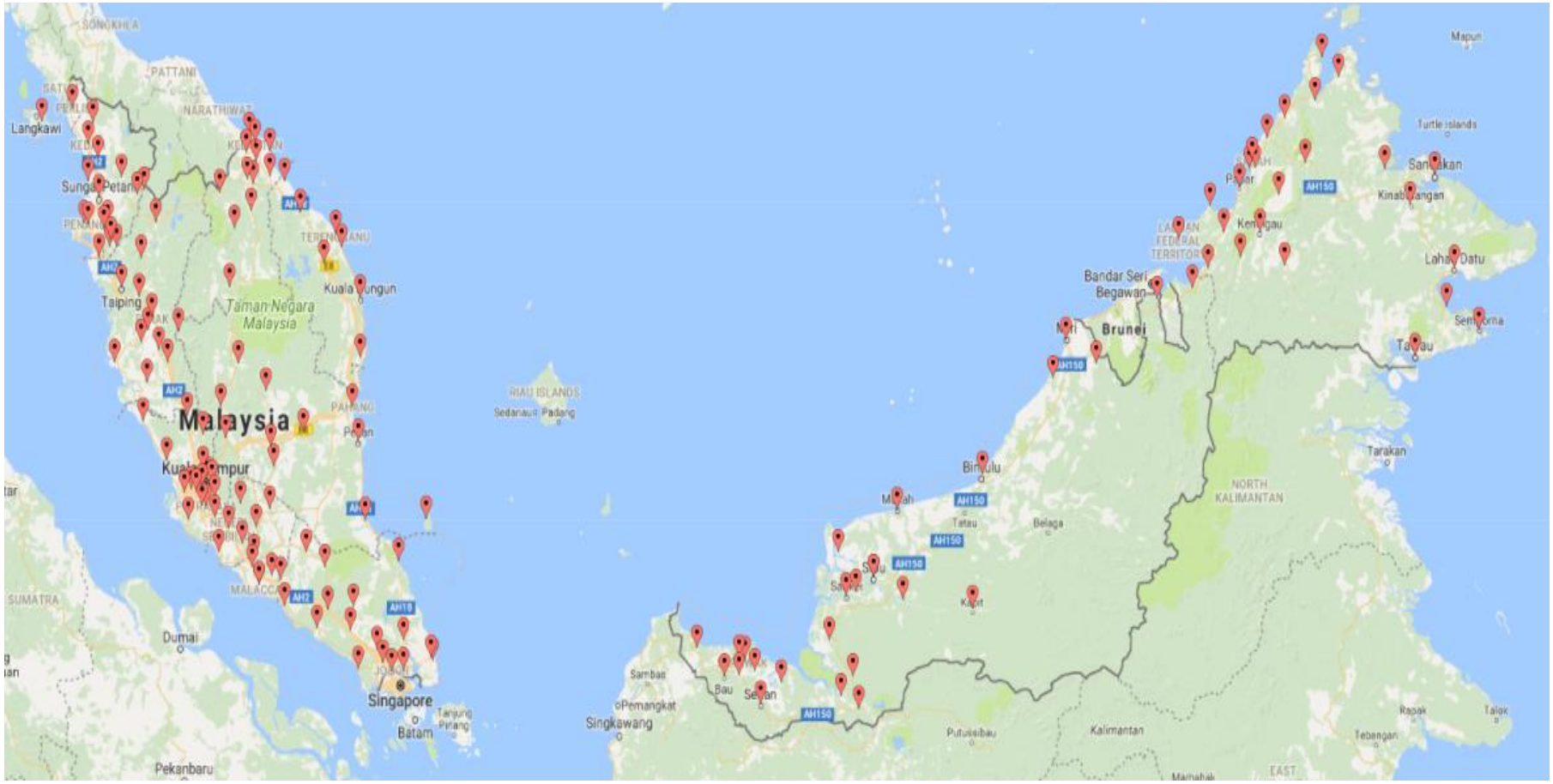

Figure 1.4 Distribution of Malaysia local government organizations on Malaysia's map

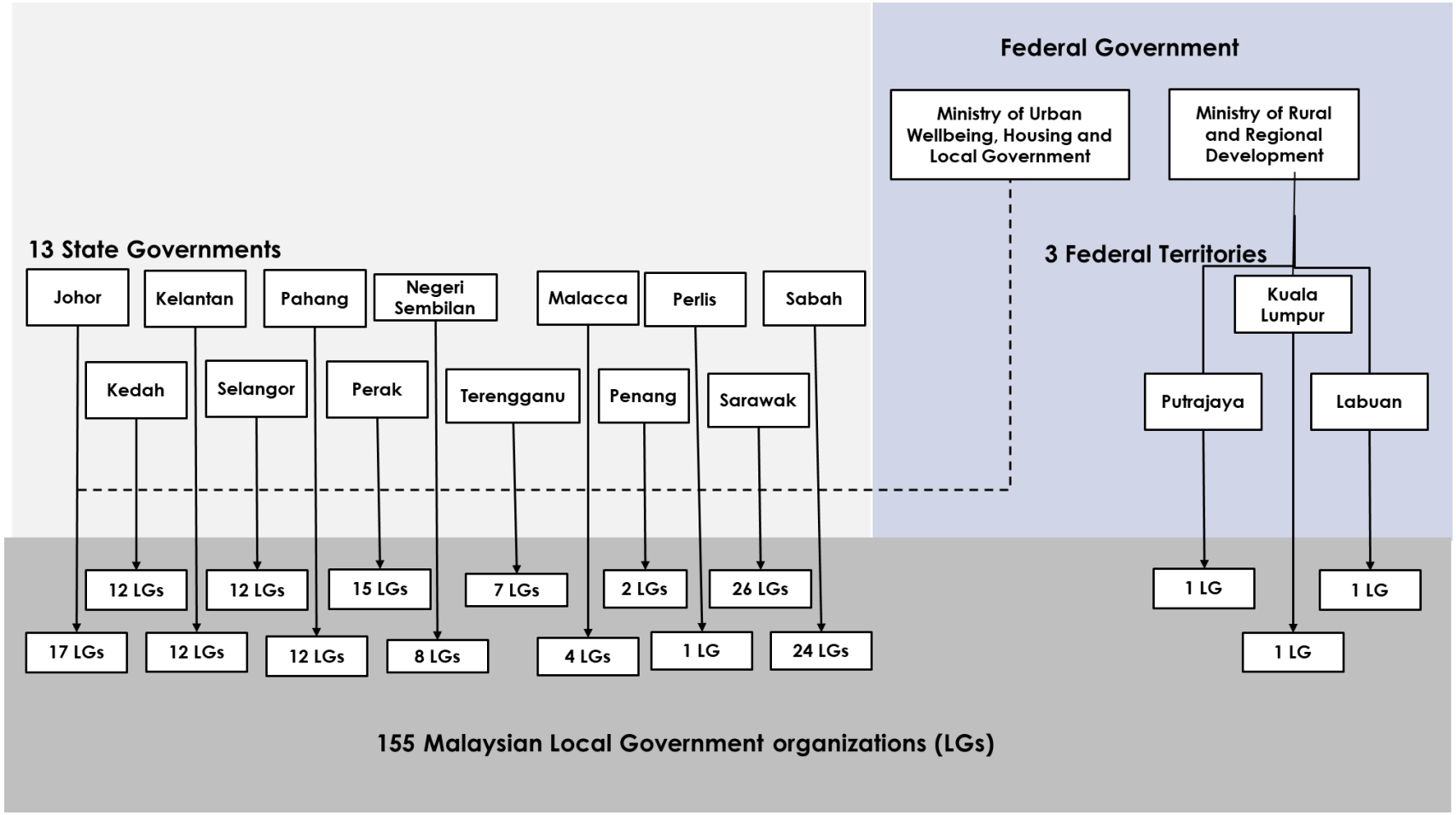

Figure 1.5 Reporting structure of Malaysia local government

Malaysian population density is measured by three levels: low, medium, and high, depending on the number of the citizen served by each local government organization (McCullough *et al.*, 2015; Rubin *et al.*, 2014). With regards to the citizen proportion of the Malaysia local government organizations, this research classified a citizen density of Malaysia local government into 'low' when less than 100,000 people, 'medium' when it is between 100,000 to 3000,000 people, and 'high' when more than 3000,000 people served by the local government. The number of citizen served by each local government in Malaysia is retrieved from the electronic data bank of Department of Statistics, Malaysia (DOSM, 2010). Table 1.2 outlines the number of Malaysia local government organizations based on high, medium, and low population density.

Table 1.2 Citizen population density of Malaysia local government

Citizen population density	**Number of Malaysia local government organizations**
High (more than 3000,000 people)	23 organizations
Medium (100,000 – 3000,000 people)	51 organizations
Low (less than 100,000 people)	81 organizations
Total	155 organizations

As organizations that directly deal with citizens, local government organizations own significant valuable master data which can be shared across government agencies, including citizen profile, business registration and licensing, and town development plan. Hence, the adoption of MDM by Malaysia local government organizations by sharing and providing their master data to the MDM repository is highly important.

1.3 Problem Background

The adoption of MDM by organizations has remained at moderate rate, despite the outward benefits of the MDM (O'Kane, White, Judah, Friedman, & De Simoni, 2014). In Malaysian public sector, although earlier MDM initiatives have been successfully developed, the adoption rate by the government organizations, particularly local government in providing their master data to the MDM, is growing very slowly. After ten years operation of BLESS and ePBT, very few local government organizations have participated in these initiatives, only 3% (ICU, 2009, 2010, 2011, 2012, 2013, 2014, 2015) and 40% (KPKT, 2017b) respectively. This slow adoption might be due to the critical technological, organizational, individual and environmental challenges that the organizations may encounter at the adoption stage of MDM (Berson & Dubov, 2011; Haug *et al.*, 2013; Silvola *et al.*, 2011).

According to Falco and Kleinhans (2018), local government organizations have difficulties in adopting new innovations or digital platforms. Given the slow pace of MDM adoption, the public sector may have difficulty in capturing the value from their investments in the development of strategic information systems i.e. MDM (Rezvani, Dong, & Khosravi, 2017). In addition, the slow rate of MDM adoption by local government affects service delivery to customers, since information and services from different public sector organizations are not seamless (Ndou, 2004). An MDM initiative requires inter-organizational adoption to ensure the successful implementation. Particularly in the public sector, MDM needs the adoption of multiple organizations, such as federal, state, and local governments to provide their master data to the MDM repository. Hence, it is vital to understand the factors that influence the MDM adoption in Malaysia local government context.

Although there has been an increasing interest in MDM research, there has been very little research directly investigating the causal relationship between determinants affecting MDM adoption and proposing definitive MDM adoption model. Results from various previous studies indicate that most of the MDM literature focused on the implementation stage as compared to the adoption stage, which have been examined extensively in the literatures. A number of previous studies include

MDM technical implementation (Baghi *et al.*, 2014; Otto, Hüner, & Österle, 2012; Otto, 2015), implementation approach (Vilminko-Heikkinen & Pekkola, 2013), maturity model (Spruit & Pietzka, 2014), implementation advantages and challenges (Alharbi, 2016; Piedrabuena, González, & Ruggia, 2015) have focused on MDM implementation rather than MDM adoption. Similarly, this trend is also consistent with the review study of e-government initiatives by Rana, Dwivedi, and Williams (2013) which maintained that e-government literature mostly started with the research on implementation and followed by the research on adoption. This is due to the adoption problem only being realized after certain period of time after the technology implementation was introduced. Taking this on board, we can state that as MDM is associated with e-government initiatives, hence, at current stage, further research is necessary to explore e-government adoption at the organizational level (Shareef, Kumar, Kumar, & Dwivedi, 2011).

In addition, there has been lack of quantitative approach in MDM extant research (Haug *et al.*, 2013). Most of the MDM studies are conceptual (Alharbi, 2016; Bonnet, 2013; Dreibelbis *et al.*, 2008; Duff, 2005; Loshin, 2009; Luh, Pan, & Wei, 2008), and qualitative in nature, involving interviews (Baghi *et al.*, 2014), focus groups (Otto *et al.*, 2012; Smith & McKeen, 2008), or case studies (Cleven & Wortmann, 2010; Otto, 2012; Otto & Schmidt, 2010; Silvola *et al.*, 2011; Spruit & Pietzka, 2014; Vilminko-Heikkinen & Pekkola, 2013). A recent study conducted by Vilminko-Heikkinen and Pekkola (2017) has identified the challenges of MDM in public sector, but the study only focused on the implementation stage. Furthermore, even though the context of the study is local government organizations, the study was based on a single qualitative case study. Another study by Alharbi (2016) also highlighted the challenges of MDM implementation, which include data governance, costs, and implementation style, but the findings are conceptual in nature and there was no any empirical work. A study by Haug *et al.* (2013) has outlined barriers to master data quality through MDM implementation. Even though the study has empirically validated with a very large sample, the study only involved 787 Danish manufacturing companies from the private sector, but not the public sector organizations. Thus, more quantitative research is suggested to be conducted to address the methodological gaps in the MDM field.

Particularly in the local government context, although many recent studies on Information Technology (IT) adoption have been carried out, there has been very little focus on MDM adoption. Most of the IT adoption studies investigate the adoption of social media (Anderson, Lewis, & Dedehayir, 2015a; Rubin *et al.*, 2014; Seigler, 2017; Sharif, Troshani, & Davidson, 2015), e-government (Jans *et al.*, 2016; Kamal, Hackney, & Sarwar, 2013; Norris & Reddick, 2013), e-services (Dijkshoorn, 2013; Lagrandeur & Moreau, 2014; Li & Feeney, 2014), and cloud computing (Ali, Soar, & Yong, 2016). This is probably because problems of MDM adoption are only being realized ten years after its establishment. Most of MDM initiatives were established in the years 2004 to 2009, and it takes approximately 5-10 years for an organization to successfully adopt MDM.

Therefore, to deal with the problem of MDM adoption by Malaysia local government and to address the knowledge gaps in MDM literature, it is vital to understand the determinants that influence the MDM adoption by Malaysia local government. The adoption is an essential phase of any innovation, which includes a mental preparation of the organization or individual from get-to-know the innovation to a decision to implement it (Hsu & Lin, 2015). The innovation process is inadequate if the creation or the final product is restricted just to the innovation initiator but is not embraced by others as well (Mannan & Haleem, 2017). Hence, this research aims to develop, validate and evaluate a new model of determinants that influence the MDM adoption by Malaysia local government organizations.

1.4 Problem Statement

Despite the crucial benefits of the MDM, the adoption rate by organizations has remained at moderate level. In Malaysian public sector, although earlier MDM initiatives have been successfully developed, the adoption rate by the government organizations, particularly local government in providing their master data to the MDM, is growing very slowly. One factor that leads to slow adoption rate of MDM in Malaysian public sector is the absence of guidelines and strategy on the MDM adoption. In addition, there have been limited studies on the MDM adoption in prior

research. The slowness of MDM adoption affects the public service delivery to the citizens, where information and services from different government organizations are not seamless to the citizens, due to the lack of data sharing and data integration among public sector organizations. Hence, it is vital to identify the determinants that influence the MDM adoption in local Malaysia government context.

This research aims to develop, validate and evaluate a new model of the determinants that influence the MDM adoption by Malaysia local government organizations. A rationale to the research motivation was based on the MDM adoption problem of Malaysia local government and knowledge gap analyses of the extant research as described in Section 2.5, page 77. The gap analyses advocate the development of a new MDM adoption model in three justifications: 1) MDM adoption is an underexplored topic in MDM literature, 2) there is a lack of literature on IT adoption exploring local government context in developing countries, and 3) there is lack of TOE research investigating inter-organizational adoption (e.g. MDM) and examining internal relationship between the variables within technological, organizational or environmental dimension. With the development, validation and evaluation of the proposed MDM adoption model in Malaysia local government, the research attempts to address the MDM adoption problem and the knowledge gaps.

1.5 Research Questions

To achieve the research aim, three research questions were formulated as follows:

(a) RQ1: What are the potential determinants that influence the MDM adoption in Malaysia local government?

(b) RQ2: What model can be used to explain determinants that influence the MDM adoption in Malaysia local government?

