

“I hereby acknowledge that this project paper has been accepted as part fulfilment for the degree of Bachelor of Technology Management (Hons) in Technology Innovation”

Signature :

Supervisor : DR. FARARISHAH BINTI ABDUL KHALID

Date :

Signature :

Evaluator : DR. NORHIDAYAH BINTI MOHAMAD

Date :

FACTORS TO ENHANCE PRODUCTIVITY BY UTILISING WASTE
MANAGEMENT IN MALACCA MANUFACTURING SMEs

RABIAH ADUWIYAH BINTI BUBIN

Report submitted in fulfilment of the requirement for the degree of Bachelor of
Technology Management (Innovation Technology) with Honours

Faculty of Technology Management and Technopreneurship

Universiti Teknikal Malaysia Melaka

JUNE 2016

“I declare that this project is the result of my own research except as cited in the references. The research project has not been for any degree and is not concurrently submitted in candidature of any degree.”

Signature :

Name :

Date :

DEDICATION

For my parents, the greatest tutors and joys of my life, for my siblings whom company enlighten my heart, to myself for all the hardships and the memories, and for the faculty for the knowledge and the opportunities.

ACKNOWLEDGEMENT

My utmost gratitude and appreciation goes to ALLAH Al-mighty, for without the lord mercy and blessings, I would not be able to further my study and be where I am today. My deepest thanks go to my parents and siblings for their moral supports and constant advices enriched me with different perspectives and solutions on problems and challenges encountered. My thanks also go to my teammates and classmates who had shared their knowledge with me and whom I had spent my Bachelor degree student life with. My expression of gratitude also goes to my supervisor, Dr. Fararishah Binti Abdul Khalid for her supervision and advices during the course of completing this research paper.

ABSTRACT

This research study seeks to provide further understanding of waste management implication towards productivity rate. The Unified Theory of Acceptance and Use of Technology (UTAUT) formulated by Venkatesh et al. (2003) were used as the factors for waste management evaluation on productivity rate. The researcher implemented quantitative research design as the methodology of the research paper. Questionnaires were distributed to 220 respondents in Malacca manufacturing SMEs, with 173 returned questionnaires, and 150 valid questionnaires, a 68% response rate. Data collected were analysed using SPSS (Statistical Package for Social Sciences) version 20.0. Analysis from SPSS 20.0 implied that PE (.000, $p < .05$), EE (.040, $p < .05$), SI (.001, $p < .05$), and FC (.002, $P < .05$) significantly enhance productivity in the SMEs, when waste management were used in the companies. The researcher suggests that future studies should incorporate other state in the research study; to include UTAUT moderating factors; and to utilize other statistical measures, in order to obtain more diverse data variance and data interpretations.

Keywords: Waste management, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, SME, Productivity enhancement

ABSTRAK

Kertas kajian ini bertujuan untuk memberi kefahaman yang lebih mendalam mengenai kesan pengurusan sisa terhadap peningkatan produktiviti. Unified Theory of Acceptance and Use of Technology (UTAUT) dirumuskan oleh Venkatesh et al. (2003) telah digunakan sebagai faktor untuk menilai produktiviti berdasarkan pengurusan sisa. Penyelidik menggunakan kaedah kajian kuantitatif sebagai metodologi kertas penyelidikan. Borang soal selidik telah diedarkan kepada 220 responden dalam PKS pembuatan negeri Melaka, daripada 173 borang soal selidik yang dikembalikan, hanya 150 borang soal selidik yang sah untuk digunakan, kadar respon borang soal selidik ialah 68%. Data yang diperolehi dianalisis menggunakan SPSS (Statistical Package for Social Sciences) versi 20.0. Analisis daripada SPSS 20.0 mempamerkan bahawa PE (.000, $p < .05$), EE (.040, $p < .05$), SI (.001, $p < .05$), dan FC (.002, $P < .05$) ketara dalam meningkatkan produktiviti PKS, apabila mereka menggunakan pengurusan sisa. Penyelidik mencadangkan pengkaji masa hadapan untuk mengkaji negeri lain dalam kajian penyelidikan; menggunakan faktor moderator UTAUT dalam kajian penyelidikan; dan menggunakan kaedah analisis statistik lain, bagi mendapatkan data variasi yang pelbagai di samping memperolehi tafsiran data yang lebih mendalam.

