Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

WASTE MANAGEMENT SATISFACTION AMONG LOCAL FOLKS IN KELANTAN DISTRICTS

Mohamad Rahimi Mohamad Rosman[1*]
Faizal Haini Fadzil [2]
Nurulannisa Abdullah [3]
Izzatil Husna Arshad [4]
Mohamad Sayuti Md. Saleh [5]
Mohd Zafian Mohd Zawawi [6]

[1] Information Science Studies; (Email: rahimimr@uitm.edu.my)
[2] Information Science Studies; (Email: faizal958@uitm.edu.my)
[3] Information Science Studies; (Email: annisa@uitm.edu.my)
[4] Information Science Studies; (Email: husna672@uitm.edu.my)
[5] Business and Management; (Email: sayuti16@uitm.edu.my)
[6] Information Science Studies; (Email: zaffian@uitm.edu.my)
* Correspondence: rahimimr@uitm.edu.my

Article history
Received date : 15-8-2024
Revised date : 16-8-2024
Accepted date : 7-9-2024
Published date : 15-10-2024

To cite this document:
Mohamad Rosman, M. R., Fadzil, F. H., Abdullah, N., Arshad, I. H., Md. Saleh, M. S., & Mohd Zawawi, M. Z. (2024). Waste management satisfaction among local folks in Kelantan districts. *Journal of Islamic, Social, Economics and Development (JISED)*, 9 (66), 668 – 681.

Abstract: *Waste management is one of the issues that seem like an unfinished business. Everyday communities as well as local district offices face multiple problems related to waste management – especially related to disposal, sustainability, collection schedule, lack of bins, and inefficient waste management. Thus, this study looks upon the dearth of empirical evidence on the influence of information system characteristics towards efficient waste management approach – mainly towards user satisfaction. A quantitative research methodology was developed. Data was collected from all districts in Kelantan. Next, SmartPLS 4.0 was used for inferential data analysis. The findings show that local government approach, waste management services, policy and law, and subjective norms have a positive and significant influence on user satisfaction, while awareness has an insignificant impact on user satisfaction.*

Keywords: *waste, management, sustainability.*

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

Introduction

Waste Management is one of the crucial activities performed by local authorities. Its ensure that we are living in a sustainable environment, as well as guarantee a safer future to the next generation. However, for years the volumes of waste have increased significantly, indicating that more effort is needed to combat the problem associated with waste management.

In Kelantan, waste management was performed by local authorities that has been appointed; namely Majlis Perbandaran Kota Bharu Bandar Raya Islam, Majlis Daerah Tanah Merah, Majlis Daerah Tumpat, Majlis Daerah Ketereh, Majlis Daerah Kuala Krai, Majlis Daerah Bachok Bandar Pelancongan Islam, Majlis Daerah Gua Musang, Majlis Daerah Pasir Puteh, Majlis Daerah Jeli, Majlis Daerah Pasir Mas, Majlis Daerah Machang, and Majlis Daerah Dabong. The local authorities were responsible for collecting, managing, and disposal of waste throughout the state of Kelantan. The importance of the roles is undeniable and warrant for further exploration.

Thus, the aim of this paper is twofold; first, we look into the factors that influence the waste management efficiency in the context of Kelantan state, and second, we investigate the level of satisfaction for waste management in Kelantan. The following subsection is arranged as follows; first, we provide brief literature on waste management and information system management. Then, the finding of the studies was discussed, with discussion on future recommendation.

Literature Review

Influence of Information System on Waste Management Efficiency

a. Information Technology Adoption in Waste Management

In order to understand the influence of information systems towards waste management, previous research and papers related to technology adoptions in various industries were analysed. M F Omar, et. al. (2016) has proposed the implementation of smart waste management (SWM) in Malaysia to enhance the city management and to provide better services to the public by having smart city applications. The system can be described as a waste collection system that employing the Internet of Things (IoT) with the technology of smart wireless sensors. The sensors are able to gather fill-level data from waste containers (real-time mode) and provide a waste monitoring solution that helps in saving waste collection costs

According to Monzambe et al. (2021), the implementation of artificial intelligence (AI) in the development of computing strategies to solve municipal solid waste management problems has been increased. Furthermore, Andeobu, et al. (2022) stated that AI application in solid waste management has provide a lot of benefits, especially in evaluation of; 1) safe and harmful by-products, 2) leachate and other pollutants, and 3) beneficial by-products (energy and biogas, etc.). The information system's influence can further be viewed from a comprehensive review conducted by Zhechen, Z., et. al. (2024) on municipal solid waste management in various countries specifically in African and Asian region; the review suggested that countries may have to consider to focus on intelligent techniques and digital innovation. This approach will contribute to the sustainable development in all industries.

