

THE IMPACT OF PACKAGING ON FOOD WASTE: STUDY
ON RETAIL INDUSTRY

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DECLARATION

“I declared that this report is the results by my own work except certain explanations
And passage where every part of it is cited with sources clearly stated in References”

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Date :

DEDICATION

To my beloved parents and siblings, thank you for raising and support me until now.

I would like to dedicate this research to my beloved parents, siblings, supervisor, panel and friends. Huge appreciations to my family members who always give me supports in term of moral, motivation, advice and financial. It will not be easy for me to go through the completion of my PSM without their concern and support. A special thanks to my supervisor, panel and my friends for helping me throughout the project towards accomplishing my thesis.

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ABSTRACT

Food waste in Malaysia has increases and has bought many environment issues such as air and land pollutions. There are thousand tons of that was still fit for consumption. While food waste occurred in many ways in every stages of supply chain and packaging may be one of reason of food waste happening. This study will be focusing in retail industry in Melaka Tengah, Melaka. Packaging play the important role on containing and protecting food as it moves through the supply chain. In Malaysia, there are more on managing food waste rather than preventing it. The aim of this research is to identify the impact of food packaging on food waste in retail industry. The relationship of food packaging material and food waste will be also analyze in this research. Method that will be carried in this research is qualitative where data collection used in this research is interview. Tools that used in this research is voice recording and writing. There are three respondent interviewed from three different retail industry. Food packaging contributed to food waste is happening along the delivery process from warehouse to retail store. This research will be benefit to retail industry and manufacturer on to preventing food waste occurring in the future.

ABSTRAK

Sisa makanan di Malaysia telah meningkat dan telah memberi banyak isu alam sekitar seperti pencemaran udara dan tanah. Terdapat beribu tan sisa makanan yang masih sesuai untuk diguna pakai oleh pengguna. Walaupun sisa makanan terbuang boleh berlaku dalam pelbagai cara di setiap peringkat rantaian bekalan, pembungkusan makanan itu sendiri mungkin merupakan salah satu sebab hal ini berlaku. Kajian ini bertumpu kepada industri runcit di Melaka Tengah, Melaka. Pembungkusan makanan memainkan peranan penting dalam mengandungi dan melindungi makanan tersebut semasa melalui rantaian bekalan. Di Malaysia, terdapat lebih banyak pengurusan sisa makanan daripada mencegahnya. Tujuan penyelidikan ini adalah untuk mengenalpasti kesan pembungkusan makanan ke atas sisa makanan dalam industri runcit. Hubungan bahan bungkusan makanan dan sisa makanan juga akan dikaji dalam kajian ini. Kaedah yang akan dijalankan dalam kajian ini adalah kualitatif di mana pengumpulan data yang digunakan dalam kajian ini adalah temuduga. Alat yang digunakan dalam kajian ini adalah rakaman suara dan tulisan. Terdapat tiga responden yang ditemuramah dari tiga industri runcit yang berbeza. Sisa makanan yang berlaku disebabkan pembungkusan adalah di sepanjang proses penghantaran dari gudang ke kedai runcit. Penyelidikan ini akan memberi manfaat kepada industri dan pengeluar runcit untuk mencegah sisa makanan berlaku pada masa akan datang.

TABLE OF CONTENTS

CHAPTER	CONTENTS	PAGE
	SUPERVISOR DECLARATION	
	RESEARCH TOPIC	i
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	xi
	LIST OF FIGURE	xii
	LIST OF APPENDICES	xiii
CHAPTER 1	INTRODUCTION	
	1.1. Introduction	1
	1.2. Problem Statements	3
	1.3. Research Questions	5
	1.4. Research Objectives	6
	1.5. Scope of Study	6
	1.6. Limitations	7
	1.7. Significance of Study	7
	1.8. Summary	8

CHAPTER 2 LITERATURE REVIEW

2.1	Definition of Food Waste	9
2.2	Method used on Reducing Food Waste	10
2.3	Supply Chain	12
	2.3.1 Production Stages	13
	2.3.2 Retail Stages	13
	2.3.3 Food Service Stages	14
	2.3.4 Household Stages	15
2.4	Retailing	16
2.5	Function of Food Packaging	18
2.6	Determinants of Food Waste	21
	2.6.1 Packaging Material	21
	2.6.1.1 Glass	22
	2.6.2.2 Metal	23
	2.6.1.3 Plastics	23
2.7	Conceptual Framework	24
2.8	Summary	25

CHAPTER 3 RESEARCH METHODOLOGY

3.1	Research Design	26
3.2	Methodological Choice	27
	3.2.1 Advantages of Qualitative Research	28
	3.3.2 Disadvantages of Qualitative Research	28
3.3	Primary Data and Secondary Data	29
3.4	Research Location	29