Kata Kunci: Pengurusan sisa, Jangkaan Prestasi, Jangkaan Usaha, Pengaruh Sosial, Situasi Memudahkan, PKS, Peningkatan produktiviti.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	<i>ABSTRAK</i>	vi
	TABLE OF CONTENT	vii
	LIST OF TABLES	xi
	LIST OF FIGURES	xiii
	LIST OF ABBREVIATIONS	xiv
	LIST OF APPENDICES	xvi
CHAPTER 1	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Background of Research	2
	1.3 Problem Statement	3
	1.4 Research Objectives	6
	1.5 Research Questions	6
	1.6 Scope, Limitation and Key Assumption of the Study	7
	1.7 Importance of the Study	7
	1.8 Summary	8

CHAPTER 2	LITERATURE REVIEW	9
2.1	Introduction	9
2.2	Waste Management	10
2.2.1	Waste Treatment	10
2.2.2	Waste Diversion & Waste Minimization	12
2.3	Small Medium Enterprises (SMEs)	15
2.4	Productivity Enhancement	16
2.5	Adopted Model: UTAUT	18
2.6	Theoretical Framework	21
2.7	Research Hypotheses	22
2.8	Summary	23
CHAPTER 3	RESEARCH METHODOLOGY	24
3.1	Introduction	24
3.2	Research Design	25
3.3	Methodological Choices	25
3.3.1	Quantitative Research Design	26
3.3.2	Data Collection	27
3.3.3	Data Sources	27
3.3.3.1	Primary Data	28
3.3.3.2	Secondary Data	28
3.3.4	Data Analysis	29
3.3.4.1	SPSS 20.0	29
3.3.4.2	Correlation Coefficient	30
3.3.4.3	Linear Regression Analysis	30
3.4	Research Strategy	32
3.4.1	Sampling Method	33
3.4.2	Questionnaire	33
3.4.3	Pilot Study	37
3.5	Location	37
3.6	Time Horizon	39
3.7	Scientific Canons	39

3.7.1	Reliability Test	39
3.7.2	Validity Test	40
3.8	Summary	41
CHAPTER 4	RESULT AND ANALYSIS	42
4.1	Introduction	42
4.2	Pilot Study	43
4.2.1	Pilot Study Reliability Test	43
4.3	Validity and Reliability Analysis	46
4.3.1	Validity Analysis	46
4.3.1.1	Correlation Analysis	48
4.3.2	Reliability Analysis	49
4.4	Descriptive Analysis	51
4.4.1	Company Profile	51
4.4.1.1	Manufacturing Sector	52
4.4.1.2	Company Operation	54
4.4.1.3	Waste Management	56
4.4.2	Descriptive Statistics for Each Construct	58
4.4.2.1	Descriptive Statistics for Performance Expectancy	59
4.4.2.2	Descriptive Statistics for Effort Expectancy	61
4.4.2.3	Descriptive Statistics for Social Influence	63
4.4.2.4	Descriptive Statistics for Facilitating Condition	65
4.4.2.5	Descriptive Statistics for Productivity Enhancement	68
4.5	Inferential Analysis	70
4.5.1	Simple Regression Analysis	70
4.5.2	Multiple Regression Analysis	79
4.6	Summary	82

CHAPTER 5	DISCUSSION AND CONCLUSION	83
	5.1 Introduction	83
	5.2 Discussion	83
	5.3 Conclusion	88
REFERENCES		90
APPENDICES		95