Moreover, Mahdi Mohammed Abdullah Abkar, et. al. (2024) has discussed some utilisation of systems that assisting the construction industry in Malaysia. Firstly, Industrialized Building

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

System (IBS) has been recognized as an effective approach to improve construction performance by contributing to waste reduction, improving productivity, as well as decreasing environmental harm by focusing on off-site prefabrication and modularization. Secondly, Building Information Modelling (BIM) aids in design processes by providing 3D modelling software, open access to information and contribute to multidisciplinary integration within the context of waste management.

In Malaysian palm oil sector, technology adoption including mulching, CHP systems, POME anaerobic digestion, and direct co-firing of PKS has already lead to 68.80% reduction in theoretical emissions (Jaya Prasanth Rajakal, et. al., 2024). Furthermore, in energy management sector, correct understanding of energy efficiency methods and cutting edge technology helps organisations to be more sustainable in terms of energy consumption; lead to lower emissions and better environmental performance (Mohammed Hammam Mohammed Al-Madani, et. al., 2024).

The advancement of technology has shown increase productions and usage of electrical and electronic gadget in Malaysia, such as laptops, calculators, personal computers, mobile devices, etc. Information technology (IT) may contribute to efficient waste management by the development of information system, however, improper usage of IT products may also contribute to increasing e-waste. E-waste requires proper handling of disposal process; whereby informal disposal practise and open burnt may discharges harmful chemicals. Therefore, Krishnaswamy Jayaraman, et. al (2019) highlighted that green design is essential in reducing upstream and downstream e-waste generation, while consumers' choice on green and environmental friendly appliances is similarly important. Thus, information distribution on guidelines of electronic products usage and guidelines of proper disposal process is needed to support green initiatives and to instil consumers' awareness. Moreover, green initiatives are also related with recycling efforts, thus, effective distribution of recycling information is needed to educate consumers of basic recycling etiquette (Yiing Chiee Moh, and Latifah Abd Manaf, 2014).

b. Importance of Information System in Waste Management

Various researchers progressively year by year, recommended information systems or data repositories be developed to manage information that could aid in efficient waste management. In the other hand, information systems can also be the platform for information distribution to guide proper handling of works and materials in various sectors, thus, help in minimizing waste. Mohd Dinie & Mashitah Mat Don (2013) suggested sustainable municipal solid waste (MSW) management system to be prioritised and utilised to ensure information accessibility on the characteristics of waste generated. Broadcasting medias, newspaper, billboards, internet sources are also important medium to distribute information pertaining solid waste management and recycling initiatives (Yiing Chiee Moh, and Latifah Abd Manaf (2014). Krishnaswamy Jayaraman, et. al (2019) pointed out on the similar direction, whereby utilisation of social media networks is suggested to promote green Malaysia initiatives and to share proper disposal practise of e-waste. Krishnaswamy Jayaraman, et. al (2019) also suggested that companies should provide detail information to the consumers about hazardous materials and ways to dispose them. Thus, to do so, companies may consider to provide e-brochure that consumers can refer to anytime and anywhere while using and handling their gadgets.

According to Haikal Ismail, and Marlia M. Hanafiah (2020), continuous research initiatives are important to ensure ongoing evaluation of e-waste, which covers various aspects of

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

investigation. These research efforts lead to essential information gathering, as well as valuable information be kept for future reference for developing and maintaining sustainable e-waste management. Not only that, Haikal Ismail and Marlia M. Hanafiah (2021) also suggested for data inventory development which keeps information of 1) environmental constraints affecting e-waste management, as well as, 2) economic and social factors affecting e-waste management.

Furthermore, Mahdi Mohammed Abdullah Abkar, et. al. (2024) emphasized that utilisation of Building Information Modeling (BIM) can support to reduce waste and reduce construction errors, while improving communication and work efficiency. As a result, resource conservation, energy efficiency, material preservation, and waste reduction can be achieved. Lastly, managers can also employ 3D-BIM to examine site layout plans against predefined regulations; to ensure conflict-free alignment with the design before beginning with construction processes.

Nonetheless, adoption of information systems involves maintenance costs. Therefore, information system development for waste management must be thoroughly planned and analysed to ensure it is sustainable and reliable, while considering affordable cost that local authority can bear for development and maintenance.

Roles of Local Authority in Waste Management Efficiency

A few papers which discussed about initiatives by local authority and government bodies in Malaysia have been scrutinized. The initiatives include regulations, orders, guidelines, as well as efforts, such as campaign. The discussions are simplified as in Table 1.