(c) RQ3: How to evaluate the developed MDM adoption model in Malaysia local government?

1.6 Research Objectives

To answer the formulated research questions, four research objectives were constructed. Those research objectives were defined in order to achieve the overall aim of this research, which is to develop, validate and evaluate a new model of determinants that influence the MDM adoption by Malaysia local government organizations. Table 1.3 associates each research question and its research objectives.

Table 1.3 Research questions and research objectives

Research Questions	Research Objectives
RQ1: What are the potential determinants that influence the MDM adoption by Malaysia local government?	RO1: To identify the potential determinants that influence the MDM adoption by Malaysia local government
RQ2: What model can be used to explain determinants that influence the MDM adoption by Malaysia local government?	RO2: To develop a new MDM adoption model in Malaysia local government
	RO3: To validate the developed MDM adoption model in Malaysia local government through a survey with local government organizations
RQ3: How to evaluate the developed MDM adoption model in Malaysia local government?	RO4: To evaluate the developed MDM adoption model in Malaysia local government by developing a set of guidelines and strategy for MDM adoption in Malaysia local government

1.7 Significance of the Research

The significance of this research is in three-fold: theoretical, contextual, and practical implication. First, the development of a new MDM adoption model of determinants that influence MDM adoption by Malaysia local government has contributed to the new theoretical findings in the field of MDM and IT adoption. This is done by incorporating the theory of TOE framework, Diffusion of Innovations, Fit-Viability Model, and related previous studies to examine the influential determinants of MDM adoption by Malaysia local government. These findings imply that six

determinants of technological (complexity, quality of master data), organizational (data governance, top management support, technological competence), and organizational (citizen demand) could hinder the MDM adoption by Malaysia local government.

As the TOE framework only defines the causal relationship between the constructs under each TOE dimension and IT adoption. This research extends this relationship by examining the internal relationships within the organizational dimension. This research revealed that top management support has influences on technological competence of MDM in Malaysia local government organizations, and this is consistent with the theory of Fit-Viability Model. This relationship appears to be a new addition to the knowledge by enriching the application of the TOE framework. Moreover, the research also contributes to the knowledge by introducing population density of local government as a moderator to the relationship between demand and MDM adoption by local government. Also, the quantitative approach using Partial Least Squares-Structural Equation Modelling (PLS-SEM) for the model validation has contributed to the MDM research area since most of MDM studies use qualitative approaches such as case studies and interviews (Silvola *et al.,* 2011; Spruit & Pietzka, 2014; Vilminko-Heikkinen & Pekkola, 2013). The quantitative approach is a structured way to make a generalization to the whole population (e.g. country or region) by examining the relationship between variables (Creswell, 2014). This research applies a quantitative approach using a survey and collected data from 176 local government departments in Malaysia to examine the relationships of determinants affecting MDM adoption. A total of 224 valid responses were analysed using PLS-SEM for measurement and structural analysis.

Second, the context of this research is Malaysia local government. Although there has been continuous interest in studying IT adoption in local government context in extant research, most of the studies were conducted in developed countries such as Australia, United States, United Kingdom, and Netherlands. It is surprising that the literature on IT adoption in developing countries is very limit. Hence, the findings of this research have addressed the knowledge gap by investigating the determinants of MDM adoption by local government in developing country, which is Malaysia.

Important to realize, quality of master data appeared to be a specific determinants that influence MDM adoption by local government in developing country. This is due to the lower quality of data in developing countries as opposed to the developed countries. Similarly, the moderation effect of population density on the relationship between demand and MDM adoption by local government revealed in this research also distinguished the importance of number of citizens or customers served by an organization in the adoption of IT in the context of developing countries. Hence, the results have a potential to be a reference for other research on IT adoption, particularly in the context of developing country.

Third, the result of this research has a valuable practical contribution. The involvement of MDM and local government practitioners in verifying the initial conceptual model, validating the survey instrument and reviewing the proposed guidelines and strategy has made the finding reliable to be used in real-world phenomena. In addition, to evaluate the developed MDM adoption model in Malaysia local government, this research proposed a set of guidelines and strategy of MDM adoption for the Malaysian public sector (see Appendix N). The proposed guidelines and strategy of MDM adoption will assist the MDM implementation in the Malaysian Public Sector. This is due to the intention of developing more MDM initiatives in the Malaysian public sector has been established in Eleventh Malaysia Plan, 2016-2020 published by The Economic Planning Unit (2016) and the Malaysian Public Sector ICT Strategic Plan 2016-2020 developed by MAMPU (2016b). The findings of this research would be beneficial for the MDM initiators, such as MAMPU, the Ministry of Urban Wellbeing, Housing and Local Government, the Ministry of Rural and Regional Development, and state government. MDM initiators could understand the key constructs that must be considered for MDM adoption so that the implementation of this technology can be widely accepted by local government and other organizations in the future.

1.8 Research Scope

The scope of this research is limited to the five main perspectives: IT adoption stage, IT adoption study, level of analysis, MDM cluster, and respondents. Table 1.4 shows the perspectives, perspective' types and scope applied in this research.

Table 1.4 Scope of the research

Perspective	Type	Scope of this research
IT adoption stage	i. Pre-adoption ii. Post-adoption	Pre-adoption
IT adoption study	i. Relational ii. Descriptive iii. Comparative	Relational
Level of analysis	i. Individual ii. Organization	Organization (department unit of Malaysia local government organizations)
MDM cluster	i. Business ii. Education iii. Health iv. Others	Business
Respondents	Department units of Malaysia local government organizations	i. Information Management Department ii. Town Planning Department iii. Business Licensing and Petty Traders Department

The MDM adoption as a dependant variable in this research refers to the intention of Malaysia local government to participate in sharing their master data as data sources to the MDM initiatives. Generally, IT adoption stages can be categorised into two stages of pre-adoption and post-adoption (Lin, 2014). Pre-adoption refers to the initial decision of the organizations to adopt IT innovation. On the other hand, post-adoption refers to the willingness of the organization to continue using the IT

innovation after the implementation stage (Kamal, 2006). This research focuses on the pre-adoption stage of MDM by Malaysia local government, particularly in business domain (i.e. business registration and licensing MDM initiatives).

The nature of this research is a relational study of IT adoption. According to Hanafizadeh, Keating and Khedmatgozar (2014), studies on IT adoption are typically classified into three categories, namely relational, descriptive, and comparative studies. Relational studies aim to investigate causal relationship of variables that influence IT innovation adoption. Descriptive studies identify the characteristic and opinion of IT adopters, adoption challenges, and characteristics of adoption. Whereas comparative studies analyse IT adoption by focusing on the evaluation of major variables, which comprises three sets of studies: population, distribution channel, and methods. This research applied relational approach to investigate the relationship between the independent variables; technological, organizational, and environmental determinants, and the dependant variable; MDM adoption by Malaysia local government.

This research investigates the determinants that influence the MDM adoption by Malaysia local government at the organizational level. IT adoption research mostly categorised into three main adoption levels, namely organizational, individual, and team level (Salahshour, Mehrbakhsh, & Dahlan, 2017). Organization term in this research refers to a department unit as an entity that consists a group of people to achieve the same mission, vision, strategies, and goals (Miles, 2012). The level of analysis in this research includes the departments of Malaysia local government organizations.

Based on the Malaysian Government Online Services Gateway model (Figure 1.3, page 6); MDM is classified into several clusters, such as business, education, and health. This research only focuses on MDM on the business cluster, in particular, the BLESS initiative. Business cluster is among the most important domains in the Malaysian public sector, which contributes to the ‘Doing Business’ assessment that includes the aspects of business regulation and their implications for firm establishment and operations (World Bank, 2018). Hence, the research only involved

department of Information Management, City Planning and Business Licensing and Petty Traders from 155 Malaysia local government bodies. The selection of these departments as potential respondents is based on the master data entity managed by these departments. These departments are responsible for managing master data regarding business registration and licensing. Sampling frame shows that there is a total of 465 departments of Information Management Department, Town Planning Department, and Business Licensing and Petty Traders Department from 155 Malaysia local government (Johor State Government 2017, KPKT Selected Statistics 2015).

1.9 Structure of the Thesis

This thesis is structured into seven chapters. Chapter 1 gives an overview of the research. It introduces the research background, which briefly introducing the MDM, the Malaysia local government, and MDM adoption scenario by Malaysia local government organizations. It then provides the problem background and problem statement of the research, research questions, and research objectives. And finally outlines the significance of the research and the research scope.

Chapter 2 review the literature and highlights the knowledge gaps in extant research to justify the novelty of this research. The chapter starts with a discussion of the key concepts by explaining the key terms. Subsequently, the chapter reviews related theories of IT adoption at the organizational level. Then, the chapter describes two systematic literature review (SLR) that have been conducted to identify related works within MDM research area and IT adoption in local government context. The chapter analyses a knowledge gap of previous studies to justify the rationale of the current research and proposes a conceptual model for a new MDM adoption model for Malaysia local government. At the end of the chapter, an initial conceptual model is proposed by discussing the theoretical underpinning and matrix analysis between two SLR.

Chapter 3 discusses the research methodology followed for the overall research process to fulfil the research objectives and obtain the expected outcomes. It begins

with a discussion of research philosophy, research roadmap design, and research stages. Chapter 4 explains the process of the conceptual model development. It discusses the expert verifications on the initial conceptual model, research hypotheses, and operational definition.

Chapter 5 presents the empirical data analysis of the research. First, initial preparation is described, including response rate analysis, data cleaning, non-response bias test, common method bias test, and normality test. Second, descriptive analysis of the demographics is presented. Third, the measurement model analysis is discussed, including internal consistency reliability, convergent validity, and discriminant validity. Fourth, the structural model analysis is discussed, including the collinearity, path coefficient, coefficient of determination, effect size, and blindfolding and predictive relevance. Fifth, since this research involves assessing the moderating effect of population on the relationship between citizen demand and MDM adoption, a moderation analysis is also presented. At the end of the chapter, the summary of hypotheses testing is presented.

Chapter 6 presents the discussion of empirical findings of Chapter 5 and model evaluation process. The discussion of determinants of MDM adoption by Malaysia local government is discussed with regards to the technological, organizational, and environmental dimensions. Moreover, moderating effect of population on the relationship between citizen demand and MDM adoption is also elaborated. In evaluating the proposed MDM adoption model in Malaysia local government, the research suggests a set of guidelines and strategy of MDM adoption to the Malaysian public sector. The guidelines and strategy development and validation are discussed in Chapter 6. Finally, Chapter 7 concludes the thesis. It summarizes the findings according to the research objectives, and then it describes the research implications, research limitations followed by recommendations for future research.

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Appendix A

List of Malaysia Local Government Organizations

State	No.	Local Governments	Total
Johor	1	Johor Bahru City Council	17
	2	Iskandar Puteri City Council	
	3	Batu Pahat Municipal Council	
	4	Kluang Municipal Council	
	5	Kulai Municipal Council	
	6	Muar Municipal Council	
	7	Pasir Gudang Municipal Council	
	8	Kota Tinggi District Council	
	9	Labis District Council	
	10	Mersing District Council	
	11	Pontian District Council	
	12	Segamat District Council	
	13	Simpang Renggam District Council	
	14	Tangkak District Council	
	15	Yong Peng District Council	
	16	Pengerang Local Authority (Johor Corporation)	
	17	Johor Tenggara Town Board	
Kedah	18	Alor Setar City Council	12
	19	Kulim Municipal Council	
	20	Sungai Petani Municipal Council	
	21	Langkawi Municipal Council	
	22	Baling District Council	
	23	Bandar Baharu District Council	
	24	Kubang Pasu District Council	
	25	Padang Terap District Council	
	26	Pendang District Council	
	27	Sik District Council	
	28	Yan District Council	
	29	Kulim Hi-Tech Industrial Park Local Authority	
Kelantan	30	Kota Bharu Municipal Council	12
	31	Bachok District Council	
	32	Gua Musang District Council	
	33	Ketereh District Council	
	34	Dabong District Council	

	35	Kuala Krai District Council	
	36	Machang District Council	
	37	Pasir Mas District Council	
	38	Pasir Puteh District Council	
	39	Tanah Merah District Council	
	40	Tumpat District Council	
	41	Jeli District Council	
Malacca	42	Malacca Historic City Council	4
	43	Alor Gajah Municipal Council	
	44	Jasin Municipal Council	
	45	Hang Tuah Jaya Municipal Council	
Negeri Sembilan	46	Seremban Municipal Council	8
	47	Nilai Municipal Council	
	48	Port Dickson Municipal Council	
	49	Jelebu District Council	
	50	Jempol District Council	
	51	Kuala Pilah District Council	
	52	Rembau District Council	
	53	Tampin District Council	
Pahang	54	Kuantan Municipal Council	12
	55	Temerloh Municipal Council	
	56	Bentong Municipal Council	
	57	Cameron Highlands District Council	
	58	Jerantut District Council	
	59	Lipis District Council	
	60	Maran District Council	
	61	Pekan District Council	
	62	Raub District Council	
	63	Rompin District Council	
	64	Bera District Council	
	65	Tioman Development Authority	
Penang	66	Penang Island City Council	2
	67	Seberang Perai Municipal Council	
Perak	68	Ipoh City Council	15
	69	Manjung Municipal Council	
	70	Kuala Kangsar Municipal Council	
	71	Taiping Municipal Council	
	72	Teluk Intan Municipal Council	
	73	Kampar District Council	

	74	Gerik District Council	
	75	Kerian District Council	
	76	Batu Gajah District Council	
	77	Lenggong District Council	
	78	Pengkalan Hulu District Council	
	79	Perak Tengah District Council	
	80	Selama District Council	
	81	Tanjong Malim District Council	
	82	Tapah District Council	
Perlis	83	Kangar Municipal Council	1
Terengganu	84	Kuala Terengganu City Council	7
	85	Kemaman Municipal Council	
	86	Dungun Municipal Council	
	87	Besut District Council	
	88	Hulu Terengganu District Council	
	89	Marang District Council	
	90	Setiu District Council	
Selangor	91	Shah Alam City Council	12
	92	Petaling Jaya City Council	
	93	Ampang Jaya Municipal Council	
	94	Kajang Municipal Council	
	95	Klang Municipal Council	
	96	Selayang Municipal Council	
	97	Subang Jaya Municipal Council	
	98	Sepang Municipal Council	
	99	Hulu Selangor District Council	
	100	Kuala Langat District Council	
	101	Kuala Selangor District Council	
	102	Sabak Bernam District Council	
Sabah	103	Kota Kinabalu City Hall	24
	104	Sandakan Municipal Council	
	105	Tawau Municipal Council	
	106	Beaufort District Council	
	107	Beluran District Council	
	108	Keningau District Council	
	109	Kinabatangan District Council	
	110	Kota Belud District Council	
	111	Kota Marudu District Council	

	112	Kuala Penyu District Council	
	113	Kunak District Council	
	114	Lahad Datu District Council	
	115	Nabawan District Council	
	116	Papar District Council	
	117	Penampang District Council	
	118	Ranau District Council	
	119	Semporna District Council	
	120	Sipitang District Council	
	121	Tambunan District Council	
	122	Tenom District Council	
	123	Tuaran District Council	
	124	Kudat Town Board	
	125	Pitas District Council	
	126	Putatan District Council	
Sarawak	127	Kuching Utara City Hall	26
	128	Kuching Selatan City Council	
	129	Miri City Council	
	130	Padawan Municipal Council	
	131	Sibu Municipal Council	
	132	Bintulu Development Authority	
	133	Bau District Council	
	134	Betong District Council	
	135	Dalat & Mukah District Council	
	136	Kanowit District Council	
	137	Kapit District Council	
	138	Lawas District Council	
	139	Sibu Rural District Council	
	140	Lubok Antu District Council	
	141	Maradong & Julau District Council	
	142	Lundu District Council	
	143	Marudi District Council	
	144	Matu & Daro District Council	
	145	Samarahan District Council	
	146	Saratok District Council	
	147	Sarikei District Council	
	148	Serian District Council	
	149	Simunjan District Council	
	150	Sri Aman District Council	

	151	Subis District Council	
	152	Limbang District Council	
W.P Kuala Lumpur	153	Kuala Lumpur City Hall	1
W.P Putrajaya	154	Putrajaya Corporation	1
W.P Labuan	155	Labuan Corporation	1
Total Number of Local Governments in Malaysia			**155**

Appendix B

Email to the Responsible Officer for Problem Clarification (ePBT Adoption Rate)

RE: Permohonan penyemakan maklumat pelaksanaan e-PBT bagi kajian penyelidikan

Mohamad Zubir bin Sidi <zubir.sidi@kpkt.gov.my>

Mon 8/28/2017 11:48 AM

To: FAIZURA HANEEM MOHAMED ALI <hmafaizura2@live.utm.my>;

Cc: MOHD NAZRI BIN KAMA <mdnazri@utm.my>; fhaneem@gmail.com <fhaneem@gmail.com>;

Assalamualaikum,

Puan,

Dengan segala hormatnya saya merujuk kepada emel puan di bawah.