LIST OF TABLES

TABLE	TITLE	PAGE
1.1	Disposal method of generated scheduled wastes by industries	5
2.1	UTAUT Constructs	20
3.1	Determining Sample Size for Research Activities	36
4.1	Cronbach's alpha coefficient range and strength of association	44
4.1.1	Pilot Study Reliability Test	45
4.2	Validity of questionnaire	46
4.2.1	Correlations analysis for all variables	48
4.3	Reliability Test	50
4.3.1	Overall Reliability Statistics of Cronbach's Alpha	50
4.4	Manufacturing Sector	52

4.5	Company Operation	54
4.6	Waste Management	56
4.7	Descriptive Statistics	58
4.8	Descriptive Statistics for Performance Expectancy	59
4.9	Descriptive Statistics for Effort Expectancy	61
4.10	Descriptive Statistics for Social Influence	63
4.11	Descriptive Statistics for Facilitating Condition	65
4.12	Descriptive Statistics for Productivity Enhancement	68
4.13	Simple Regression Analysis for Performance Expectancy	71
4.14	Simple Regression Analysis for Effort Expectancy	73
4.15	Simple Regression Analysis for Social Influences	75
4.16	Simple Regression Analysis for Facilitating Conditions	77
4.17	Model Summary of Multiple Regression Analysis	79
4.18	ANOVA of Multiple Regression Analysis	80
4.19	Coefficients of Multiple Regression Analysis	81

LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Waste Management Hierarchy	14
2.2	UTAUT (Unified Theory of Acceptance and Use of Technology)	18
2.3	Theoretical Framework of the research paper	21
4.1	Manufacturing Sector	53
4.2	Company Operation	55
4.3	Waste Management	57

LIST OF ABBREVIATIONS

3Rs	Reduce, Reuse, Recycle
ANOVA	Analysis of Variance
APO	Asian Productivity Organization
BI	Behavioural Intention
DOE	Department of Environment
DV	Dependent Variable
EE	Effort Expectancy
FC	Facilitating Conditions
GLCs	Government-Linked Corporations
H ₀	Null Hypothesis
H ₁	Alternative Hypothesis
IV	Independent Variable
MHLG	Ministry of Housing and Local Government
MNCs	Multi-National Corporations
MRA	Multiple Regression Analysis
MSW	Municipal Solid Waste
NGOs	Non-Governmental Organizations
OECD	Organisation for Economic Co-operation and Development
OPAC	Online Public Access Catalog
P	Productivity Enhancement
PE	Performance Expectancy
PPCM	Pearson Product-Moment Correlation
RM	Ringgit Malaysia

SI	Social Influence
Sig.	Significance
SME	Small and Medium Enterprises
SMIDEC	Small and Medium Industries Development Corporation
SPSS	Statistical Package for Social Sciences
SRA	Simple Regression Analysis
UB	Use Behaviour
UNCRD	United Nations Centre for Regional Department
UNESCO	United Nations Educational, Scientific and Cultural Organization
USEPA	United States Environmental Protection Agency
UTAUT	Unified Theory of Acceptance and Use of Technology
WSP	Waste Service Provider

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Pearson Product-Moment Correlation	93
B	Gantt Chart	95
C	Questionnaire	97

CHAPTER 1

INTRODUCTION

1.1 Introduction

Waste management is a crucial issue that needed to be addressed by all business sectors especially those of manufacturing sector. Manufacturing sector is one of the sectors that produce the most amounts of wastes due to their nature of business. According to Mohamed (2009), in Malaysia, manufacturing sector had contributed an overall Gross Domestic Product (GDP) from 13.9% in 1970 to 31.9% in 2000 (Malaysia, 2006). Current municipal solid waste (MSW) generated in Malaysia ranged between 1.2-1.5 kg per capita resulting in the waste generation of 30,000 tonnes per day (Fauziah and Agamuthu, 2012). Failure to manage waste will impact various parties such as the stakeholders, the community, and the environment. Ishak (2002) stated that Malaysia has been practising end-of-pipe treatment or regulation in managing waste. Malaysia rules and regulations regarding waste management are not stringent enough to prevent tonnes of waste disposal per month. Nevertheless, in Malaysia, waste management and waste minimization is not the sole responsibility of local authorities, but it is also the responsibility of most government agencies such as the Ministry of Housing and Local Government (MHLG), the