Table 1: Initiatives by Local Authority and Government in Malaysia for Efficient Waste Management

• ***1974: Environmental Quality Act 1974 (ACT 127)*** Department of Environment (DOE), Malaysia was established to manage, coordinate and formulate environmental laws and regulations for environmental protection. The jurisdiction was on the scheduled/hazardous waste generated by the industrial sector.	Haikal Ismail and Marlia M. Hanafiah (2019)
• ***1977: Environmental Quality (Licensing) Regulation 1977***	Haikal Ismail and Marlia M. Hanafiah (2019)
• **1987: Environmental Quality (Presribed Activities) (Environmental Impact Assessment) Order 1987**	Haikal Ismail and Marlia M. Hanafiah (2019)
• ***1988 - Action Plan for a Beautiful and Clean (ABC) Malaysia***	Mohd Dinie Muhaimin Samsudin and Mashitah Mat Don (2013)
• ***1989: Environmental Quality (Scheduled Wastes) Regulation 2005 – Enacted 1989, Revised 2005*** • ***1989: Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Facilities) Regulation 2006 - Enacted 1989, Revised 2006*** • ***1989: Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989*** Revision in August 2005 extended the responsibility of the DOE to monitor scheduled/hazardous waste generated by	Haikal Ismail and Marlia M. Hanafiah (2019)

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

the industrial sector and nonindustrial sectors, such as households. 77 categories of scheduled/hazardous waste were recognized, including e-waste (was coded as SW110, SW103, SW109). The disposal of scheduled/hazardous waste from the industrial sector requires appropriate treatment and disposal at licensed facilities. Any activities of scheduled/hazardous waste from its generation, collection and transportation until its treatment and disposal, were to fall under regulations that were enforced by the DOE.	
• ***2005: Environmental Quality Prescribed Conveyance) (Scheduled Wastes) Order 2005*** This order concerns on collection and transportation activities of scheduled/ hazardous waste. DOE was issued the Guidelines for Classification of Used Electrical and Electronic Equipment as a guideline to all stakeholders involved in the international trade of used electrical and electrical equipment.	Haikal Ismail and Marlia M. Hanafiah (2019)
• ***2006: Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 2006***	Haikal Ismail and Marlia M. Hanafiah (2019)
• ***2007: Malaysia Solid Waste and Public Cleansing Management Act 2007 (Act 672)*** Disposal of any solid waste could be by any means of destruction, incineration and deposit or decomposing.	Moh and Latifah Abd Manaf (2014)
• ***2008: Guidelines for Classification of Used Electrical and Electronic Equipment 2010 (First Edition 2006, Second Edition 2010)***	Haikal Ismail and Marlia M. Hanafiah (2019)
• ***2012: Customs (Prohibition of Exports) Order 2012***	Haikal Ismail and Marlia M. Hanafiah (2019)
• ***2014: The SWCorp Strategic Plan 2014–2020*** This plan aims to create clean culture and reducing the generation of solid waste, yet the public also enhanced their understanding of solid waste classification.	Zhechen, et. al (2024)
• ***2015: Environmental Quality (Presribed Activities) (Environmental Impact Assessment) Order 2015***	Haikal Ismail and Marlia M. Hanafiah (2019)
E-Waste Management Initiatives The government of Malaysia through DOE aims to safeguard the safe, effective, and economically beneficial management of e-waste in Malaysia by; 1) Enforcing Law and Regulation, 2) Revision of Environmental Regulation, 3) Promotion of E-Waste Recovery Activities, 4) International Collaboration, such as with Japan International Collaboration Agency (JICA) Continuous collaboration between DOE and JICA (since 2011). Several projects were introduced;	Haikal Ismail and Marlia M. Hanafiah (2021): Haikal Ismail and Marlia M. Hanafiah (2019): DOE (2017): Fatihah Suja, et. al. (2014). Krishnaswamy Jayaraman, et. al. (2019): Moh and Latifah Abd Manaf (2014): Kang, et. al. (2020).