2. Daripada senarai yang puan berikan, setelah di tolak MP Kuantan, hanya 60 PBT yang masih menggunakan sistem ePBT. Manakala tiada perancangan peluasan sistem ePBT ke PBT lain kerana PBT lain telah menggunakan sistem yang mereka bangunkan sendiri.

Sekian, terima kasih.

MOHAMAD ZUBIR BIN SIDI
Penolong Pengarah
Bahagian Pengurusan Maklumat,
Jabatan Kerajaan Tempatan,
Kementerian Kesejahteraan Bandar, Perumahan & Kerajaan Tempatan
Telefon : 03 - 8891 3218
Faksimili : 03 - 8891 3198

From: FAIZURA HANEEM MOHAMED ALI [mailto:hmafaizura2@live.utm.my]
Sent: Thursday, 24 August, 2017 10:55 AM
To: Mohamad Zubir bin Sidi <zubir.sidi@kpkt.gov.my>
Cc: MOHD NAZRI BIN KAMA <mdnazri@utm.my>; fhaneem@gmail.com
Subject: Permohonan penyemakan maklumat pelaksanaan e-PBT bagi kajian penyelidikan

Assalamualaikum En. Zubir,

Dengan segala hormatnya saya merujuk kepada perbualan telefon kita sebentar tadi.

Untuk makluman tuan, saya Faizura Haneem merupakan Pegawai Teknologi Maklumat (PTM) yang sedang menyambung pengajian Doktor Falsafah di Universiti Teknologi Malaysia, Kuala Lumpur dalam bidang Sistem Maklumat. Latar belakang penyelidikan saya adalah berkenaan adaptasi sistem maklumat oleh Pihak Berkuasa Tempatan. Bagi membantu kajian penyelidikan saya, amatlah diharapkan pihak Jabatan Kerajaan Tempatan dapat membantu dalam perkara berikut di bawah.

Berdasarkan **Buku "Memperkasa Penyampaian Perkhidmatan PBT Menerusi Penggunaan ICT"** yang diterbitkan oleh MAMPU pada **tahun 2013, m/s 16 dan m/s 23 (rujuk lampiran)**, ePBT telah melalui beberapa fasa pelaksanaan. Sebahagian statistik penggunaan ada dinyatakan di dalam buku tersebut. Bagi membantu kajian penyelidikan saya, amatlah diharapkan pihak tuan dapat **menyemak ketepatan dan menyalurkan maklumat tambahan** yang diperlukan dalam Jadual seperti di dalam Lampiran.

Kerjasama pihak tuan amat saya hargai dan saya dahului dengan ucapan terima kasih.

Faizura Haneem,
Universiti Teknologi Malaysia,
0192718144

Appendix C

Initial Conceptual Model Verification Questionnaire

(Please refer to the next page)

AN ADOPTION MODEL OF MASTER DATA MANAGEMENT FOR LOCAL AUTHORITIES IN MALAYSIA

Introduction:

As part of my doctoral study, you are kindly invited to validate the proposed determinants of Master Data Management (MDM) adoption by local government organizations in Malaysia. MDM enables an establishment of central repository of master data which involve the activities of data sharing, consolidation, and integration among different applications from various organizations. The examples of MDM initiatives in Malaysia are: Business Licensing Electronic Support System (BLESS), and e-Pihak Berkuasa Tempatan (ePBT).

Objectives:

From the literature review conducted, the following model is the initial conceptual model of determinants affecting Master Data Management adoption by Malaysia local government. The determinants are categorized into three main dimensions which are technological, organizational, and environmental. This questionnaire will ask you opinion:

1. To **rate the relevancy of each construct in the model** by rating from 1-5.
2. To give a feedback on **the initial conceptual model of determinants affecting Master Data Management adoption by Malaysia local government**

The success of this survey greatly depends on your participation. Your cooperation is highly appreciated as it is beneficial to both academia and industry.

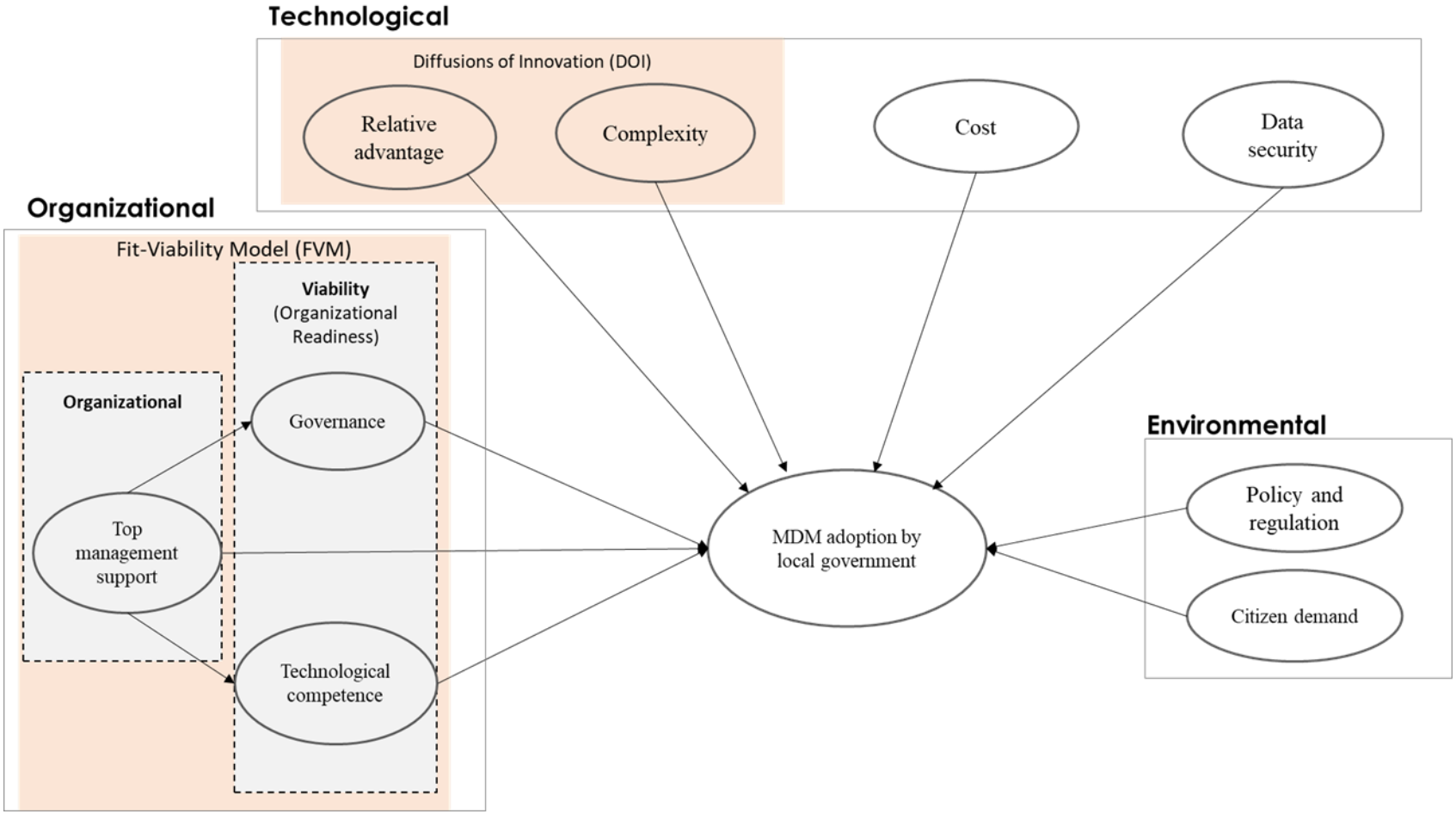
Thank You.

Faizura Haneem binti Mohamed Ali, PAN 153002
Advanced Informatics School
Universiti Teknologi Malaysia
Supervisor: Associates. Prof. Dr. Mohd Nazri bin Kama
Co-Supervisor: Dr. Rosmah binti Ali

RESEARCH DEFINITION

Term	Definition	References
Master Data Management (MDM)	A management of shared master data at central level to reduce redundancy and ensure better data quality through a set of processes, governance and technology. It aims to serve data as a 'single reference of truth' to the consumers by consolidating and integrating the master data from multiple data sources into a central repository.	(Cervo and Allen 2011; DAMA 2009; Dreibelbis *et al.*, 2008)
MDM adoption by local government	The intention of local government organizations in Malaysia to participate in sharing their master data to the MDM innovations such as BLESS and ePBT application	(Rogers, 1995)
Technological Dimension	The characteristics of the MDM which includes the benefits, equipment complexity, data security, and cost to adopt it.	(Tornatzky & Fleischer 1990; Wisdom, Chor, Hoagwood, & Horwitz, 2014)
Organizational Dimension	The measures about the organization which include governance, top management support, technology competency, and sufficient resources.	(Tornatzky & Fleischer, 1990; Wisdom *et al.*, 2014)
Environmental Dimension	The condition of fields in organization conducts its business which include government policies and citizen demand.	(Tornatzky & Fleischer, 1990; Wisdom *et al.*, 2014)

Proposed/Initial Conceptual Model - Determinants of Master Data Management Adoption by Malaysia local government



No.	Items/Questions	Relevancy				
		1	2	3	4	5
M-1	Do you agree that **Relative Advantage** is positively influence Malaysia local government to adopt MDM innovations?					
M-2	Do you agree that **Complexity** is negatively influence Malaysia local government to adopt MDM innovations?					
M-3	Do you agree that **Cost** is positively influence Malaysia local government to adopt MDM innovations?					
M-4	Do you agree that **Data Security** is positively Malaysia local government to adopt MDM innovations?					
M-5	Do you agree that **Governance** is positively influence Malaysia local government to adopt MDM innovations?					
M-6	Do you agree that **Top Management Support** is positively influence Malaysia local government to adopt MDM innovations?					
M-7	Do you agree that **Top Management Support** is positively influence **Data Governance** and **Technological Competence** in Malaysia local government to adopt MDM innovations?					
M-8	Do you agree that **Technological Competency** is positively influence Malaysia local government to adopt MDM innovations?					
M-9	Do you agree that **Policy and Regulation** that support MDM innovation is positively influence Malaysia local government to adopt MDM innovations?					
M-10	Do you agree that **Citizen Demand** on MDM innovation is positively influence Malaysia local government to adopt MDM innovations?					
Comments/Suggestions to improve the conceptual model based on Malaysia local government context:						

Appendix D Cover Letter of Content Validity Invitation (Sample)

UTM UNIVERSITI TEKNOLOGI MALAYSIA | Advanced Informatics School (AIS)

Advanced Informatics School
Level 5, Menara Razak
Universiti Teknologi Malaysia
Jalan Semarak
54100 Kuala Lumpur, Malaysia

Tel: +(6)03-21805192 Fax: +(6)03-21805370 http://www.ais.utm.my Email: enquiry_ais@ic.utm.my

OUR REF.: UTM.K.38/13.11/1/1 Jld. 20 (49) 5 October 2017

Prof. T Ramayah
Professor, Operations Management Section
School of Management (SOM)
Universiti Sains Malaysia
11800 USM Penang

Dear Prof. T Ramayah,

CONTENT VALIDITY BY EXPERT

The above matter is kindly referred.

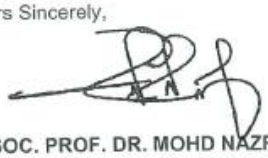
2. I would like to inform that **Faizura Haneem binti Mohamed Ali (PAN153002)** is a registered post-graduate student of Advanced Informatics School, Universiti Teknologi Malaysia and currently under my supervision in conducting the research regarding **Master Data Management**.

3. With your expertise, we would like to request your service to validate the content of the research instrument. The confidentiality of your response is assured and it is only be used to support the research.

Your kind cooperation is highly appreciated. Thank you.

"BERKHIDMAT UNTUK NEGARA"

Yours Sincerely,



ASSOC. PROF. DR. MOHD NAZRI BIN KAMA
Deputy Dean (Research, Innovation, Commercialization & Networking)
Advanced Informatics School (AIS)
UTM Kuala Lumpur
☎ : 03-2180 5274
: 03-2180 5370
✉ : mdnazri@utm.my

Appendix E

Content Validity Survey Form

(Please refer to the next page)

AN ADOPTION MODEL OF MASTER DATA MANAGEMENT FOR LOCAL AUTHORITIES IN MALAYSIA

Introduction:

As part of my doctoral study, you are kindly invited to validate the proposed determinants of Master Data Management (MDM) adoption by local government organizations in Malaysia. MDM enables an establishment of central repository of master data which involve the activities of data sharing, consolidation, and integration among different applications from various organizations. The examples of MDM initiatives in Malaysia are: Business Licensing Electronic Support System (BLESS), and e-Pihak Berkuasa Tempatan (ePBT).

Objectives:

From the literature review conducted, the following items are the influencing determinants of MDM adoption by the local government. The determinants are categorized into three main dimensions which are **technological, organizational, and environmental**. This survey will ask you opinion:

1. To **rate the relevancy of each measurement item** by rating from 1-5.
2. To give a **suggestion** for each construct in terms of the **measures, words that are difficult to comprehend, duplicate meanings, vocabulary, and long sentences.** The actual survey will involve respondents from Local Government organizations in Malaysia (senior executives and above).

The success of this survey greatly depends on your participation. Your cooperation is highly appreciated as it is beneficial to both academia and industry.

Thank You.

Faizura Haneem binti Mohamed Ali, PAN 153002
Advanced Informatics School
Universiti Teknologi Malaysia
Supervisor: Associates. Prof. Dr. Mohd Nazri bin Kama
Co-Supervisor: Dr. Rosmah binti Ali

RESEARCH DEFINITION

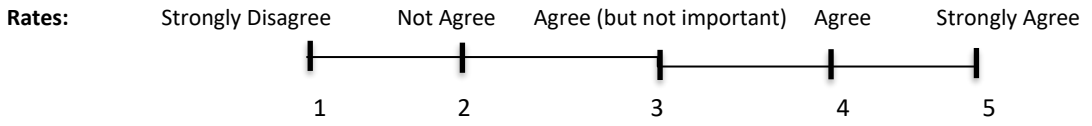
Term	Definition	References
Master Data Management (MDM)	A management of shared master data at central level to reduce redundancy and ensure better data quality through a set of processes, governance and technology. It aims to serve data as a 'single reference of truth' to the consumers by consolidating and integrating the master data from multiple data sources into a central repository.	(Cervo and Allen 2011; DAMA 2009; Dreibelbis *et al.*, 2008)
MDM adoption by local government	The willingness of Malaysia local government to participate in sharing their master data to the MDM innovations	(Rogers, 1995)
Technological Dimension	The characteristic of the MDM innovation which relevant to the organization	(Tornatzky and Fleischer 1990; Wisdom, Chor, Hoagwood, & Horwitz, 2014)
Organizational Dimension	The resources characteristic and linking structure of the personnel of the organization which related to the MDM innovation	(Tornatzky & Fleischer, 1990; Wisdom *et al.*, 2014)
Environmental Dimension	The arena in which the organization conducts its business	(Tornatzky & Fleischer, 1990; Wisdom *et al.*, 2014)

Please read each item and give any comment for its relevance for the survey instrument.