Ministry of Environment, the Ministry Of Health, the various academic institutions and Non-Governmental Organizations (NGOs) (Sreenivasan et al., n.d). Larger companies in Malaysia are fared better in addressing their waste management issue compared to the small and medium companies due to financial constraints and other challenges.

1.2 Background of Research

Malaysian definition of waste according to the law is stated in section (s) 2 of the Environmental Quality Act 1974 (Act 127) and Regulations (EQA1974) as “waste includes any matter prescribed to be scheduled wastes, or any matter whether in a solid, semi-solid or liquid form, or in the form of gas or vapour which is emitted, discharged or deposited in the environment in such volume, composition or manner as to cause pollution.” Moreover, the specific meaning of industrial waste can be defined as the products or by-products of industrial processes. Mohamed (2006) mentioned that the Department of Environment (DOE) Malaysia has defined industrial waste as water from industrial plants, industrial process effluents, sludge and sawdust (Information Service Unit, DOE, 1991-1995).

Waste is hard to be defined concretely and universally because waste to another person or process can be useful to another person or process as mentioned by Purdue (1990), using simple example; “the old newspapers blowing down the street maybe gathered by boy scouts to be recycled or even used by vagrant to keep warm. Even at the same moment one person may regard an object as waste, another has a use for it. This makes legal definition difficult”.

SME stands for Small-and Medium sized Enterprises. According to Rahman (2001), SME can be classified and defined as businesses based on its quantifiable characteristics such as the number of employees, the sales volume, or worth of

assets. Mohammad (2012) identified the same criteria whereby the specific definitions of SMEs by country are usually based on businesses sales or assets, number of employees and levels of capital. Meanwhile, Muhammad (2014) mentioned that there is no uniform definition of SMEs available in literature.

In Malaysia, the governing body responsible to supervise SMEs, the SMIDEC (Small and Medium Industries Development Corporation) had established a new definition of SMEs based on specific criteria such as sales turnover and number of full-times employees. The definition for services and other sectors SMEs are those firms with sales turnover not exceeding RM20 million OR number of full-time employees not exceeding 75 while SMEs in manufacturing sector were defined as firms with sales turnover not exceeding RM50 million OR number of full-time employees not exceeding 200 (SME Corp. Malaysia).

Finally, productivity, as defined by Rogers (1998) is the ratio of output to input for a specific production situation. Generally, when more output is produced by using the same amount of inputs, or when fewer inputs are needed to produce the same amount of output, it is considered as increasing productivity.

1.3 Problem Statement

In Malaysia, the body that acted as Waste Service Provider (WSP) in every district is usually the local district health office and the Local Government Act 1976 and the Street, Drainage and Building Act 1974. Some independent company have also provided waste collection service such as Southern Waste Management by SWCorp. These organizations are responsible for public cleansing services and sanitary disposal. Murad and Siwar (2007) mentioned in their study that common Malaysian practices of dumping wastes are in open fields and rivers. The study found that waste disposal behaviour in Kuala Lumpur indicated that 31.9% of waste was disposed by open burning, while 6.5% were dumped into the river system. Small districts such as Kuala Lumpur is focusing to find new alternatives to manage wastes

as fewer lands is available for landfills due to increase in population density. The challenges of managing wastes in Malaysia have propelled it to look for innovative solutions to improve the inefficient and inadequate WSP by local authorities and privates WSP. Sreenivasan et al., (2012) suggested that waste audits performed on office waste, municipal waste, commercial and industrial waste and construction waste is essential to be carried out as a key to establish waste and source reduction programmes.