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

• The Project for Model Development for E-Waste Collection, Segregation and Transportation from Household for Recycling" (2011) • The Project for Development of Mechanism for Household E-waste Management (2015). Furthermore, the proposal of a new regulation, known as the 'Household Scheduled Waste Regulation 201X'. Moreover, e-waste of no commercial value must be disposed of at sites/premises licensed by DOE. DOE provides guidelines for industrial e-waste. DOE also manages schedule or hazardous waste and clinical waste is under the Ministry of Health (MOH).	
'Reduce, Reuse, Recycle' (3R) Initiatives • 2001: Recycle Campaign held in Penang State - The campaign's motto: "Kembalikan Sinar kepada Pulau Mutiara" (Restore the Shine to the Pearl of the Orient). • 2009: 15 recycling centres in Kuala Lumpur, 22 in Selangor, and 56 in Pahang. Plastics, paper and glass are among the three types of waste which are more identified as having the greatest potential for recycling. Malaysia's key institutional mechanism for waste recycling; • National strategic plan for solid waste management (such as recycling non-organic waste in the ***10th Malaysian Plan***) • National recycling program • The incentive for waste recycling activities	Mohd Dinie Muhaimin Samsudin and Mashitah Mat Don (2013): Moh and Latifah Abd Manaf (2014): Mahdi Mohammed Abdullah Abkar, et. al. (2024).
Municipal Solid Waste (MSW) Management Initiatives • Cabinet committee (Government of Malaysia) had recommended incineration as an alternative to landfill for MSW treatment. Incineration has been recognized as an effective effort in decreasing volume of MSW and also offers usable energy. MSW is managed by the Ministry of Housing and Local Government (MHLG). • Malaysia's National Solid Waste Management Department (NSWMD) formulates and proposes policies, plan and strategies in respect of solid waste management and public cleansing, sets standards, specifications and codes of practice exercising regulatory function and lastly, grants licenses and approval under Act 672. • Solid Waste Management and Public Cleansing Corporation (PPSPPA) runs the formulated policies, plans and strategies proposed by NSWMD, monitors compliance with standards, specifications and code of practices set by NSWMD and enforces the solid waste management and public cleansing laws.	Mohd Dinie Muhaimin Samsudin and Mashitah Mat Don (2013): Moh and Latifah Abd Manaf (2014)

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

Water and Air Quality Monitoring Initiatives Department of Environment (DOE) regularly monitors water and air quality from monitoring stations (river), sampling stations in coastal and estuarine for the assessment of marine quality	Mohd Dinie Muhaimin Samsudin and Mashitah Mat Don (2013)
Transboundary Movement of Hazardous Wastes Control • Malaysia approved the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal 1989 since October 1993. • Malaysia recognized the Ban Amendment in 2001 to prevent the transboundary movement of hazardous waste through 'legal loopholes', such as reuse, which does not require any notification and approval from the Basel Convention prior to any shipment.	DOE (2013)a: DOE (2013)b
Construction and Building Management Initiatives Industrialized Building Systems (IBS) aims to replace conventional construction methods. IBS is recognized a practical approach to improve construction performance, achieve safety and health standards, and reduce waste. Construction Industry Development Board Malaysia (CIDB) describes IBS as the method to produce construction components within a controlled environment.	Shi and Xu (2021): S. Saad, et. al. (2022): A.M. Al-Awag, et. al. (2023).
Renewable Energy (RE) / Energy Initiatives • Since 2001, Government of Malaysia provides **feed-in-tariffs,** investment tax allowances, or pioneer status to support energy efficiency and RE growth in Malaysia. The government also encouraged manufacturing firms to contribute to developing the renewable energy supply chain (RESC), which transform raw energy into useable clean energy. Malaysian manufacturing sectors handle rice husks, organic waste, and agricultural residues that can be produced into biofuels and distributed within manufacturing facilities. In 2011, **feed-in-tariffs** scheme supported the implementation of CHP systems in palm oil industry. • **The 12th Malaysia Plan** by Economic Planning Unit of the Ministry of Economy set a target of achieving carbon neutrality by 2050. • Malaysian Sustainable Palm Oil (MSPO) certification scheme. • Bursa Malaysia's environmental, social and governance framework regulates public-listed companies to meet its emissions reduction obligations. • National Biomass Action Plan (NBAP) 2023–2030 - empower and promote biomass and renewable energy industry. • Malaysia's Energy Transition Plan 2021–2040. • National Energy Efficiency Action Plan of Malaysia.	Mohammed Hammam Mohammed Al-Madani, et. al. (2024): Jaya Prasanth Rajakal, et. al. (2024): The Star (2023): Tee, Gan and Junainah Sardi (2024).

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

• Malaysia Renewable Energy Roadmap (MyRER) Tenaga Nasional Berhad (TNB) initiatives; • 2014: Smart Metering System and Advanced Metering Infrastructure (AMI) • 2018: Grid technologies to enhance efficiency of the National Grid • Environmental, Social and Governance & Economic (ESG) Agenda - Four sustainable development goals in accordance with the UN SDGs, which include UN SDG 7 (Affordable and Clean Energy), UN SDG 8 (Decent Work and Economic Growth), UN SDG 13 (Climate Action), and UN SDG 17 (Partnerships for Goals). • System Average Interruption Duration Index (SAIDI) 50 initiative; to keep the SAIDI under 50 min/consumer/year. • Promotes sustainable business performance and creates employment opportunities; growth in revenue, *zakat* (alms) contributions.	

Findings

Demographic Details

Table 2 shows the demographic details of respondents for the study. A total of 369 respondents participates in the study. Majority of respondents are female (N=210 or 56.9%) while male represented by 159 respondents (N=159 or 43.1%). In relation to respondent's age, majority of respondents are between 20 to 30 years old (N=180 or 48.8%), follows by 31 to 40 years old (N=87 or 23.6%), 41 to 51 years old (N=60 or 16.3%), 51 to 60 years old (N=33 or 8.9%), and above 60 years old (N=3 or 0.8%).