SECTION A: RESPONDENT PROFILE

No.	Items/Questions	Comment(s)
A1	Name of Local Government organization/ local authority: ……	
A2	State: ……..	
A3	Number of citizen population served by the organization (leave if you are not sure): …… persons	
A4	Designation Category o Top Management o Executive and above o Non-Officer o Others, please specify ……	
A5	Department: …….	
A6	Working Experience in Local Governments o None/Fresh Graduate o 1-5 Years o 6-10 Years o 11 Years and Above	
A7	Working Experience in data management o None/Fresh Graduate o 1-5 Years o 6-10 Years o 11 Years and Above	
A8	Select master data that you are currently managing/have once managed: o Customer's profile o Agency's profile o Assets profile o Geographic data (GIS) o Agency's products and services. Please specify : ……. o Others. Please specify: ……..	
A9	My organization has adopted one of Master Data Management innovation in Malaysia (i.e. BLESS) - Yes - No	

Please read each item and rate it for its relevance in representing the factor. Please give comments and tick (√) at the number from **1 to 5** as indication of the level of your argument with the statement. The agreement scale of **Relevancy** are:



SECTION B: TECHNOLOGICAL DIMENSION

RA	**Relative Advantage**
Definition	The degree of the MDM innovation could improve service delivery, provide better communication, reduce data management cost, providing timely decision-making, and reduce data quality issue.
Adapted from	(Premkumar & Roberts, 1999) (Vilminko-Heikkinen & Pekkola 2013)

No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
RA1	Implementing MDM will increase the profitability of my organization through service delivery improvement					
RA2	Adoption of MDM will provide timely information for decision-making					
RA3	Data duplication in my organization will be reduced as my organization can refer to the MDM for other related master data without having to create some new ones					
RA4	The MDM will allow my organization to cut costs in our data management operations since common master data are managed by the central repository					
RA5	The MDM will improve the data quality in my organization through data sharing with other public organizations					
Comments/Suggestions:						

Sub Section CX	**Complexity**
Definition	The degree of organization difficulty to understand and implement the MDM innovation
Adapted from	(Premkumar & Roberts, 1999) (Loshin, 2009)

No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
CX1	Identifying master data of my organization that can be shared with MDM is difficult					

CX2	Master data of my organization need to undergo a complex data cleansing process before being shared with MDM					
CX3	Integrating MDM innovation in our current work practices will be very difficult					
CX4	The skills required to use MDM are too complex for our employees.					
Comments/Suggestions:						

Sub Section DQ	**Quality of Master Data**					
Definition	The degree of completeness, uniqueness, timeliness, validity, accuracy, and consistency of master data at the local government organization					
Adapted from	(DAMA UK Working Group, 2013)					
No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
DQ-1	Master data in my organization are complete					
DQ-2	Master data in my organization are not duplicate					
DQ-3	Master data in my organization are up-to-date					
DQ-4	Master data in my organization are valid					
DQ-5	Master data in my organization are accurate					
DQ-6	Master data in my organization are consistent					
Comments/Suggestions:						

Sub Section DS	**Data Security**					
Definition	The degree to which MDM innovation could preserve data confidentiality, integrity and availability					
Adapted from	(Soliman & Janz, 2004) (Hristidis *et al.*, 2010) (Smallwood, 2014)					
No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
DS1	Data exchange between my organization and central repository of the MDM requires a secured communication medium					

DS2	In the MDM repository, data is safeguarded from unauthorized changes					
DS3	In the MDM repository, sensitive master data is protected from those who should not have access to it					
DS4	MDM requires disaster management to protect data in the MDM repository from any disaster					
DS5	The data exchange transactions between my organization and MDM need to have digital signature verification					
Comments/Suggestions:						

SECTION C: ORGANIZATIONAL DIMENSION

Sub Section DG	**Data Governance**					
Definition	The strategy of organization in terms of defining operation procedures, roles and responsibilities in steering the MDM innovation					
Adapted from	(Hung *et al.*, 2014) (Smallwood 2014)					
No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
DG1	The stakeholder's organization, data owner, and data stewardship for the MDM implementation will be identified					
DG2	The achievement of MDM comes from the ongoing responsibility taken					
DG3	The MDM implementation will identify the accountability of decision making					
DG4	My organization will follow the systematic procedure for dealing with changes caused by the implementation of MDM					
DG5	My organization will certainly define the business cases for every initiative or application of the MDM					
DG6	My organization will clearly define a measure to evaluate the impact of adopting MDM					
Comments/Suggestions:						

Sub Section TS	Top Management Support
Definition	The degree of top management to create a supportive environment and providing adequate financial and human resources for the adoption of MDM innovation
Adapted from	(Premkumar & Roberts, 1999)

No.	Items/Questions	Relevancy				
		1	2	3	4	5
TS1	Top management in my organization is highly interested in using MDM					
TS2	Top management in my organization is aware of the benefits of MDM for the future success of the organization					
TS3	Top management in my organization has allocated adequate financial and human resources for the development and operation of MDM					
TS4	Top management has the vision to project in my organization as a leader in the promotion of MDM					

Comments/Suggestions:

Sub Section TC	Technological Competency
Definition	The degree of organization capability which includes IT infrastructure and human resources availability in terms of expertise, skills and sufficient number of personnel to adopt and implement the MDM innovation.
Adapted from	(Lin, 2006) (Wang & Wang, 2016)

No.	Items/Questions	Relevancy				
		1	2	3	4	5
TC1	The ICT infrastructure for supporting applications integration with MDM is available in my organization					
TC2	My organization contains a high level of MDM innovation knowledge					
TC3	My organization contains a high level of MDM innovation acceptance					
TC4	My organization is dedicated to ensuring the employees' expertise in MDM technology					
TC5	The IT expertise of the personnel in my organization is good					
TC6	My organization will provide sufficient business personnel to implement MDM					

Comments/Suggestions:

SECTION D: ENVIRONMENTAL DIMENSION

Sub Section GP	**Government Policy**
Definition	The existence of government fundamental policies or standard for the MDM adoption or implementation by the organization
Adapted from	(M. Allen & Delton Cervo, 2015) (Lian *et al.*, 2014) (Kuan & Chau, 2001)(Awa & Ojiabo, 2016)

No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
GP1	Government has established a policy to support data sharing among government organizations					
GP2	Government has established a data quality management policy					
GP3	Current laws and regulations are insufficient to protect my organization's interest					
GP4	MDM innovation has been established as one of the aims in the 11th Malaysia Plan					
GP5	The government needs to establish data security policies in the operation of MDM					
Comments/Suggestions:						

Sub Section CD	**Citizen Demand**
Definition	The extant of citizen demand towards the MDM innovation
Adapted from	(Wang & Feeney, 2016)

No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
CD1	Citizens demand an integrated service among local government departments from my organization					
CD2	Citizens can easily use the online services that provide services across multiple local governments units					
CD3	Silo management of services across local government authorities will lower citizen trust in local government					
CD4	Citizens have very high demand for integrated, timely, and quick information through online web and mobile					
Comments/Suggestions:						

SECTION E: ADOPTION OF MASTER DATA MANAGEMENT INNOVATION

Sub Section MA	**MDM Adoption**
Definition	The willingness of Malaysia local government to participate in sharing their master data to the MDM innovations
Adapted from	Awa, H. O., Awa, H. O., Ojiabo, O. U., & Ojiabo, O. U. (2016)

No.	**Items/Questions**	**Relevancy**				
		1	**2**	**3**	**4**	**5**
MA1	My organization will adopt MDM to improve service delivery					
MA2	My organization will adopt MDM to improve data quality management					
MA3	My organization will adopt MDM to improve operational efficiencies and reduce operational costs					
MA4	My organization will adopt MDM to improve inter-organizational data exchange					
MA5	My organization will adopt MDM to reduce data duplication among government organizations					
MA6	My organization will adopt MDM to improve operation integration across agencies					
Comments/Suggestions:						

---------- END OF QUESTIONNAIRE ----------

Thank You

Appendix F

Content Validity Confirmation

To Whom it May Concern,

CONFIRMATION BY EXPERT

The above matter is kindly referred.

2. This is to confirm my participation in the evaluation of the research model and item's relevancy to the research instrument in the study of **Master Data Management** by **Faizura Haneem binti Mohamed Ali (Matrix No. : PAN 153002)** from **Advanced Informatics School, Universiti Teknologi Malaysia.**

Thank You.

Signature, Name & Designation:

Profesor Ramayah Thurasamy
Pensyarah
Pusat Pengajian Pengurusan
Universiti Sains Malaysia

Date: 23-10-2017

Appendix G

Content Validity Ratio Analysis

No.	Item ID	E 1	E 2	E 3	E4	E 5	E 6	E 7	E 8	E 9	E 10	E 11	Relevant (score 4 or 5)	CVR	Decision on Item (Accept/ Reject)
Relative Advantage (T_RA)															
1	RA1	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
2	RA2	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
3	RA3	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
4	RA4	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
5	RA5	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
Complexity (T_CX)															
6	CX1	5	5	5	4	4	5	5	5	5	5	5	11	1	Accept
7	CX2	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
8	CX3	5	5	5	4	4	5	5	5	5	5	5	11	1	Accept
9	CX4	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
Quality of Master Data (T_DQ)															
10	DQ1	4	4	5	4	5	5	5	4	5	5	5	11	1	Accept
11	DQ2	4	4	5	4	5	5	5	4	5	5	5	11	1	Accept
12	DQ3	4	4	5	4	5	5	5	4	5	5	5	11	1	Accept
13	DQ4	4	4	5	4	5	5	5	4	5	5	5	11	1	Accept
14	DQ5	4	4	5	4	5	5	5	4	5	5	5	11	1	Accept
15	DQ6	4	4	5	4	5	5	5	4	5	5	5	11	1	Accept
Data Security (T_DS)															
16	DS1	4	5	5	4	5	5	5	5	5	5	5	11	1	Accept
17	DS2	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
18	DS3	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
19	DS4	4	5	5	4	5	5	5	5	5	5	5	11	1	Accept
20	DS5	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept

No.	Item ID	E 1	E 2	E 3	E4	E 5	E 6	E 7	E 8	E 9	E 10	E 11	Relevant (score 4 or 5)	CVR	Decision on Item (Accept/ Reject)
Data Governance (O_DG)															
21	DG1	4	5	5	4	5	5	5	5	5	5	5	11	1	Accept
22	DG2	5	5	4	4	5	5	5	5	5	5	5	11	1	Accept
23	DG3	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
24	DG4	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
25	DG5	5	5	5	4	5	5	5	5	5	5	5	11	1	Accept
26	DG6	5	5	1	4	5	5	5	5	5	5	5	10	0.82	Accept
Top Management Support (O_TS)															
27	TS1	4	4	5	4	5	5	5	5	5	5	5	11	1	Accept
28	TS2	5	4	5	4	5	5	5	5	5	5	5	11	1	Accept
29	TS3	5	4	5	4	5	5	5	5	5	5	5	11	1	Accept
30	TS4	5	4	5	4	5	5	5	5	5	5	5	11	1	Accept
Technological Competency (O_TC)															
31	TC1	5	4	5	4	5	5	5	5	5	4	5	11	1	Accept
32	TC2	5	4	5	4	5	5	5	5	5	4	5	11	1	Accept
33	TC3	5	4	5	4	5	5	5	5	5	4	5	11	1	Accept
34	TC4	5	4	2	4	4	5	5	5	4	4	5	10	0.82	Accept
35	TC5	5	4	4	4	4	5	5	5	4	4	5	11	1	Accept
36	TC6	5	4	4	4	4	5	5	5	5	4	5	11	1	Accept
37	TC7	5	4	4	4	4	5	5	5	5	4	5	11	1	Accept
Government Policy (O_GP)															
38	GP1	5	4	5	4	5	5	5	5	4	5	5	11	1	Accept
39	GP2	5	4	5	4	5	5	5	5	5	5	5	11	1	Accept
40	GP3	4	4	4	4	5	5	5	5	5	5	5	11	1	Accept
41	GP4	5	4	5	4	3	5	5	5	5	5	4	10	0.82	Accept
42	GP5	5	4	5	4	3	5	5	5	5	5	4	10	0.82	Accept
Citizen Demand (O_CD)															
43	CD1	5	5	5	4	4	5	3	5	5	5	5	10	0.82	Accept
44	CD2	5	5	5	4	4	5	3	5	5	5	5	10	0.82	Accept
45	CD3	5	5	4	4	4	5	3	5	5	5	5	10	0.82	Accept

No.	Item ID	E 1	E 2	E 3	E4	E 5	E 6	E 7	E 8	E 9	E 10	E 11	Relevant (score 4 or 5)	CVR	Decision on Item (Accept/ Reject)
46	CD4	5	5	4	4	4	5	3	5	5	5	5	10	0.82	Accept
MDM Adoption by Local Government (MA)															
47	MA1	4	4	5	4	4	5	5	4	5	5	5	11	1	Accept
48	MA2	4	4	5	4	4	5	5	4	5	5	5	11	1	Accept
49	MA3	4	4	5	4	4	5	5	4	5	5	5	11	1	Accept
50	MA4	4	4	5	4	4	5	5	4	5	5	5	11	1	Accept
51	MA5	4	4	5	4	4	5	5	4	5	5	5	11	1	Accept
52	MA6	4	4	5	4	4	5	5	4	5	5	5	11	1	Accept

Appendix H

Invitation Email for Instrument Translation

Invitation for expert review on research instrument

FAIZURA HANEEM MOHAMED ALI

Tue 10/24/2017 7:32 AM

Sent Items

To: iroslina.kl@utm.my <iroslina.kl@utm.my>;

Cc: MOHD NAZRI BIN KAMA <mdnazri@utm.my>;

1 attachments (103 KB)

TRANSLATION_CONTENT VALIDITY OF RESEARCH INSTRUMENT.docx;

Assalamualaikum Dr. Roslina Ibrahim,

My name is Faizura Haneem binti Mohamed Ali, a PhD candidate from AIS, UTM Kuala Lumpur under supervision of Prof Madya Dr. Nazri Kama. I would like to invite you for the expert review on the translation of my research instrument regarding adoption of Master Data Management by Local Authorities in Malaysia. The selection criteria is based on your expertise in Information Systems instrument development.

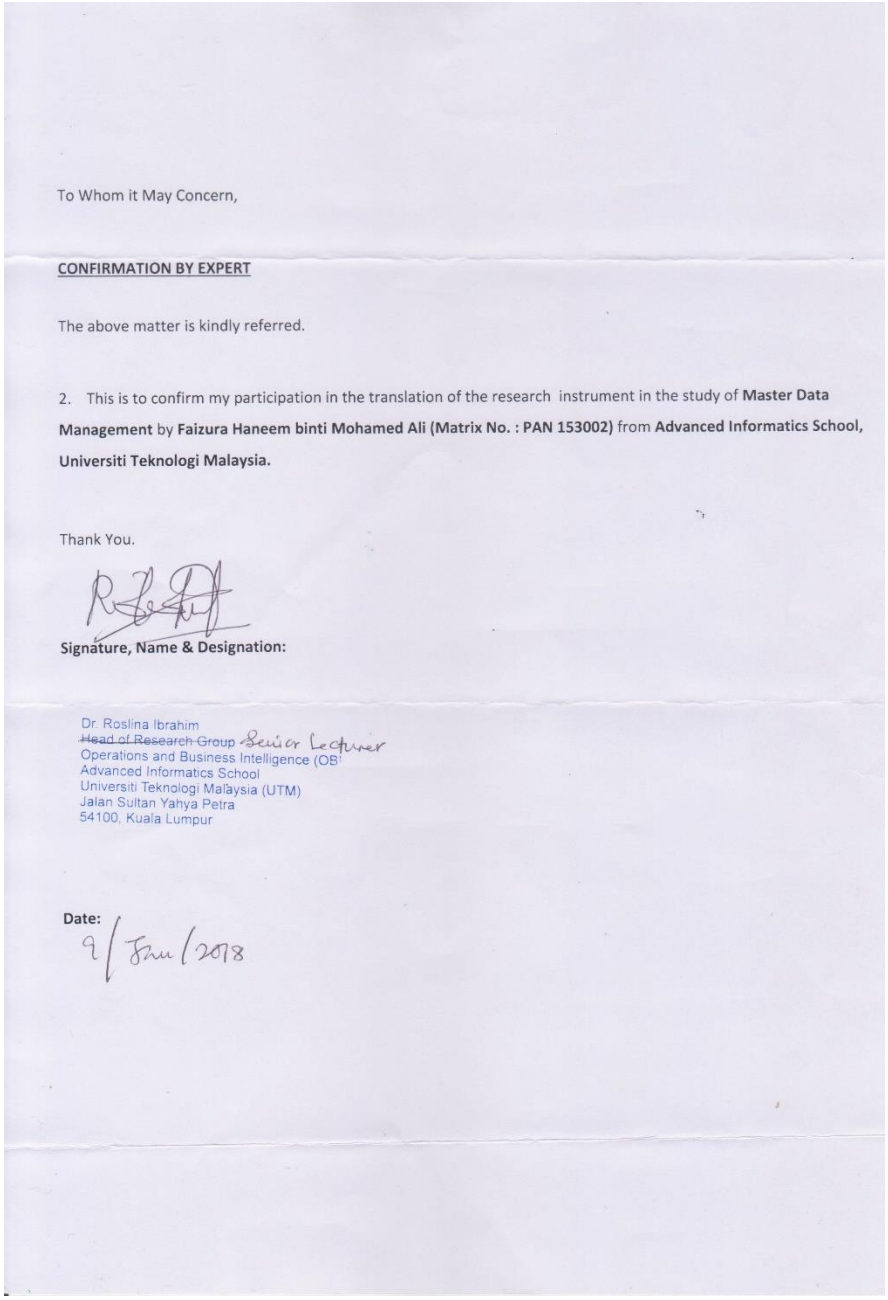
Here I attached the translation of the research instrument (draft) for your kind review. I'm looking forward for your feedback and your kind cooperation is highly appreciated.