3.5	Research Strategy	30
3.6	Research Instrument	30
3.7	Time Horizon	31
3.8	Conducting an Interview	31
3.9	Interview Process	32
	3.9.1 Before Interview	32
	3.9.2 During Interview	33
	3.9.3 After Interview	34
3.10	Data Analysis	34
3.11	Summary	35
CHAPTER 4 FINDING AND ANALYSIS		
4.1	Introduction	36
4.2	Respondent Background	37
4.3	Result and Discussion	
	4.3.1 The Contribution of Food Packaging towards Food Waste	38
	4.3.2 Relationship between Packaging Materials and Food Waste	41
	4.3.2.1 Packaging Material That Contributed to Food Waste	41
	4.3.2.2 Packaging Materials to Avoid Food Waste	44
4.4	Summary	46

CHAPTER 5 CONCLUSION AND RECOMMENDATION

5.1	Introduction	47
5.2	Conclusion	47
5.2.1	The Contributions of Food Packaging Towards Food Waste	48
5.2.2	Relationship between Food Packaging Material and Food Waste	49
5.2.3	Overall Conclusion	50
5.3	Recommendation	51
5.4	Recommendation for Future Research	52
5.5	Summary	53
	REFERENCES	54
	APPENDICES	57

LIST OF TABLES

NO	TABLE	TITLE	PAGE NUMBER
1	4.3.1	Contribution of Food Packaging towards Food Waste	40
2	4.3.2.1	Most Packaging Materials Contributed towards Food Waste	43
3	4.3.2.2	Packaging Materials to Avoid Food Waste	45

LIST OF FIGURES

NO	FIGURE	TITLE	PAGE NUMBER
1	1	Food losses generated all along the food chain	16
2	2	Conceptual Framework	24

LIST OF APPENDICES

APPENDIX	TITLE
APPENDIX 1	Gantt Chart Final Year Project 1 (PSM 1)
APPENDIX 2	Gantt Chart Final Year Project 2 (PSM 2)
APPENDIX 3	Interview Guidelines

CHAPTER 1

INTRODUCTION

1.1 Introduction

In general, food waste is food that is thrown away or it can be said to be an animal or vegetal waste from manufacture, distribution, sale and consumption of food. Waste is a major social, nutritional and environmental issue, affecting the sustainability of the food chain as a whole (Cicatiello *et al.*, 2016). There are three types of food waste, where first is food loses, where food waste during production. Secondly is, unavoidable food waste. Unavoidable is related to the waste happen in consumption phase. Third type is avoidable food waste where it is waste that cannot be avoidable. However, food waste are occurring in every stages of supply chain where it can be in household, retail, wholesale or production. Williams and Wikström, 2011, stated that there are food losses in the food chain, from agriculture to consumer. There are many causes of food waste in every stages along the supply chain (Buzby and Hyman, 2012). Every stages has different causes yet there are still some of it are the same. To eliminate the causes of food waste in those stages is by conducting a strategies to reduce and prevent it from happening again. The most common causes of perishable food waste at a retailer are overstocking, consumer behavior, inappropriate quality control and product handling (Wang and Li, 2012; Whitehead *et al.*, 2011).

Food waste was estimated to be 65-75 million kg per year in the retail sector (Katajajuuri *et al.*, 2014). In Australia, around 1.5 million tonnes of food waste from commercial and industrial sector, food service activities produce 661,000 tonnes of food waste, while food manufacturing produce 312,000 tonnes and last but not least 179,000 tonnes of food waste are from food retail. According to Marsh and Bugusu (2007), packaging reduces total waste by extending the shelf-life of foods, thereby prolonging their usability. Food waste has brought many environmental issue in Malaysia. In order to reduce the environmental from the whole food packaging system, (Williams and Wikström, 2011) stated that it is important to develop packaging ability to reduce food waste. This research will be focus on the impact of packaging contribute on food waste in order to prevent it occur in retail area. Because packaging play an important role on protecting the food from light, moist and to prolong their shelf life. It is also to protect the food along the supply chain until to the end consumer. The material used for the packaging are also important in order to reach the objective of what the purpose of product packaging where it supposedly to protect and extend the shelf life of the food. Materials used in packaging include glass, metals, paper and paperboards, and plastics (Marsh and Bugusu, 2007).

Retail companies have been making a greater effort to reduce food waste and to communicate their efforts to the public, such as Tesco in UK (TESCO, 2013). Retail industry is a sector of the economy that is comprised of individuals and companies engaged in the selling of finished products to end user consumers. As mention by (Che Wel C.C., Nor, Sallehuddin Mohd, Omar Nor A., & Hussin Siti, 2012), retailing has increase and growth every year in Malaysia and also retailing has effect so much to the national GDP where it is the second biggest contributor. There are many method on disposing food waste in Malaysia. The main ways of disposing food waste that Malaysia government used is by landfill. Landfill impacts the environment in negative ways. As studied by Jalil, 2010, landfilling will release gas which contributes to the climate change and greenhouse effect. This paper is to identify the impact of packaging on food waste, by studying about retail industry. The scope of this research paper is food waste and retail industries in Malaysia. The aim of this research is to prevent food waste from happening

in future and help food industry in Malaysia to improve their packaging and have a depth knowledge about how bad packaging or material used can contributed to food waste along the supply chain.