Table 2: Demographic Details of Respondents

Item	Sub Item	Frequency	Percentage
Gender	Male	159	43.1
	Female	210	56.9
Age	20 - 30	180	48.8
	31 - 40	87	23.6
	41 - 50	60	16.3
	51 - 60	33	8.9
	> 60	3	0.8

Normality and Bias

Mardia's multivariate analysis was conducted to determine the suitable of using Partial Leas Square Structural Equation Modelling (PLS-SEM) for analysing the research data. Based on suggestion from previous research, WebPower was used to analysed the research data, as suggested by Hair, Hult, Ringle, and Sarstedt (2017), Zhang and Yuan (2018), Mohamad Rosman, Ismail, and Masrek (2023), and Wulandari, Sutrisno, and Nirwana (2021). The finding indicated that the research data is slightly not not normal - indicated by Mardia's multivariate skewness (β=288.2188, p=<0.01) and Mardia's multivariate kurtosis

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

(β=820.5620, p=<0.01); thus justified the selection of SmartPLS as the tool to analyse PLS-SEM. Subsequently, SmartPLS was used to determine the common method bias (CMB) of the study. Finding shows VIF values between 1.115 to 5.115, indicating that there is no CMB issues within the data as suggested by Hair et al. (2017)

Measurement Model

The first step in SmartPLS is to established the measurement model, by monitoring several indicators which is internal consistency reliability, convergent validity and discriminant validity as suggested by (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). 6 variables were selected for the study, namely local government approach, waste management services, policy and law, subjective norms, awareness, and satisfaction.

Convergence Validity

Ramayah et al. (2018) and Hair et al. (2017) suggested that to achieve convergence validity, the findings must conform to certain standards, which is factor loading ≥ 0.7; Average Variance Extracted ≥ 0.5 and Composite Reliability ≥0.7. A total of single run was conducted for the study. Table 3 below shows the convergence validity result of the study that has meet the strict requirements of measurement model analysis. Based on the result, converngene validity has been successfully ascertained.

Table 3: Convergence Validity

Construct	Factor Loading		Cronbach's Alpha	CR	AVE
Local Government Support (LGA)	LGA1	0.916	0.919	0.949	0.861
	LGA2	0.949			
	LGA3	0.918			
Waste Management Services (WMS)	WMS1	0.945	0.949	0.963	0.867
	WMS2	0.949			
	WMS3	0.913			
	WMS4	0.916			
Policy and Law (PAL)	PAL1	0.874	0.952	0.962	0.808
	PAL2	0.939			
	PAL3	0.949			
	PAL4	0.953			
	PAL5	0.853			
	PAL6	0.815			
Subjective norms (SBN)	SBN1	0.919	0.890	0.922	0.749
	SBN2	0.882			
	SBN3	0.820			
	SBN4	0.837			
Awareness (AWA)	AWA1	0.937	0.949	0.967	0.906
	AWA2	0.961			
	AWA3	0.958			
Satisfaction (SAT)	SAT1	0.944	0.960	0.969	0.862
	SAT2	0.962			
	SAT3	0.863			
	SAT4	0.929			
	SAT5	0.941			

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

Discriminant Validity

Table 4 shows the result of discriminant validity. Two tests was conducted; the Fornell-Larcker Criterion and The Heterotrait-Monotrait ratio of correlations (HTMT). The result shows that the square root of the constructs is greater than its previous values – thus it meets the requirements for confirming discriminant validity.

Table 4: Fornell-Larcker Criterion

	AWA	LGA	PAL	SAT	SBN	WMS
AWA	0.952					
LGA	0.207	0.928				
PAL	0.260	0.770	0.899			
SAT	0.277	0.741	0.711	0.928		
SBN	0.352	0.727	0.834	0.827	0.865	
WMS	0.223	0.823	0.756	0.810	0.775	0.931

To further confirmed the discriminant validity assessment, The Heterotrait-Monotrait ratio of correlations (HTMT) was conducted. Table 5 shows the result of HTMT test. The findings indicate that there is no value greater than 0.9. Therefore, it can conclude that the discriminant validity has been ascertained; and subsequently the measurement model has been successfully established.