Thank you.

Faizura Haneem,
PhD. candidate,
AIS, UTM Kuala Lumpur

Appendix I

Translation Confirmation from the Expert



To Whom it May Concern,

CONFIRMATION BY EXPERT

The above matter is kindly referred.

2. This is to confirm my participation in the translation of the research instrument in the study of **Master Data Management** by **Faizura Haneem binti Mohamed Ali (Matrix No. : PAN 153002)** from **Advanced Informatics School, Universiti Teknologi Malaysia.**

Thank You.

Signature, Name & Designation:

Dr. Roslina Ibrahim
~~Head of Research Group~~ Senior Lecturer
Operations and Business Intelligence (OBI
Advanced Informatics School
Universiti Teknologi Malaysia (UTM)
Jalan Sultan Yahya Petra
54100, Kuala Lumpur

Date:
9/Jan/2018

Appendix J

Survey Form - Malay Version

(Please refer to the next page)

SOAL SELIDIK BERKENAAN 'FAKTOR-FAKTOR YANG MEMPENGARUHI PENERIMAGUNAAN REPOSITORI RUJUKAN DATA BERPUSAT (RRDP) OLEH PIHAK BERKUASA TEMPATAN DI MALAYSIA

Y.Bhg. Prof./Prof. Madya/Dr./Tuan/Puan,

Saya merupakan seorang pelajar PhD. di Universiti Teknologi Malaysia, Kampus Kuala Lumpur (UTMKL) dan sedang menjalankan kajian mengenai faktor-faktor yang mempengaruhi penerimagunaan Repositori Rujukan Data Berpusat (RRDP) oleh Pihak Berkuasa Tempatan di Malaysia.

Repositori Rujukan Data Berpusat (RRDP) merupakan **repositori pusat** yang diwujudkan di peringkat pusat melalui pengumpulan **data-data utama** seperti profil pelanggan, aset, GIS, produk dan perkhidmatan daripada agensi-agensi kerajaan. RRDP boleh dirujuk oleh agensi-agensi kerajaan bagi mendapatkan data-data utama yang sah dengan cepat dan tepat. RRDP **mengurangkan duplikasi data dan memastikan pengurusan data yang lebih berkualiti** menerusi pengurusan proses yang sistematik, tadbir urus dan aplikasi teknologi.

Kaji selidik ini hanya akan mengambil masa kira-kira 10-15 minit dan ia hanya untuk tujuan akademik sahaja. Saya amat menghargai jika anda dapat menjawab kaji selidik ini sebelum 30 November 2017. Saya ingin mengucapkan terima kasih terlebih dahulu untuk penyertaan anda dalam kaji selidik ini dan kerjasama anda sangat dihargai.

Terima kasih.

Untuk maklumat lanjut, anda boleh menghubungi:

Faizura Haneem binti Mohamed Ali (PAN 153002)
Advanced Informatics School (AIS)
Universiti Teknologi Malaysia, Kampus Kuala Lumpur (UTMKL)
E-mail: fhaneem@gmail.com atau hmafaizura2@live.utm.my
Telefon: 019-2718144

Penyelia: Prof. Madya Dr. Mohd Nazri Kama, Timbalan Dekan
Advanced Informatics School (AIS)
Universiti Teknologi Malaysia, Kampus Kuala Lumpur (UTMKL)

SEKSYEN A: PROFIL RESPONDEN

<table>
<tr><td>Nama Agensi Pihak Berkuasa Tempatan:

……</td><td>Bahagian/ Jabatan:

……</td></tr>
<tr><td>Kumpulan Jawatan:
o Pengurusan Tertinggi
o Eksekutif
o Kumpulan Sokongan
o Lain-lain, sila nyatakan
……</td><td>Pengalaman bekerja di Pihak Berkuasa Tempatan:
o 11 tahun dan ke atas
o 6-10 tahun
o 1-5 tahun
o Kurang 1 tahun</td></tr>
<tr><td>Pengalaman dalam pengurusan maklumat/data:
o 11 tahun dan ke atas
o 6-10 tahun
o 1-5 tahun
o Kurang 1 tahun</td><td>Pilih data utama yang sedang diuruskan /pernah diurus oleh anda:
o Profil pelanggan
o Profil Aset
o Data Geografi (GIS)
o Produk dan perkhidmatan agensi
o Lain-lain. Sila nyatakan:
……
……..……..</td></tr>
<tr><td colspan="2">Agensi saya telah terlibat dalam perkongsian data dan penggunaan RRDP dalam domain pelesenan perniagaan seperti Business Licensing Electronic Support System (BLESS) – Inisiatif di bawah Unit Penyelarasan Pelaksanaan (ICU).
- Ya
- Tidak
- Tidak Pasti</td></tr>
<tr><td colspan="2">Populasi rakyat (anggaran) yang diuruskan oleh agensi:

…….. orang</td></tr>
</table>

SEKSYEN B: FAKTOR TEKNOLOGI

1-Amat Tidak Setuju 2-Tidak Setuju 3-Neutral 4-Setuju 5-Amat Setuju

No.	FAEDAH RRDP	1	2	3	4	5
RA-1	RRDP akan **menguntungkan agensi** saya dengan **peningkatan penyampaian** agensi saya					
RA-2	RRDP akan **membantu pembuatan keputusan** agensi saya melalui data-data utama yang **sahih dan terkini**					
RA-3	**Duplikasi data** agensi saya akan **berkurang** kerana agensi saya boleh merujuk RRDP **tanpa perlu mewujudkan** data-data utama yang **baru** di agensi					
RA-4	RRDP akan **mengurangkan kos operasi pengurusan data** di agensi saya kerana agensi saya tidak perlu mengurus data-data utama yang boleh didapati daripada RRDP					
RA-5	RRDP akan **meningkatkan kualiti data** agensi saya melalui perkongsian data antara agensi saya dan agensi-agensi kerajaan yang lain					

No.	KOMPLEKSITI	1	2	3	4	5
CX-1	**Proses mengenalpasti data** yang boleh dikongsi oleh agensi saya dengan RRDP adalah **sukar**					
CX-2	Data-data utama agensi saya perlu melalui **proses pembersihan** yang **rumit** sebelum dikongsi dengan RRDP					
CX-3	**Pengintegrasian** aplikasi-aplikasi agensi saya dengan RRDP **sukar** dilaksanakan					
CX-4	**Kemahiran teknikal yang** tinggi diperlukan bagi penyelenggaraan integrasi aplikasi-aplikasi agensi saya dengan RRDP					

No.	KUALITI DATA	1	2	3	4	5
DQ-1	Pada masa ini, data utama agensi saya adalah **lengkap**					
DQ-2	Pada masa ini, data utama agensi saya adalah **tidak bertindan** di antara aplikasi-aplikasi di agensi saya					
DQ-3	Pada masa ini, data utama dalam agensi saya adalah **terkini**					
DQ-4	Pada masa ini, data utama dalam agensi saya adalah **sah**					
DQ-5	Pada masa ini, data utama dalam agensi saya **tepat**					
DQ-6	Pada masa ini, data utama dalam agensi saya **konsisten**					

No.	KESELAMATAN DATA	1	2	3	4	5
DS-1	Perkongsian data di antara agensi saya dan RRDP memerlukan **saluran komunikasi yang selamat (https atau encryption)**					
DS -2	RRDP perlu **melindungi** data-data utama daripada **perubahan yang tidak dibenarkan**					
DS -3	RRDP perlu **melindungi** data-data utama daripada **diakses oleh mereka yang tidak sepatutnya** mempunyai akses					
DS-4	Pusat Data RRDP perlu mewujudkan **Disaster Recovery Center (DRC)** bagi melindungi data-data utama agensi yang ditempatkan di RRDP daripada sebarang bencana					
DS-5	Segala transaksi pertukaran data (data exchange) antara agensi saya dan RRDP perlu menggunakan **pengesahan tandatangan digital**					

SEKSYEN C: FAKTOR ORGANISASI

No.	TADBIR URUS DATA	1	2	3	4	5
DG -2	Keberjayaan tadbir urus RRDP berpunca daripada **tanggungjawab yang berterusan**					
DG -3	Tadbir urus RRDP bersama agensi-agensi terlibat perlu **mengenalpasti** kebertanggungjawaban **pengambilan keputusan**					
DG -4	Tadbir urus RRDP perlu mewujudkan **prosedur yang sistematik** untuk **menangani perubahan** hasil pelaksanaan RRDP					
DG -5	Tadbir urus RRDP perlu **mengenalpasti data, aplikasi dan proses kerja** yang terlibat di agensi					
DG -6	Tadbir urus RRDP perlu **menentukan pengukuran** untuk **menilai impak/kesan penggunaan RRDP** di agensi					

No.	SOKONGAN PENGURUSAN ATASAN	1	2	3	4	5
TS-1	**Pengurusan atasan** agensi saya **akan berminat** untuk menggunakan RRDP **jika mengetahui faedah** RRDP kepada agensi saya					
TS-2	**Pengurusan atasan** agensi saya **menyedari** akan faedah RRDP yang akan menyumbang kepada **kejayaan agensi**					
TS-3	**Pengurusan atasan** agensi saya **akan memperuntukkan sumber-sumber bisnes dan IT yang mencukupi** bagi penggunaan RRDP					
TS-4	**Pengurusan atasan** agensi saya **mempunyai visi untuk mensasarkan agensi sebagai peneraju** dalam mempromosi penggunaan RRDP					

No.	KOMPETENSI TEKNOLOGI	1	2	3	4	5
TC-1	**Infrastruktur ICT** untuk menyokong pengintegrasian aplikasi berkaitan RRDP tersedia di agensi saya					
TC-2	Agensi saya mengandungi **pengetahuan mengenai RRDP yang tinggi**					
TC-3	**Tahap penerimaan** agensi saya terhadap **RRDP** adalah **tinggi**					
TC-4	Agensi saya akan **berdedikasi** untuk **memastikan kemahiran pekerja** dalam **membangun dan menyelenggara** pengintegrasian RRDP dan aplikasi-aplikasi agensi saya					
TC-5	**Kepakaran kakitangan teknologi maklumat** agensi saya dalam **mempelajari** pelaksanaan pengintegrasian RRDP dan aplikasi-aplikasi agensi saya adalah **tinggi**					
TC-6	Agensi saya akan menyediakan **kakitangan bisnes yang mencukupi** untuk melaksanakan pengintegrasian RRDP dan aplikasi-aplikasi agensi saya					
TC-7	Agensi saya akan menyediakan **kakitangan teknologi maklumat yang mencukupi** untuk melaksanakan pengintegrasian RRDP dan aplikasi-aplikasi agensi saya					

SEKSYEN D: FAKTOR PERSEKITARAN

No.	POLISI KERAJAAN	1	2	3	4	5
GP-1	Kerajaan **perlu** menubuhkan **polisi** bagi **menyokong perkongsian data** di kalangan agensi pihak berkuasa tempatan					
GP -2	Kerajaan **perlu** menubuhkan **polisi pengurusan kualiti data** merentasi agensi sektor awam					
GP -3	**Undang-undang dan peraturan semasa perlu dikemaskini** bagi **melindungi kepentingan agensi** dalam penglibatan dengan inisiatif RRDP					

GP -4	**Halatuju** dorongan data (**data-driven**) dalam **Rancangan Malaysia ke-11** akan menyokong **keberjayaan pelaksanaan RRDP**					
GP-5	Kerajaan perlu **menubuhkan dasar keselamatan maklumat dalam pengoperasian RRDP** dalam menggalakkan penglibatan agensi dengan inisiatif RRDP					

No.	PERMINTAAN RAKYAT	1	2	3	4	5
CD-1	Rakyat mempunyai **permintaan tinggi** bagi **perkhidmatan bersepadu di kalangan pihak berkuasa tempatan**					
CD-2	Rakyat dapat menggunakan **perkhidmatan dalam talian** yang menyediakan **perkhidmatan daripada pelbagai pihak berkuasa tempatan**					
CD-3	Pengurusan **perkhidmatan yang tidak merentasi agensi** di seluruh pihak berkuasa kerajaan tempatan akan **menyebabkan kepercayaan rakyat yang rendah** kepada agensi saya					
CD-4	Rakyat **mempunyai permintaan tinggi** terhadap **penyaluran maklumat** kepada rakyat dengan **cepat dan tepat** melalui aplikasi web dan telefon pintar					

SEKSYEN E: PENERIMAGUNAAN REPOSITORI RUJUKAN DATA BERPUSAT (RRDP)

No.	Soalan	1	2	3	4	5
MA-1	Agensi saya akan menerimaguna RRDP untuk **meningkatkan penyampaian perkhidmatan kepada rakyat**					
MA-3	Agensi saya akan menerimaguna RRDP untuk **meningkatkan kecekapan operasi dan mengurangkan kos operasi**					
MA-4	Agensi saya akan menerimaguna RRDP untuk **menggalakkan perkongsian dan pertukaran data antara agensi**					
MA-5	Agensi saya akan menerimaguna RRDP untuk **mengurangkan duplikasi data** merentasi agensi					
MA-6	Agensi saya akan menerimaguna RRDP untuk **meningkatkan pengintegrasian operasi** merentasi agensi					

----------SOAL SELIDIK TAMAT----------

Appendix K

Survey Cover Letter

UTM Universiti Teknologi Malaysia | Sekolah Informatik Termaju (AIS)

Sekolah Informatik Termaju (AIS)
Aras 5, Menara Razak
Universiti Teknologi Malaysia
Jalan Semarak
54100 Kuala Lumpur, Malaysia

Tel: +(6)03-21805192 Faks: +(6)03-21805370 http://www.ais.utm.my Emel: enquiry_ais@ic.utm.my

RUJUKAN KAMI: UTM.K.38/13.11/1/4 Jld. 20 (68) 20 November 2017

To Whom It May Concern,

Dear Sir/Madam,

PERMISSION TO CONDUCT RESEARCH AND SURVEY

STUDENT NAME	:	**FAIZURA HANEEM BINTI MOHAMED ALI**
MATRIC NO.	:	**PAN153002**
RESEARCH TITLE	:	**MASTER DATA MANAGEMENT IN PUBLIC SECTOR** ***(REPOSITORI RUJUKAN DATA BERPUSAT SEKTOR AWAM)***

With reference to the above matter.

2. I am pleased to inform you that **Faizura Haneem binti Mohamed Ali** is a registered post graduate student of Advanced Informatics School, Universiti Teknologi Malaysia, Kuala Lumpur.