Problems that are often cited with waste are waste accumulation and disposal that can led to harm towards human health and the environment, increasing population and urbanization had reduced the space for landfilling, and waste implied environmental and resource depletion of natural resources. Current waste management issues faced by Malaysia is the exhaustion of landfill space due to increasing population growth and existing priority of industrial solid waste management method treatment and disposal (Mallak & Ishak, 2012). Table 1.1 indicates disposal method of generated schedule wastes by industries. The United Nations Centre for Regional Development (UNCRD) stressed that poor waste management further compounds the water issue such as the issue of highly contaminated leachate seeps untreated into groundwater, a source of drinking water. Abd Rashid et al. (2015) observed that implementation of green office environment in an organization in Malaysia has not been fully successful due to the employees' lack of awareness on 3R practices, i.e. some of them are reluctant to follow the policies and procedures.

In the Klang Valley alone there are more than 52 illegal dump sites with the 933 tonnes of wastes accumulation that contaminate the environment with the greenhouse emission and leachate, the deficiency of a good situation of practicing waste minimisation arise the lack of suitable land for disposal and financial issues. It is huge obstacles to overcome in moving toward sustainable landfill in Malaysia. (Agamuthu; 2009, 2011).

Table 1.1: Disposal method of generated scheduled wastes by industries

Waste Category	Waste Code	Sources	Tonnes	%	Disposal Method
Sludge containing heavy metal	SW 204	Industry	92,314	7.65	Sanitary landfill
Fly ash	SW 104	Industry	9,077	0.75	Reuse at non prescribed premises
Gypsume	SW 205	Industry	55,545	4.60	Sanitary landfill
Glue	SW 303	Industry	100	0.01	Reuse at non prescribed premises
Petroleum by-product	SW 320	Industry	515	0.04	Reuse at non prescribed premises
Waste containing formaldehyde	SW 322	Industry	5,447	0.45	Sanitary landfill
Discarded pharmaceutical products	SW 405	Industry	249	0.02	Sanitary landfill
Ash of paper sludge	SW 406	Industry	5,479	0.45	Sanitary landfill

Source: DOE 2010

1.4 Research Objectives

The researcher highlights three research objectives for the research paper, the objectives are as follows:

RO1: To identify the factors of waste management adoption.

RO2: To appraise the relationships between waste management factors and productivity enhancement in Malacca manufacturing SMEs.

RO3: To assess the most significant factor that influence productivity enhancement.

1.5 Research Questions

The researcher formulates three research questions for the research paper, in order to answer the research objectives, the questions are as follows:

RQ1: What are the factors of waste management adoption?

RQ2: What are the relationships between waste management factors and productivity enhancement in Malacca manufacturing SMEs?

RQ3: What is the most significant factor that influence productivity enhancement?

1.6 Scope, Limitation, and Key Assumption of the Study

This research paper will solely focus on Malacca manufacturing SMEs waste management in its influence on productivity. The paper will collect and analyse data distributed to manufacturing SMEs located in a few selected Malacca industrial areas. The paper will investigate how factors in the chosen model for the research study will determine the relationship of waste management to productivity.

The research poses limitation where waste management of larger companies or other industry sectors are not being considered in this research paper. Furthermore, the paper will not discuss about factors that initiate adoption, the process of implementation, the selection of most suitable practices, as well as the consequences of not adopting the waste management practices.

The researcher has to assume that the respondents who will be answering the questions will give honest answers to all the questions asked. Moreover, the researcher has to assume that the SMEs owner-managers who are answering the questions have a substantial and adequate knowledge regarding the practices they adopted, in order to attain a reliable and valid data collection.

1.7 Importance of the Study

This research paper is significant as it delved into the effectiveness of waste management as a tool to help boost productivity in small-and-medium sized companies. With the findings from this research paper, the researcher hope to help create awareness among other SMEs who have yet to take serious thought on waste