Table 5: The Heterotrait-Monotrait ratio of correlations (HTMT)

	AWA	LGA	PAL	SAT	SBN	WMS
AWA						
LGA	0.220					
PAL	0.280	0.816				
SAT	0.284	0.787	0.739			
SBN	0.397	0.780	0.888	0.872		
WMS	0.227	0.879	0.791	0.847	0.814	

Structural Model Analysis

Hypothesis Testing

A total of 5 hypotheses were developed for the study. A bootstrapping method was used to determine the relationship between the independent and dependent variables. independent variables were represented by local government approach, waste management services, policy and law, subjective norms, and awareness, while satisfaction toward waste management provided by the local authority is formulated as the dependent variable. Table 6 shows the final result of the study, in which one single hypothesis was rejected - it was found that Awareness has an insignificant relationship with satisfaction (H5: Not Supported, $t= 0.392$, $p>0.05$). In contrast, other hypotheses were accepted (H1: Supported, $t= 3.023$, $p<0.000$; H2: Supported, $t= 4.841$, $p<0.000$; H3: Supported, $t= 2.862$, $p<0.000$; H4: Supported, $t= 8.011$, $p<0.000$).

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

Table 6: Structural Model Assessment

Hypothesis	Relationship	t	p	Result
H1	LGA → SAT	3.023	0.003	Supported
H2	WMS → SAT	4.841	0.000	Supported
H3	PAL → SAT	2.862	0.004	Supported
H4	SBN → SAT	8.011	0.000	Supported
H5	AWA → SAT	0.392	0.695	Not Supported

Coefficient Determination Score

The next steo is to test the impact of exogenous variables (local government approach, waste management services, policy and law, subjective norms, and awareness) on the endogenous variables (satisfaction). Adjusted R Square was used instead of regular R Square, as the value of Regular R Square are too depending on the number of variables used in a study, as suggested by Wherry (1931), Akossou and Palm (2013), and Karch (2020). Table 7 shows the Coefficient Determination Score of the study. An adjusted R Suare value of 0.760 indicated that the exogenous variables can explained a total of 76.0% of variations on the endogenous variable.

Table 7: Coefficient Determination Score

Construct	R Square	R Square Adjusted	Decision	Source
Satisfaction	0.763	0.760	Moderate	Hair et al. (2017)

Effect Size

The following Table 8 shows the effect size assessment (f^2). The findings indicated an effect size ranging from small to medium (0.008 to 0.550). The largest effect size is produced by SBN → SAT (f^2=0.550) while the smallest effect size was produced by the relationship between AWR → INT (f^2=0.068). Subsequently, Figure 1 below shows the final structural model of the study.

Table 8: Effect Size

Hypothesis		f^2	Result
H1	LGA → SAT	0.141	Small
H2	WMS → SAT	0.372	Medium
H3	PAL → SAT	0.140	Small
H4	SBN → SAT	0.550	Medium
H5	AWA → SAT	0.008	Small