3. For your information, she needs your permission to do research and collect data from you for research purposes. This research is important and required among students enrolled in Doctor of Philosophy (Research) program at UTM AIS.

4. Should you have any enquiries please do not hesitate to call the undersigned or directly contact our office at 03-2180 5217.

Your cooperation is very much appreciated. Thank you.

"BERKHIDMAT UNTUK NEGARA"

Yours Sincerely,

ASSOC. PROF. DR. MOHD NAZRI BIN KAMA
Deputy Dean (Research, Innovation, Commercialization & Networking)
Advanced Informatics School (AIS)
UTM Kuala Lumpur
Jalan Sultan Yahya Petra
54100 Kuala Lumpur
☎ : 03-2180 5274
📠 : 03-2180 5370
✉ : mdnazri@utm.my

Appendix L

Non-Response Bias Test

Non-response bias test of demographics

Group Statistics

	EarlyLateRespondent	N	Mean	Std. Deviation	Std. Error Mean
Population_T	1.00	169	2.01	.787	.061
	2.00	55	1.85	.678	.091
Department_T	1.00	169	1.71	.827	.064
	2.00	55	1.47	.634	.085
Designation_T	1.00	169	1.70	.705	.054
	2.00	55	1.69	.690	.093
WorkingExp_T	1.00	169	2.02	.740	.057
	2.00	55	1.93	.690	.093
DataMgmtExp_T	1.00	169	2.10	.864	.066
	2.00	55	2.09	.617	.083

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Population_T	Equal variances assumed	1.590	.209	1.330	222	.185	.157	.118	-.076	.390
	Equal variances not assumed			1.434	105.170	.154	.157	.110	-.060	.375
Department_T	Equal variances assumed	12.375	.001	1.950	222	.052	.237	.122	-.003	.477
	Equal variances not assumed			2.227	118.597	.028	.237	.107	.026	.448
Designation_T	Equal variances assumed	.106	.745	.067	222	.947	.007	.109	-.207	.222
	Equal variances not assumed			.068	93.455	.946	.007	.108	-.207	.221
WorkingExp_T	Equal variances assumed	.367	.545	.853	222	.395	.096	.113	-.126	.319
	Equal variances not assumed			.884	97.553	.379	.096	.109	-.120	.313
DataMgmtExp_T	Equal variances assumed	8.101	.005	.077	222	.939	.010	.126	-.238	.258
	Equal variances not assumed			.091	128.112	.928	.010	.106	-.201	.220

Non-response bias test of survey items

Group Statistics

	EarlyLateRespondent	N	Mean	Std. Deviation	Std. Error Mean
RA1	1.00	169	4.0473	.83674	.06436
	2.00	55	4.1636	.63139	.08514
RA2	1.00	169	3.9527	.82959	.06381
	2.00	55	4.2182	.62925	.08485
RA3	1.00	169	3.7337	.80555	.06197
	2.00	55	3.9273	.83565	.11268
RA4	1.00	169	3.7041	.75280	.05791
	2.00	55	3.9273	.76629	.10333
RA5	1.00	169	3.9941	.65916	.05070
	2.00	55	4.1818	.69631	.09389
CX1	1.00	169	3.2840	.85345	.06565
	2.00	55	3.3455	.94708	.12770
CX2	1.00	169	3.6095	.92654	.07127
	2.00	55	3.4364	.95769	.12914
CX3	1.00	169	3.1124	.84114	.06470
	2.00	55	3.1636	.89781	.12106
CX4	1.00	169	3.8994	.99788	.07676
	2.00	55	3.6727	.98234	.13246
DS1	1.00	169	4.2663	.84169	.06475
	2.00	55	4.3636	.67669	.09125
DS2	1.00	169	4.2367	.82568	.06351
	2.00	55	4.4727	.63405	.08550
DS3	1.00	169	4.2663	.84873	.06529
	2.00	55	4.5091	.60470	.08154
DS4	1.00	169	4.4201	.81347	.06257
	2.00	55	4.4727	.60414	.08146
DS5	1.00	169	4.0947	.92094	.07084
	2.00	55	4.2545	.75076	.10123
DG2	1.00	169	3.4320	.99243	.07634
	2.00	55	3.1455	.75567	.10190
DG3	1.00	169	3.5325	.87990	.06768
	2.00	55	3.2364	.76893	.10368
DG4	1.00	169	3.6213	.88561	.06812
	2.00	55	3.4182	.87540	.11804
DG5	1.00	169	4.2071	.70606	.05431
	2.00	55	4.2182	.56735	.07650
DG6	1.00	169	4.2722	.58493	.04499
	2.00	55	4.2909	.53308	.07188
TS1	1.00	169	4.2249	.67900	.05223
	2.00	55	4.3091	.50452	.06803
TS2	1.00	169	4.2071	.55502	.04269
	2.00	55	4.4000	.49441	.06667
TS3	1.00	169	4.1479	.58402	.04492
	2.00	55	4.4000	.49441	.06667
TS4	1.00	169	4.2189	.64963	.04997
	2.00	55	4.3636	.55656	.07505
TC1	1.00	169	4.0296	.77480	.05960
	2.00	55	4.1273	.47354	.06385
TC2	1.00	169	3.8521	.85670	.06590
	2.00	55	4.0182	.56078	.07562
TC3	1.00	169	3.7751	.90454	.06958
	2.00	55	3.6727	.77111	.10398
TC4	1.00	169	3.8107	.79410	.06108
	2.00	55	3.8182	.74761	.10081
TC5	1.00	169	3.6391	.71955	.05535
	2.00	55	3.4727	1.01570	.13696
TC6	1.00	169	3.1893	.80896	.06223
	2.00	55	3.2545	.90714	.12232
TC7	1.00	169	3.3609	.71955	.05535
	2.00	55	3.4000	.95452	.12871
CD1	1.00	169	3.5799	.67776	.05214
	2.00	55	3.8727	.63987	.08628

CD2	1.00	169	3.3787	.99332	.07641
	2.00	55	3.3273	.98234	.13246
CD3	1.00	169	3.2249	.67900	.05223
	2.00	55	3.2727	.62226	.08391
CD4	1.00	169	3.3432	.79468	.06113
	2.00	55	3.3818	.78152	.10538
DQ1	1.00	169	4.2071	.78586	.06045
	2.00	55	4.2909	.56676	.07642
DQ2	1.00	169	4.1598	.79689	.06130
	2.00	55	4.2727	.55958	.07545
DQ3	1.00	169	4.1834	.82849	.06373
	2.00	55	4.3818	.49031	.06611
DQ4	1.00	169	4.0178	.92886	.07145
	2.00	55	4.0909	.58603	.07902
DQ5	1.00	169	4.1716	.79441	.06111
	2.00	55	4.4364	.50050	.06749
DQ6	1.00	169	4.0651	.85316	.06563
	2.00	55	4.4000	.56437	.07610
MA1	1.00	169	4.2130	.82495	.06346
	2.00	55	4.4000	.49441	.06667
MA3	1.00	169	4.2367	.70090	.05392
	2.00	55	4.3091	.57325	.07730
MA4	1.00	169	3.4320	.89132	.06856
	2.00	55	3.3455	.84367	.11376
MA5	1.00	169	3.3491	.98320	.07563
	2.00	55	3.5091	.92040	.12411
MA6	1.00	169	3.5266	.91979	.07075
	2.00	55	3.7273	.65134	.08783
GP1	1.00	169	3.8698	.75252	.05789
	2.00	55	3.9091	.70113	.09454
GP2	1.00	169	4.0000	.82375	.06337
	2.00	55	3.9636	.76893	.10368
GP3	1.00	169	3.9586	.83349	.06411
	2.00	55	3.9091	.77633	.10468
GP4	1.00	169	3.9941	.65006	.05000
	2.00	55	4.0364	.63723	.08592
GP5	1.00	169	3.9882	.71538	.05503
	2.00	55	4.0727	.63405	.08550

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
RA1	Equal variances assumed	2.238	.136	-.946	222	.345	-.11630	.12290	-.35850	.12591
	Equal variances not assumed			-1.090	120.695	.278	-.11630	.10673	-.32760	.09500
RA2	Equal variances assumed	.933	.335	-2.177	222	.031	-.26552	.12195	-.50585	-.02519
	Equal variances not assumed			-2.501	120.025	.014	-.26552	.10617	-.47572	-.05531
RA3	Equal variances assumed	.357	.551	-1.534	222	.127	-.19354	.12621	-.44226	.05517
	Equal variances not assumed			-1.505	88.984	.136	-.19354	.12859	-.44906	.06197
RA4	Equal variances assumed	1.083	.299	-1.901	222	.059	-.22313	.11738	-.45445	.00818
	Equal variances not assumed			-1.884	90.382	.063	-.22313	.11845	-.45843	.01217
RA5	Equal variances assumed	2.913	.089	-1.809	222	.072	-.18774	.10376	-.39221	.01674
	Equal variances not assumed			-1.759	87.693	.082	-.18774	.10671	-.39980	.02433

CX1	Equal variances assumed	2.119	.147	-.451	222	.652	-.06143	.13617	-.32978	.20691
	Equal variances not assumed			-.428	84.418	.670	-.06143	.14359	-.34696	.22410
CX2	Equal variances assumed	.433	.511	1.194	222	.234	.17310	.14503	-.11270	.45891
	Equal variances not assumed			1.174	89.248	.244	.17310	.14750	-.11996	.46617
CX3	Equal variances assumed	.921	.338	-.386	222	.700	-.05121	.13277	-.31286	.21044
	Equal variances not assumed			-.373	86.976	.710	-.05121	.13727	-.32404	.22162
CX4	Equal variances assumed	.131	.718	1.469	222	.143	.22668	.15433	-.07745	.53081
	Equal variances not assumed			1.481	92.989	.142	.22668	.15309	-.07733	.53069
DS1	Equal variances assumed	.285	.594	-.779	222	.437	-.09736	.12492	-.34354	.14881
	Equal variances not assumed			-.870	112.870	.386	-.09736	.11188	-.31903	.12430
DS2	Equal variances assumed	.596	.441	-1.941	222	.054	-.23604	.12161	-.47570	.00362
	Equal variances not assumed			-2.216	118.454	.029	-.23604	.10651	-.44694	-.02514
DS3	Equal variances assumed	1.688	.195	-1.964	222	.051	-.24282	.12361	-.48643	.00079
	Equal variances not assumed			-2.325	128.465	.022	-.24282	.10445	-.44949	-.03615
DS4	Equal variances assumed	1.677	.197	-.441	222	.659	-.05261	.11920	-.28751	.18229
	Equal variances not assumed			-.512	122.785	.609	-.05261	.10272	-.25594	.15073
DS5	Equal variances assumed	1.318	.252	-1.167	222	.245	-.15987	.13701	-.42987	.11013
	Equal variances not assumed			-1.294	111.262	.198	-.15987	.12356	-.40470	.08496
DG2	Equal variances assumed	10.423	.001	1.963	222	.051	.28650	.14598	-.00118	.57418
	Equal variances not assumed			2.250	119.531	.026	.28650	.12732	.03440	.53859
DG3	Equal variances assumed	2.102	.149	2.233	222	.027	.29618	.13261	.03484	.55752
	Equal variances not assumed			2.392	103.775	.019	.29618	.12382	.05064	.54172
DG4	Equal variances assumed	.006	.940	1.482	222	.140	.20312	.13710	-.06706	.47330
	Equal variances not assumed			1.490	92.659	.140	.20312	.13629	-.06753	.47377
DG5	Equal variances assumed	3.700	.056	-.106	222	.916	-.01108	.10478	-.21757	.19541
	Equal variances not assumed			-.118	112.932	.906	-.01108	.09382	-.19696	.17480
DG6	Equal variances assumed	.615	.434	-.211	222	.833	-.01872	.08891	-.19394	.15650
	Equal variances not assumed			-.221	99.688	.826	-.01872	.08480	-.18697	.14953
TS1	Equal variances assumed	3.087	.080	-.847	222	.398	-.08424	.09950	-.28032	.11185
	Equal variances not assumed			-.982	122.719	.328	-.08424	.08577	-.25402	.08554
TS2	Equal variances assumed	.721	.397	-2.297	222	.023	-.19290	.08397	-.35838	-.02742
	Equal variances not assumed			-2.437	101.868	.017	-.19290	.07917	-.34993	-.03587
TS3	Equal variances assumed	1.410	.236	-2.881	222	.004	-.25207	.08748	-.42447	-.07967
	Equal variances not assumed			-3.136	107.081	.002	-.25207	.08039	-.41144	-.09271
TS4	Equal variances assumed	.024	.877	-1.484	222	.139	-.14470	.09753	-.33691	.04750
	Equal variances not assumed			-1.605	105.815	.111	-.14470	.09016	-.32346	.03406

TC1	Equal variances assumed	4.333	.039	-.882	222	.379	-.09769	.11074	-.31591	.12054
	Equal variances not assumed			-1.118	151.997	.265	-.09769	.08735	-.27026	.07488
TC2	Equal variances assumed	14.683	.000	-1.346	222	.180	-.16611	.12340	-.40930	.07708
	Equal variances not assumed			-1.656	141.030	.100	-.16611	.10030	-.36440	.03218
TC3	Equal variances assumed	.898	.344	.755	222	.451	.10242	.13567	-.16495	.36979
	Equal variances not assumed			.819	106.338	.415	.10242	.12511	-.14561	.35045
TC4	Equal variances assumed	.313	.576	-.062	222	.951	-.00753	.12156	-.24709	.23203
	Equal variances not assumed			-.064	96.743	.949	-.00753	.11787	-.24148	.22642
TC5	Equal variances assumed	18.923	.000	1.336	222	.183	.16633	.12446	-.07894	.41160
	Equal variances not assumed			1.126	72.459	.264	.16633	.14772	-.12811	.46077
TC6	Equal variances assumed	3.488	.063	-.504	222	.615	-.06520	.12945	-.32031	.18992
	Equal variances not assumed			-.475	83.765	.636	-.06520	.13724	-.33812	.20773
TC7	Equal variances assumed	13.177	.000	-.321	222	.748	-.03905	.12159	-.27866	.20056
	Equal variances not assumed			-.279	74.996	.781	-.03905	.14010	-.31816	.24005
CD1	Equal variances assumed	10.099	.002	-2.821	222	.005	-.29285	.10381	-.49743	-.08826
	Equal variances not assumed			-2.905	96.498	.005	-.29285	.10081	-.49293	-.09276
CD2	Equal variances assumed	.140	.709	.334	222	.738	.05143	.15379	-.25165	.35450
	Equal variances not assumed			.336	92.621	.737	.05143	.15292	-.25225	.35510
CD3	Equal variances assumed	.075	.784	-.463	222	.644	-.04788	.10333	-.25152	.15577
	Equal variances not assumed			-.484	99.173	.629	-.04788	.09883	-.24398	.14823
CD4	Equal variances assumed	.046	.830	-.314	222	.754	-.03862	.12287	-.28077	.20352
	Equal variances not assumed			-.317	93.069	.752	-.03862	.12183	-.28054	.20330
DQ1	Equal variances assumed	1.193	.276	-.731	222	.466	-.08381	.11465	-.30976	.14214
	Equal variances not assumed			-.860	126.765	.391	-.08381	.09744	-.27663	.10901
DQ2	Equal variances assumed	1.335	.249	-.975	222	.330	-.11296	.11583	-.34123	.11530
	Equal variances not assumed			-1.162	130.528	.247	-.11296	.09722	-.30529	.07936
DQ3	Equal variances assumed	2.686	.103	-1.681	222	.094	-.19839	.11801	-.43095	.03418
	Equal variances not assumed			-2.160	157.317	.032	-.19839	.09183	-.37976	-.01701
DQ4	Equal variances assumed	9.093	.003	-.549	222	.583	-.07316	.13322	-.33570	.18938
	Equal variances not assumed			-.687	146.844	.493	-.07316	.10653	-.28370	.13738
DQ5	Equal variances assumed	.771	.381	-2.324	222	.021	-.26477	.11392	-.48927	-.04026
	Equal variances not assumed			-2.908	147.070	.004	-.26477	.09104	-.44469	-.08484
DQ6	Equal variances assumed	2.933	.088	-2.722	222	.007	-.33491	.12305	-.57741	-.09241
	Equal variances not assumed			-3.333	139.404	.001	-.33491	.10049	-.53359	-.13623
MA1	Equal variances assumed	10.017	.002	-1.589	222	.113	-.18698	.11766	-.41886	.04489
	Equal variances not assumed			-2.032	155.224	.044	-.18698	.09204	-.36879	-.00517

MA3	Equal variances assumed	1.291	.257	-.694	222	.488	-.07240	.10433	-.27802	.13321
	Equal variances not assumed			-.768	110.889	.444	-.07240	.09424	-.25916	.11435
MA4	Equal variances assumed	.526	.469	.633	222	.527	.08650	.13660	-.18271	.35571
	Equal variances not assumed			.651	96.272	.516	.08650	.13282	-.17715	.35014
MA5	Equal variances assumed	.094	.760	-1.064	222	.288	-.15998	.15032	-.45621	.13625
	Equal variances not assumed			-1.101	97.244	.274	-.15998	.14534	-.44842	.12846
MA6	Equal variances assumed	10.004	.002	-1.499	222	.135	-.20065	.13385	-.46442	.06313
	Equal variances not assumed			-1.779	129.327	.078	-.20065	.11278	-.42378	.02249
GP1	Equal variances assumed	1.517	.219	-.342	222	.733	-.03927	.11493	-.26576	.18723
	Equal variances not assumed			-.354	97.667	.724	-.03927	.11085	-.25926	.18073
GP2	Equal variances assumed	.278	.599	.289	222	.773	.03636	.12586	-.21167	.28440
	Equal variances not assumed			.299	97.501	.765	.03636	.12151	-.20479	.27752
GP3	Equal variances assumed	.082	.776	.389	222	.698	.04949	.12729	-.20136	.30034
	Equal variances not assumed			.403	97.694	.688	.04949	.12275	-.19412	.29310
GP4	Equal variances assumed	.298	.586	-.421	222	.674	-.04228	.10043	-.24021	.15565
	Equal variances not assumed			-.425	93.331	.672	-.04228	.09942	-.23969	.15513
GP5	Equal variances assumed	.138	.711	-.782	222	.435	-.08456	.10812	-.29763	.12851
	Equal variances not assumed			-.832	102.364	.408	-.08456	.10167	-.28622	.11710

Appendix M

Common Method Variance (CMV) Test

Method 1: Harman's Single Factor

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.496	27.877	27.877	14.496	**27.877**	27.877
2	6.092	11.715	39.592			
3	4.822	9.273	48.865			
4	3.033	5.833	54.698			
5	2.933	5.640	60.338			
6	2.459	4.729	65.067			
7	1.815	3.490	68.557			
8	1.602	3.081	71.638			
9	1.409	2.709	74.347			
10	1.295	2.490	76.838			
11	1.019	1.959	78.796			
12	.975	1.875	80.671			
13	.881	1.695	82.366			
14	.745	1.434	83.800			
15	.673	1.294	85.094			
16	.639	1.229	86.323			
17	.542	1.042	87.365			
18	.520	1.001	88.366			
19	.485	.934	89.299			
20	.471	.905	90.204			
21	.369	.710	91.734			
22	.340	.653	92.387			
23	.313	.602	92.989			
24	.304	.586	93.574			
25	.283	.544	94.118			
26	.264	.508	94.627			
27	.246	.474	95.100			
28	.240	.462	95.562			
29	.214	.412	95.974			
30	.200	.384	96.358			
31	.188	.362	96.720			
32	.180	.347	97.067			
33	.171	.330	97.396			
34	.155	.298	97.694			
35	.151	.291	97.985			
36	.147	.282	98.267			
37	.133	.256	98.523			

38	.117	.225	98.748			
39	.093	.179	98.927			
40	.089	.171	99.098			
41	.082	.158	99.256			
42	.064	.124	99.380			
43	.063	.122	99.501			
44	.054	.104	99.606			
45	.049	.094	99.699			
46	.039	.075	99.774			
47	.035	.066	99.841			
48	.024	.045	99.941			
49	.018	.034	99.975			
50	.013	.025	100.000			

Extraction Method: Principal Component Analysis.

Method 2: Full Collinearity Variance Inflation Factors, VIF

	E_CD	E_GP	MA	O_DG	O_TC	O_TS	T_CX	T_DQ	T_DS	T_RA
E_CD		1.557	1.521	1.625	1.623	1.644	1.568	1.601	1.586	1.589
E_GP	2.357		2.41	2.214	2.055	2.26	1.831	2.448	2.675	2.404
MA	2.422	2.552		2.465	2.552	1.753	2.661	2.15	2.378	2.539
O_DG	1.579	1.556	1.593		1.607	1.489	1.477	1.385	1.581	1.584
O_TC	2.212	1.846	2.289	2.184		2.255	1.699	2.383	2.238	2.4
O_TS	1.665	1.639	1.107	1.522	1.649		1.793	1.486	1.569	1.551
T_CX	1.085	1.099	1.069	1.105	1.117	1.129		1.072	1.153	1.074
T_DQ	1.794	1.772	1.591	1.669	1.871	1.694	1.752		1.599	1.779
T_DS	1.931	1.758	1.97	1.659	1.885	2.011	1.443	1.886		1.879
T_RA	1.418	1.396	1.418	1.377	1.435	1.412	1.278	1.428	1.292	

Appendix N

Master Data Management (MDM) Adoption Guidelines & Strategy for the Malaysian Public Sector

PURPOSE

This document outlines the MDM adoption guidelines for the use of MDM initiators, data steward and data provider organizations that involved in MDM initiative in the Malaysian public sector. These guidelines consist of the action needed to be taken by the MDM initiators during the adoption stage of MDM to encourage the participation of multiple government agencies in the MDM initiatives as data providers as well as the responsibilities of data steward and data provider organizations throughout the implementation. These guidelines should be used in complementary manner with other government related guidelines such as the circular of Open Data Implementation and Big Data Implementation in the Malaysian Public Sector in order to have a more effective MDM implementation and adoption.

BACKGROUND

One of the government initiatives to reduce data duplication, increase data quality, enable broader data integration, and eliminate redundant integration activities is establishing Master Data Management (MDM). MDM involves the activities of identifying, consolidating, and integrating master data from multiple data sources from different organizations into central data repository. With the MDM, master data from multiple government organizations which potentially valuable across government organizations are identified and consolidated in a central repository of. This repository is served as a 'single source of truth' by many applications across organizations.

The MDM has been positioned as the heart of the Malaysian Government Online Services Gateway model (refer Figure 1) to allow horizontal information sharing and integration across multiple organizations. Centralization and integration of master data from various sources happen through data sharing between data provider organizations (e.g. central, state, and local government) and MDM repositories. The centralized master data in MDM are consumed by multiple data consumers' applications (e.g. business, education, and health clusters) through data brokers for the establishment of

government online services. Figure 1 presents the elements of the Malaysian Government Online Services Gateway model.

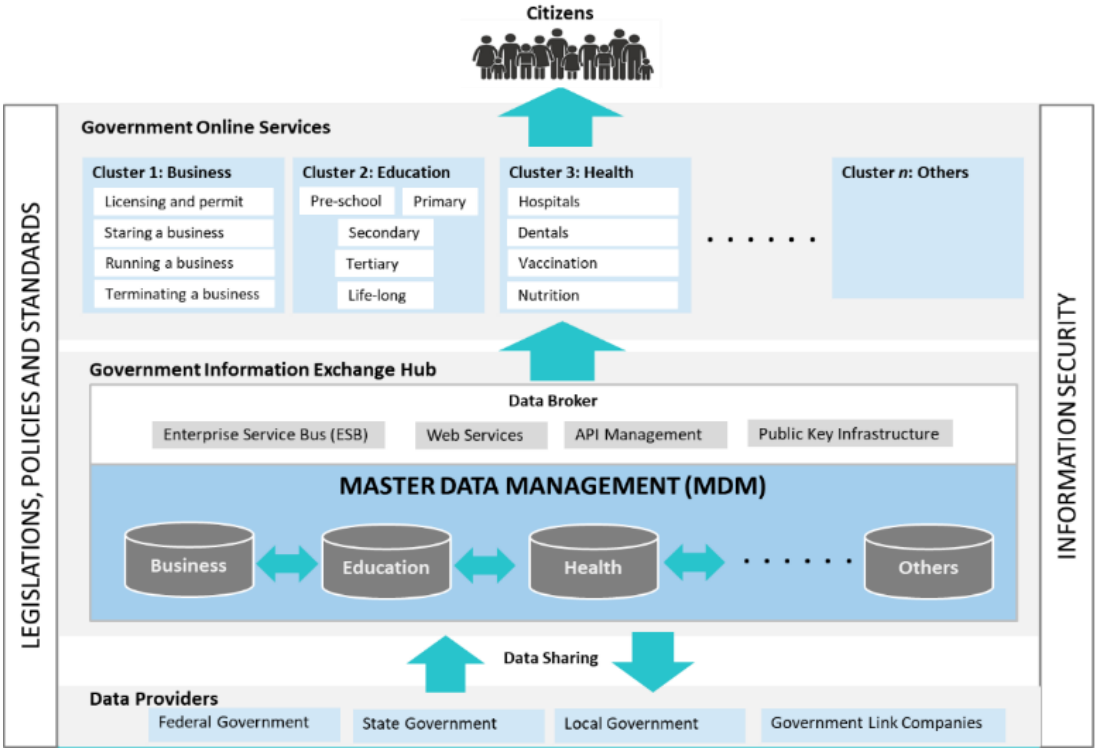


Figure 1: Malaysian Government Online Services Gateway model

Recognizing the importance of implementing MDM in the Malaysian public sector, this document presents the guidelines of MDM adoption to encourage data sharing activities among government organizations.

DEFINITION

'Master Data Management' or MDM in short is referring to the management of shared master data at central level to reduce data redundancy and ensure better data quality with a combination of process, governance, and technology.

'Master Data' is referring to the critical business data in an organisation, potentially valuable to be shared across several different systems or organisational units and serve as a reference for transactional data.

'MDM initiator' is referring to the organization that initiate the MDM initiative and commonly is the regulator body of the MDM program

'Data steward' is referring to the data steward or data custodian organization that manage the consolidated master data at the MDM repository at central level

‘Data provider’ is referring to the organization that own the master data and responsible as a data provider to share their master data to the MDM repository.

‘Data source’ is referring to the databases which stores the master data in data provider organizations.

‘MDM repository’ is referring to the central repository which consolidate master data from multiple data source from data provider organizations across public sector.

GUIDELINES

A. Technological Context:

i. Master data identification

Data provider organization should identify the master data of the organization. Master data master is defined as an enterprise-critical data that is consumed by different business processes, across organizational units, and between operational systems and decision support systems. The master data must be clearly differentiated from the transactional data where master data entities are often unchanged and relatively constant such as properties of the material.

ii. Data Cleansing

Data provider organization should perform data cleansing to the identified master data before sharing them with the MDM repository. Data cleansing is used to identify duplicates within the master data when unique identifiers are unavailable. It relies primarily on matching of names, attributes, and other non-unique identifiers.

iii. Data Mapping and Synchronization

After the data cleansing process, the data provider organization and the data steward should perform and agree on the schema mappings between master data sources and MDM repository (also known as meta data).

iv. Data Integration

Data steward should integrate the master data from different data sources in order to provide a unified view of them. The data integration is responsible for detecting

records from different data sources that represent the same instance from the real world. The data integration could be achieved using schema mappings.

v. Data Maintenance & Support

Data steward and data provider organizations should perform continuous data maintenance and support. This is to ensure the synchronization between master data sources and MDM repository is constantly running to ensure that the consolidated master data at the MDM are the latest updates from the sources.

vi. Data Quality

Data provider organization should continuously ensure master data in the organization are complete, not duplicate, up-to-date, valid, accurate, and consistent. Data provider organization should continuously perform Total Data Quality Management (TDQM) in the organization. The measurement of each data quality characteristic is described as follows:

Completeness: The degree of completeness of master data items at the sources. It is measure by comparing the presence of non-blank values against a hundred per cent (100%) complete of the master data items.

Uniqueness: The degree of uniqueness of master data items at the sources. It is measure by analysing the number of things as assessed in the 'real world' compared to the number of entities in the master data set.

Timeliness: The degree of up-to-date records of master data items at the sources.

Validity: The degree of master data at the sources that conform to the syntax (format, type, range) of its definition.

Accuracy: The degree to which master data at the sources correctly describes the real-world object or event being described.

Consistency: The degree of similarity of one of more representatives of master data entities at the sources.

B. Organizational Context

i. Data Governance

MDM initiator is advised to set up a committee at the early stage of MDM implementation before the actual implementation being in place. The roles and responsibility should be specific to ensure the smooth and effective decision-making process. MDM implementation monitoring should be made as a regular agenda in the committee meeting which involve multiple participated parties from different organizations across government agencies. Figure 2 illustrates the committee structure of the MDM data governance and Table 1 presents the responsibilities of each role.

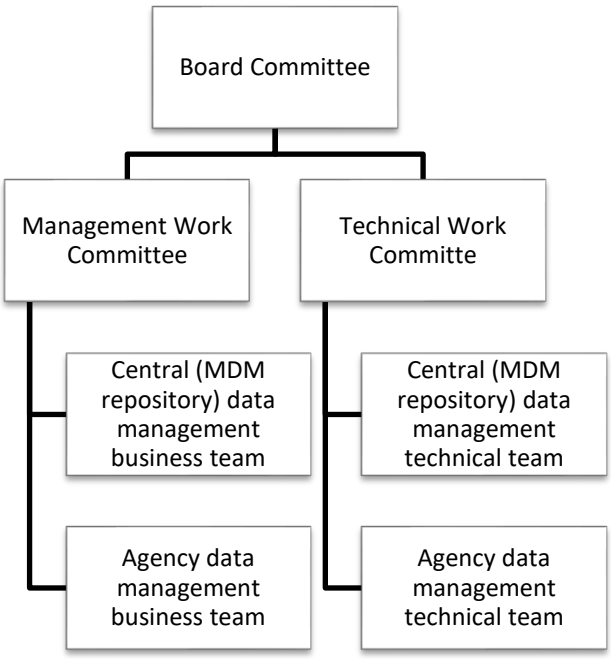


Figure 2: Data governance committee

a. Board Committee

The Committee is responsible for ensuring MDM implementation is made according to the established policies. The Committee is chaired by a senior officer responsible for the MDM initiative. The members comprising representatives of top management from MDM initiator, data steward, and data provider organizations.

b. Management work committee

The Committee is responsible for providing strategic and business-related assistance for the MDM implementation. The Committee is chaired by the related business department manager from the MDM initiator or regulator organization. The members comprising business managers from the data steward, and data provider organizations.

c. Technical work committee

The Committee is responsible for providing technical assistance for the MDM implementation. The Committee is chaired by Information and Communication Technology (ICT) Manager from the MDM initiator or regulatory body organization. The members comprising the ICT managers from the data steward, and data provider organizations.

d. Central (MDM repository) data management business team

Business data management team in data steward organization which responsible in managing the consolidated master data in the MDM repository at central level.

e. Agency data management business team

Business data management team in data provider organizations which responsible in verifying the quality of master data in the organization before sharing with the MDM repository.

f. Central (MDM repository) data management technical team

Technical data management team in data steward organization which responsible in managing the consolidated master data in the MDM repository at central level.

g. Agency data management technical team

Technical data management team in data provider organizations which responsible in preparing the quality of master data in the organization before sharing with the MDM repository.