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

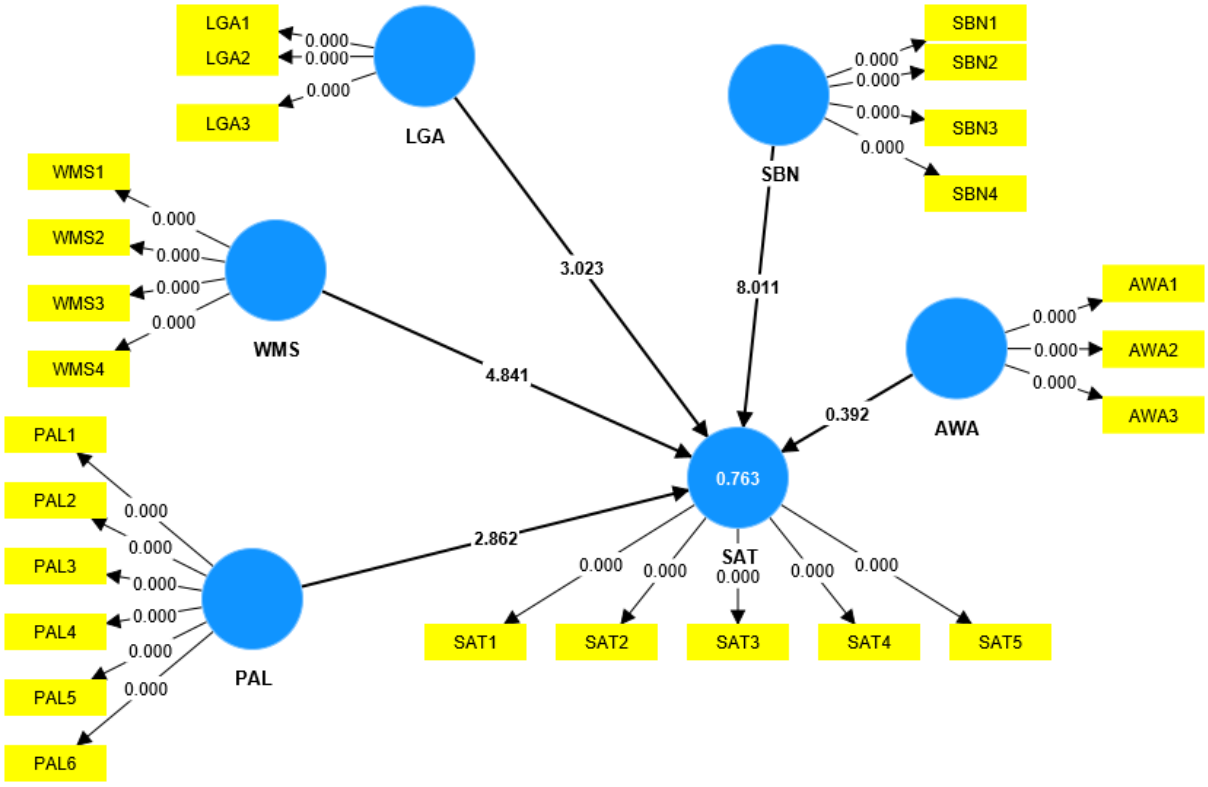

Figure 1: Final Structural Model

Discussion & Conclusion

The aim of this paper is twofold; first, we look into the factors that influence the waste management efficiency in the context of Kelantan state, and second, we investigate the level of satisfaction for waste management in Kelantan. Data was collected an analysed using SmartPLS 4.0. The results indicated that all hypotheses were accepted, except for awareness. In relation to level of satisfaction, it was found that the current level of satisfaction is moderate. Thus, more effort should be undertaken to increase the level of satisfaction among the local citizens.

This study, however, is not without limitations. First, we only use minimal numbers of indicators – future study should consider a more complex representation of a research model. Second, the study use convenience sampling – meaning that the data might not be generalized to the whole state. Future study should consider more complex and strategic sampling to cater for generalization of theory.

Acknowledgments

The authors would like to thank the financial support received from Universiti Teknologi MARA Cawangan Kelantan, Malaysia, under Internal Grant 600-TNCPI 5/3/DDN (03) (005/2022).

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

References

Akossou, A., & Palm, R. (2013). Impact of data structure on the estimators R-square and adjusted R-square in linear regression. *Int. J. Math. Comput, 20*(3), 84-93.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).

Karch, J. (2020). Improving on Adjusted R-squared. *Collabra: Psychology, 6*(1).

Mohamad Rosman, M. R., Ismail, M. N., & Masrek, M. N. (2023). Determinants and Impacts of Digital Library Engagement: Evidence from Research-Based Universities in Malaysia. *International Journal of Information Science and Management (IJISM), 21*(3), 49-65. doi:10.22034/ijism.2023.1977682.0

Ramayah, T., Cheah, J., Chuah, F., Ting, H., & Memon, M. A. (2018). Partial least squares structural equation modeling (PLS-SEM) using smartPLS 3.0. *An updated guide and practical guide to statistical analysis*.

Wherry, R. J. (1931). A new formula for predicting the shrinkage of the coefficient of multiple correlation. *The annals of mathematical statistics, 2*(4), 440-457.

Wulandari, D., Sutrisno, S., & Nirwana, M. B. (2021). Mardia's skewness and kurtosis for assessing normality assumption in multivariate regression. *Enthusiastic: International Journal of Applied Statistics and Data Science*, 1-6.

Zhang, Z., & Yuan, K.-H. (2018). Practical statistical power analysis using Webpower and R. Retrieved from https://webpower.psychstat.org

A.M. Al-Awag, W.S. Alaloul, M.S. Liew, A.O. Baarimah, M.A. Musarat (2023). The potential role of Industrialized Building Systems (IBS) in Malaysian sustainable construction: Awareness and barriers, *AIP Conf. Proc.* https://doi.org/10.1063/5.0128035.

Andeobu, L., Wibowo, S., Grandhi, S., 2022. Artificial intelligence applications for sustainable solid waste management practices in Australia: A systematic review. *Sci. Total Environ.*, 834, 155389. https://doi.org/10.1016/j.scitotenv.2022.155389.

Department of Environment (DOE) (2013)a. *Overview of scheduled waste management in Malaysia and the way forward.* Department of Environment, Malaysia.

Department of Environment (DOE), (2013)b. *Environmental Quality Report - 2013.* Department of Environment, Malaysia.

Department of Environment (DOE). (2017). *New mechanism of household e-waste management in Malaysia.* Department of Environment, Malaysia.

Fatihah Suja, Rakmi Abdul Rahman, Arij Yusof, and Mohd Shahbudin Masdar. (2014). e-Waste management scenarios in Malaysia. *Journal of Waste Management.* https://doi.org/10.1155/2014/609169.

Haikal Ismail, and Marlia M. Hanafiah. (2019). Discovering opportunities to meet the challenges of an effective waste electrical and electronic equipment recycling system in Malaysia. *Journal of Cleaner Production*, 238, 117927.