Table 1: Roles and responsibility of data governance committee structure

Roles	**Responsibilities**
Board committee	i. Establish policy and implementation strategy the MDM implementation aligned with the national aspiration ii. Outline a clear vision and objectives of the MDM implementation iii. Monitor the achievement of the MDM implementation iv. Endorse proposed improvements proposed by the Management work committee in the legal, policy, procedures and regulations
Management work committee	i. Monitor the MDM implementation in line with the action plan

	ii. Identify measurement of performance and determination standards. iii. Propose improvements (if applicable) in the legal, policy, procedures and regulations iv. Approve proposed improvements proposed by the technical work committee v. Report status of development progress of the MDM implementation to the Board Committee.
Technical work committee	i. Provide advice on the data management with regards to the technical issues of the MDM implementation ii. Accept and approve project deliverables iii. Review and make recommendations for improvements iv. Report status of development progress of the MDM implementation to the Management work committee
Central (MDM repository) data management business team	i. Provide advice on the data management with regards to the core functions (core business) of the MDM ii. Ensure the data quality process is being implemented in handling the data at the central level iii. Verify the quality of master data in the MDM repository v.
Agency data management business team	i. Provide advice on the data management with regards to the core functions (core business) of the agency ii. Work with agency data management technical team to identify the master data in the organization iii. Ensure the data quality process is being implemented in handling the data at the agency level iv. Verify the quality of master data in the agency before sharing with the MDM repository
Central (MDM repository) data management technical team	i. Provide advice on the data management with regards technical of the MDM ii. Perform the data quality process at the central level iii. Prepare the quality of consolidated master data in the MDM repository iv. Work with Agency data management technical team to perform and agree on the schema mappings between master data sources and MDM repository

	Report the progress of the MDM implementation to the agency's top management
Agency data management technical team	i. Provide advice on the data management with regards to the technical issue at agency level (a) Ensure the data quality process is being implemented in handling the data at the agency level (b) Work with agency data management business team to identify the master data in the organization (c) Perform data cleansing to the identified master data before sharing them with the MDM repository (d) Prepare the quality of master data in the agency before sharing with the MDM repository (e) Work with Central (MDM repository) data management technical team to perform and agree on the schema mappings between master data sources and MDM repository (f) Report the progress of the MDM implementation to the agency's top management

ii. Top Management Support

- Prior to the implementation, the MDM initiator should notify and introduce the technology the data provider's top management to get a stronger support from them to share master data from their organizations

- Top management of the data provider agency should clear on the vision of the MDM implementation

- Top management of the data provider agency should assess the agency's capabilities in terms of human resources, expertise and infrastructure to support the MDM implementation

- Top management of the data provider agency should allocate adequate financial and human resources for the development and operation of MDM

- Top management of the data provider agency should establish continuous awareness programs for current and new personnel for continuous understanding on the benefits of the MDM implementation

- Top management of the data provider agency should provide or allocate financial budget to improve the technical skills of the personnel for the development and operation of the MDM

- MDM initiator should establish MDM continuous awareness programs for current and new top management of data steward and data provider organization in order to give continuous understanding on the benefits of the MDM implementation

iii. Technological Competence

- Data steward and data provider organizations should establish sufficient ICT infrastructure in both central and agency to support the operation of the MDM
- Data steward and data provider organizations should assign dedicated personnel to be involved in the MDM implementation
- Data steward and data provider organizations should maintain or improve the IT skill and business skill of the assigned personnel by attending MDM related courses
- MDM initiator should provide helpdesk services to data steward and data provider organizations to assist in any problem they are having in operating the MDM

C. Environmental Context

i. Citizen Demand

Prior to the MDM implementation:

- MDM initiator should perform due diligence study to justify the relevancy of the MDM development
- MDM initiator should align the purpose of the proposed MDM development with the national agenda
- MDM initiator should perform business requirement analysis together with the participation from related potential data provider organizations and citizen representatives

MDM initiator should continuously assess the MDM implementation to ensure the output of the MDM implementation is fulfilling the citizen demand on the integrated government services across multiple organizations.

AMMENDMENTS AND UPDATES

These guidelines are subjected to revisions and amendments from time to time in line with changes in technology, applications, procedures, legal and social interests.

CLOSING REMARK

Agencies that participated in the MDM implementation should comply with these guidelines in developing and operating the MDM

Appendix O

MDM Adoption Guidelines & Strategy Validation Confirmation

MDM ADOPTION AND IMPLEMENTATION GUIDELINES:
FEEDBACK FROM THE PRACTITIONER

Malaysian government currently has any guidelines for the MDM adoption and implementation in the Malaysian public sector.

[ ] Yes [/] No [ ] Others: Please specify_____

Do you think that the Malaysian government needs an MDM adoption and implementation guidelines?

[/] Yes [ ] No [ ] Others: Please specify_____

Do you think that it is important to have guidelines to ensure the success of MDM implementation in the Malaysian public sector?

[/] Yes [ ] No [ ] Others: Please specify_____

Do you think the proposed guidelines from this research are suitable to be imposed in the Malaysian Public Sector in order to assist the MDM adoption and implementation?

[/] Yes [ ] No [ ] Others: Please specify_____

You are invited to give any suggestion on the proposed guidelines:

masukkan strategi of mpm dlm gudelint

Signature : 

Name : WAN AZLIN ZURITA BINTI WAN AHMAD

Designation : Pakar ICT
Bahagian Perundingan
MAMPU, Jabatan Perdana Menteri

Date : 15/5/2018

Appendix P

MDM Adoption Strategy – Priority Level

State	Local Government Organization	Citizens Population	Priority Level
W.P Kuala Lumpur	Kuala Lumpur City Hall	1,588,750	High
Pulai Pinang	Seberang Perai Municipal Council	818,197	High
Selangor	Kajang Municipal Council	795,522	High
Selangor	Klang Municipal Council	744,062	High
Selangor	Subang Jaya Municipal Council	708,296	High
Pulai Pinang	Pulau Pinang City Council	708,127	High
Perak	Ipoh City Council	657,892	High
Selangor	Petaling Jaya City Council	613,977	High
Selangor	Selayang Municipal Council	542,409	High
Selangor	Shah Alam City Council	541,306	High
Johor	Iskandar Puteri City Council	529,074	High
Johor	Johor Bahru City Council	497,067	High
Melaka	Melaka Bersejarah City Council	484,885	High
Melaka	Hang Tuah Jaya Municipal Council	450,001	High
Selangor	Ampang Jaya Municipal Council	468,961	High
Sabah	Kota Kinabalu City Hall	452,058	High
Kedah	Sungai Petani Municipal Council	443,488	High
Pahang	Kuantan Municipal Council	427,515	High
Kedah	Alor Setar City Council	405,523	High
Sabah	Tawau Municipal Council	397,673	High
Sabah	Sandakan Municipal Council	396,290	High
Terengganu	Kuala Terengganu City Council	337,553	High
Kelantan	Kota Bharu Municipal Council	314,964	High
Negeri Sembilan	Seremban Municipal Council	314,502	High
Kedah	Kulim Municipal Council	281,260	Medium
Sarawak	Padawan Municipal Council	273,485	Medium
Sarawak	Sibu Municipal Council	260,270	Medium
Perak	Taiping Municipal Council	245,182	Medium
Sarawak	Miri City Council	234,541	Medium
Johor	Kulai Municipal Council	234,532	Medium
Perlis	Kangar Municipal Council	225,590	Medium
Selangor	Kuala Langat District Council	220,214	Medium
Kedah	Kubang Pasu District Council	214,479	Medium
Sarawak	Bintulu Development Authority	212,994	Medium
Perak	Manjung Municipal Council	211,113	Medium
Johor	Batu Pahat Municipal Council	209,461	Medium
Selangor	Sepang Municipal Council	207,354	Medium
Selangor	Kuala Selangor District Council	205,257	Medium
Johor	Municipal Council Muar	201,148	Medium
Negeri Sembilan	Municipal Council Nilai	200,988	Medium
Sabah	Lahad Datu District Council	199,830	Medium
Selangor	Hulu Selangor District Council	194,387	Medium
Sabah	Kinabatangan District Council	182,328	Medium
Kelantan	Pasir Mas District Council	180,878	Medium
Melaka	Alor Gajah Municipal Council	173,712	Medium
Sabah	Keningau District Council	173,103	Medium
Johor	Kluang Municipal Council	167,833	Medium
Terengganu	Kemaman Municipal Council	166,750	Medium
Sarawak	Kuching Utara City Hall	165,642	Medium
Sarawak	Kuching Selatan City Council	159,490	Medium

Pahang	Temerloh Municipal Council	158,724	Medium
Kelantan	Ketereh District Council	153,474	Medium
Terengganu	Dungun Municipal Council	149,851	Medium
Kelantan	Tumpat District Council	143,793	Medium
Terengganu	Besut District Council	136,563	Medium
Sabah	Semporna District Council	133,164	Medium
Kedah	Baling District Council	132,304	Medium
Johor	Tangkak District Council	131,890	Medium
Melaka	Jasin Municipal Council	131,539	Medium
Perak	Teluk Intan Municipal Council	128,143	Medium
Sabah	Papar District Council	124,420	Medium
Sabah	Penampang District Council	121,934	Medium
Perak	Kerian District Council	120,192	Medium
Sarawak	Samarahan District Council	116,685	Medium
Kelantan	Tanah Merah District Council	115,949	Medium
Pahang	Bentong Municipal Council	114,397	Medium
Kelantan	Pasir Puteh District Council	113,191	Medium
Pahang	Maran District Council	111,056	Medium
Sabah	Tenom District Council	110,286	Medium
Pahang	Rompin District Council	109,599	Medium
Perak	Kuala Kangsar Municipal Council	108,504	Medium
Sabah	Beluran District Council	104,484	Medium
Pahang	Pekan District Council	103,839	Medium
Johor	Segamat District Council	103,035	Medium
Sabah	Tuaran District Council	102,411	Medium
Negeri Sembilan	Port Dickson Municipal Council	101,073	Medium
Terengganu	Marang District Council	95,283	Low
Pahang	Bera District Council	94,105	Low
Sabah	Ranau District Council	94,092	Low
Johor	Pontian District Council	93,651	Low
Kedah	Pendang District Council	93,598	Low
Kedah	Langkawi Municipal Council	92,784	Low
Pahang	Raub District Council	91,731	Low
Sabah	Kota Belud District Council	91,272	Low
Sarawak	Kapit District Council	90,551	Low
Perak	Kampar District Council	90,313	Low
Sarawak	Serian District Council	89,078	Low
Pahang	Jerantut District Council	88,035	Low
Kelantan	Gua Musang District Council	86,189	Low
Johor	Kota Tinggi District Council	84,971	Low
W.P Labuan	Labuan Corporation	83,920	Low
Sabah	Kudat Town Board	83,140	Low
Perak	Batu Gajah District Council	79,969	Low
Kelantan	Bachok District Council	77,447	Low
Perak	Tapah District Council	75,292	Low
Pahang	Lipis District Council	74,581	Low
Terengganu	Hulu Terengganu District Council	70,800	Low
W.P Putrajaya	Putrajaya Corporation	68,361	Low
Kedah	Yan District Council	66,606	Low
Kedah	Sik District Council	66,387	Low
Sabah	Kota Marudu District Council	66,374	Low
Sarawak	Sri Aman District Council	64,500	Low
Sabah	Beaufort District Council	64,350	Low
Kelantan	Kuala Krai District Council	63,575	Low
Sarawak	Marudi District Council	62,883	Low
Kedah	Padang Terap District Council	61,970	Low
Negeri Sembilan	Jempol District Council	61,308	Low

Sabah	Kunak District Council	61,094	Low
Sarawak	Betong District Council	60,728	Low
Sarawak	Dalat & Mukah District Council	60,004	Low
Sarawak	Maradong & Julau District Council	59,301	Low
Perak	Perak Tengah District Council	58,816	Low
Negeri Sembilan	Tampin District Council	57,506	Low
Kelantan	Machang District Council	56,937	Low
Sarawak	Sarikei District Council	56,228	Low
Sarawak	Subis District Council	55,733	Low
Sabah	Putatan District Council	54,733	Low
Terengganu	Setiu District Council	54,563	Low
Johor	Yong Peng District Council	53,223	Low
Sarawak	Bau District Council	52,760	Low
Perak	Tanjong Malim District Council	50,575	Low
Johor	Simpang Renggam District Council	47,583	Low
Sarawak	Limbang District Council	46,980	Low
Sarawak	Matu & Daro District Council	46,927	Low
Johor	Pasir Gudang Municipal Council	46,571	Low
Selangor	Sabak Bernam District Council	46,354	Low
Sarawak	Saratok District Council	45,015	Low
Negeri Sembilan	Kuala Pilah District Council	43,791	Low
Kedah	Bandar Baharu District Council	41,352	Low
Kelantan	Dabong District Council	40,659	Low
Sarawak	Simunjan District Council	38,324	Low
Sabah	Pitas District Council	37,808	Low
Sarawak	Lawas District Council	37,212	Low
Sabah	Tambunan District Council	35,667	Low
Sabah	Sipitang District Council	34,862	Low
Pahang	Cameron Highlands District Council	34,510	Low
Johor	Mersing District Council	33,741	Low
Kelantan	Jeli District Council	33,186	Low
Sarawak	Lundu District Council	32,568	Low
Johor	Labis District Council	32,540	Low
Sabah	Nabawan District Council	31,807	Low
Perak	Gerik District Council	31,291	Low
Perak	Selama District Council	30,449	Low
Negeri Sembilan	Rembau District Council	29,595	Low
Sarawak	Kanowit District Council	28,259	Low
Sarawak	Lubok Antu District Council	27,363	Low
Negeri Sembilan	Jelebu District Council	26,608	Low
Sarawak	Luar Bandar Sibu District Council	22,318	Low
Sabah	Kuala Penyu District Council	18,958	Low
Perak	Pengkalan Hulu District Council	15,878	Low
Perak	Lenggong District Council	13,378	Low
Pahang	Tioman Development Authority	432	Low

LIST OF PUBLICATIONS

Journals with Impact Factor

1. **Haneem, F.**, Kama, N., Taskin, N., Pauleen, D., & Bakar, N. A. A. (2018). Determinants of Master Data Management Adoption by Local Government Organizations: An Empirical Study. 96(16):5510-5521 (**Q1, Web of Science)**

2. **Haneem, F.**, & Kama, N. (2018). Critical Influential Determinants of IT Innovation Adoption at Organizational Level in Local Government Context. IET Software, (Accepted) (**Q3, Web of Science)**

Indexed Journals

3. **Haneem, F.**, & Kama, N. (2018). Recent Progress of Factors Influencing Information Technology Adoption in Local Government Context. Journal of Theoretical and Applied Information Technology, 96(16), 5510-5521 **(Indexed by SCOPUS)**

4. **Haneem, F.**, Kama, N., Azmi, A., Azizan, A., Sam, S. M., Yusop, O., & Abas, H. (2017). Master data definition and the privacy classification in government agencies: Case studies of local government. Advanced Science Letters, 23(6), 5094–5097. **(Indexed by SCOPUS)**

5. **Haneem, F.**, Kama, N., Ali, R., & Selamat, A. (2017). Applying Data Analytics Approach in Systematic Literature Review: Master Data Management Case Study. Frontiers in Artificial Intelligence and Applications, 297, 705–715. **(Indexed by SCOPUS)**

6. **Haneem, F.**, Azmi, A., & Kama, N. (2017). Co-dependence relationship between master data management and data quality: A review. Journal of

Theoretical and Applied Information Technology, 95(22), 6323–6335. **(Indexed by SCOPUS)**

7. **Haneem, F.**, Kama, N., & Azmi, A. (2016). Master Data Identification in Public Sector Organisations. Advanced Science Letters, 22(10), 2999–3003. **(Indexed by SCOPUS)**

Indexed Conference Proceedings

8. **Haneem, F**., Ali, R., Kama, N., & Basri, S. (2017). Descriptive Analysis and Text Analysis in Systematic Literature Review: A review of Master Data Management. In *International Conference on Research and Innovation in Information Systems, ICRIIS*. **(Indexed by SCOPUS)**

9. **Haneem, F.**, Ali, R., Kama, N., & Basri, S. (2017). Resolving data duplication, inaccuracy and inconsistency issues using Master Data Management. In *International Conference on Research and Innovation in Information Systems, ICRIIS*. **(Indexed by SCOPUS)**

Non-Indexed Conference Proceedings

10. **Haneem, F.**, Kama, N., & Azmi, A. (2018). A Model of Factor Influencing Data Sharing for Master Data Management. In *4th International Conference on Information Technology and Computer Science*. Siem Reap: Innovative Research Publication.

11. **Haneem, F.**, Kama, N., & Ali, R. (2016). Risk Factors in Master Data Management Implementation. In Postgraduate Annual Research on Informatics Seminar. Kuala Lumpur.