Haikal Ismail, and Marlia M. Hanafiah. (2020). A review of sustainable e-waste generation and management: Present and future perspectives. *Journal of Environmental Management*, 264, 110495. https://doi.org/10.1016/j.jenvman.2020.110495.

Haikal Ismail, and Marlia M. Hanafiah. (2021). Evaluation of e-waste management systems in Malaysia using life cycle assessment and material flow analysis. *Journal of Cleaner Production*, 308, 127358. https://doi.org/10.1016/j.jclepro.2021.127358.

Jaya Prasanth Rajakal, Foo, Y. N, Anna Zulkifli, Bing, S. H., Jaka Sunarso, Ng, Denny K.S., and Viknesh Andiappan. (2024). Analysis of current state, gaps, and opportunities for technologies in the Malaysian oil palm estates and palm oil mills towards net-zero emissions. *Heliyon*, 10, e30768. https://doi.org/10.1016/j.heliyon.2024.e30768.

Volume: 9 Issues: 66 [September, 2024] pp. 668 - 681
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.jised.com
DOI: 10.55573/JISED.096655

Kang, Kai Dean, Kang, Harnyi, Ilankoon, I.M.S.K., and Chong, Chun Yong. (2020). Electronic waste collection systems using Internet of Things (IoT): Household electronic waste management in Malaysia. *Journal of Cleaner Production,* 252, 119801. https://doi.org/10.1016/j.jclepro.2019.119801.

Krishnaswamy Jayaraman, Seela Vejayon, Shruthi Raman, and Imtiaz Mostafiz. (2019). The proposed e-waste management model from the conviction of individual laptop disposal practices: An empirical study in Malaysia. *Journal of Cleaner Production*, 208, 688-696. https://doi.org/10.1016/j.jclepro.2018.10.125

M F Omar, et. al. (2016). Implementation of spatial smart waste management system in Malaysia. *IOP Conf. Series: Earth and Environmental Science,* 37, 012059. doi:10.1088/1755-1315/37/1/012059

Mahdi Mohammed Abdullah Abkar, Riduan Yunus, Yaser Gamil, and Mohammed Abdo Albaom. (2024). Enhancing construction site performance through technology and management practices as material waste mitigation in the Malaysian construction industry. *Heliyon*, 10, e28721. https://doi.org/10.1016/j.heliyon.2024.e28721

Moh, Yiing Chiee, and Latifah Abd Manaf (2014). Overview of household solid waste recycling policy status and challenges in Malaysia. *Resources, Conservation and Recycling*, 82, 50– 61. http://dx.doi.org/10.1016/j.resconrec.2013.11.004

Mohammed Hammam Mohammed Al-Madani, Yudi Fernando, Mohammad Iranmanesh, Ming K. L., and Ming, L. T. (2024). Renewable energy supply chain in Malaysia: Fostering energy management practices and ecological performance. *Renewable Energy*, 120441. https://doi.org/10.1016/j.renene.2024.120441.

Mohd Dinie Muhaimin Samsudin, and Mashitah Mat Don. (2013). Municipal solid waste management in Malaysia: Current practices, challenges and prospects. *Jurnal Teknologi (Sciences & Engineering),* 62 (1), 95–101. DOI: 10.11113/jt.v62.1293.

Monzambe, G.M., Mpofu, K., Daniyan, I.A., 2021. Optimal location of landfills and transfer stations for municipal solid waste in developing countries using non-linear programming. *Sustain. Futures 3,* 100046. https://doi.org/10.1016/j. sftr.2021.100046.

S. Saad, W.S. Alaloul, S. Ammad, M. Altaf, A.H. Qureshi. (2022). Identification of critical success factors for the adoption of Industrialized Building System (IBS) in the Malaysian construction industry, *Ain Shams Eng. J., 13 (2),* 101547. https://doi.org/10.1016/j.asej.2021.06.031.

Shi, Y., and Xu, J. (2021). BIM-based information system for econo-enviro-friendly end-of-life disposal of construction and demolition waste, *Autom. ConStruct.*,125 103611, https://doi.org/10.1016/j.autcon.2021.103611.

Tee, W. H., Gan, C. K., and Junainah Sardi. (2024). Benefits of energy storage systems and its potential applications in Malaysia: A review. *Renewable and Sustainable Energy Reviews*, 192, 114216. https://doi.org/10.1016/j.rser.2023.114216

The Star. (2023). *Biomass is the future*. Retrieved from: https://www.thestar.com.my/news/nation/2023/12/08/biomass-is-the-future.

Zhechen, Zhang, et. al (2024). Municipal solid waste management challenges in developing regions: A comprehensive review and future perspectives for Asia and Africa. *Science of the Total Environment,* 930172794. https://doi.org/10.1016/j.scitotenv.2024.172794.