1.2 Problem Statement

Food waste should not be a problem anymore along supply chain because there are a lot of solution has been made to manage food waste to occur. Unfortunately, the accurate quantification of food waste remains a challenge (Escaler and Teng, 2011). While according to Lim *et al.*, 2016, Malaysia also dealing with food waste problem which the increasing amount of food waste in recent years has brought many environmental issues in the country where it affects the nation's solid waste management framework. This shows that every country in this world are dealing with the same problem all over again and this matter need to be prevent as soon as possible in other to keep the environment clean and reduce what food waste had cause to our world.

Food waste is acknowledged to be a huge problem worldwide, even though the definition of various terms and information collection processes are not yet well harmonized (Garrone, Melacini and Perego, 2014). In the United States, food waste and losses at the retail and consumer levels were found to amount to 188 kg per capita per year, or an overall value of 165.6 billion dollars (Buzby and Hyman, 2012). While Statistics from Solid Waste Corporation of Malaysia (SWCorp) showed that in 2015 the food waste in Malaysia reached 15,000 tonnes daily, including 3,000 tonnes that was still fit for consumption and should not have been discarded (Ghafar, 2017). Ghafar also said that, a household of five spent an average of 210 USD a month on food and that a quarter of that food was wasted during preparation, cooking and usage. It is about 53 USD end up in the dustbin every month, which total to 631 USD a year. According to Lim *et al.*, 2016, Malaysia with a population of more than 30 million in 2014 produced up to 8,000 tonnes of food waste in a day, which increase is 760% from 930 tonnes/day of food waste in year

2011. Researcher conclude that food waste in Malaysia need to be prevent immediately because statistics showed Malaysia produced a lot of food waste per year.

According to Lebersorger and Schneider, 2014 refer to Hölzl, 2014; Schneider and Lebersorger, 2009, the retail transaction is at the end of supply chain. Retail management is really important in order to reduce food waste or loss happen. Because when the media and public discussion about food waste and food waste prevention, retail is often blamed for being one of the main contributors. He add that, only a small percentage of the overall amount of food waste along the supply chain is produced by retail. The amount of food waste generated by retailers is a minor fraction of all the food discarded along the supply chain. That's is the one of the reasons why until now waste in retailing has not been studied in depth like other stages such as household and food service (Cicatiello *et al.*, 2016). While (Buisman, Haijema and Bloemhof-Ruwaard, 2017) said The reason food waste occurs in retailing is inappropriate quality control, overstocking and inaccurate forecasting. This shows retailing need good management in order to reduce food waste happen in the industry In Malaysia, there is no specific studies in that focusing on food waste in retail industry. Thus this paper will do a research on retail industry in Malaysia on how much they contribute on food waste and how they prevent or reducing it. On top everything, by preventing food waste from their roots will solve this problem from occurring and making more food waste in retailing industry in future.

Packaging is also one of the reason why food waste occur. Because food packaging are to protect food products from outside influences and damage, to contain the food, and to provide consumers with ingredient and nutritional information (Marsh and Bugusu, 2007) refer to (Coles, 2003). Packaging has a vital role to play in containing and protecting food as it moves through the supply chain to the consumer (Karli *et al.*, 2013). According to (Williams and Wikström, 2011), packaging should protect the food from physical damage, packaging must be easy to reseal to avoid biological deterioration, and most importantly is the packaging should be ease the consumer to empty the packaging completely, lastly is to build in size that avoid leftovers. These function that stated by the author is to prevent food losses occurring because of the food packaging itself. If the

packaging did not do the job of protecting the food, food may damage and waste might happen. There are many packaging material to be look into such as glass, metals (aluminum, foils and laminates, tinplate, and tin-free steel), paper and paperboards, and plastics (Marsh and Bugusu, 2007). These material may be the contributor of food waste to occur in the chain. Researcher found that there was no previous study that look into shape of the packaging that can contributed to food waste. The shape of package that protect the food may to be happen as the main contributor of these food waste. By focusing in what does food packaging impact on food waste, Malaysia would prevent food waste from happening rather than only focusing on reducing it.

1.3 Research Questions

A research question is an answerable inquiry into a specific issue. It is the first step is a research project. As the early step, when we have an idea of what we want to study, the research question is the first active step in the research project. This research will cover the following question:

- I. How does food packaging contribute towards food waste?
- II. What is the relationship between food packaging materials and food waste?

1.4 Research Objectives

According to Sanders (2012), research objective will express 'how' we intend to structure the research process to answer your question. Furthermore, the objective should also relate with the questions as it affect the results at the end of this research. This research objective has been designed by the researcher based on the research topic and research problems. The objectives of the study are stated below:

- I. To identify how food packaging contribute towards food waste.
- II. To analyze the relationship between food packaging materials and food waste.

1.5 Scope of Study

This research is conducted to identify the impact of packaging on food waste and study on retail industry in Melaka, Malaysia. Hence, this research will be conducted at retail industry in Malaysia. Researcher will choose retailing industry from Melaka Tengah. The reason why researcher choose retail industry is because researcher wanted to know does food packaging are the causes of food waste occurs. Retailer that researcher choose are the one that high sale and have a lot of customer daily. They have much more experiences in facing food waste situation. Thus, researcher can get lot more information regarding to the study.

1.6 Limitations

There are several limitations faced by the researcher in doing this research paper. Time limitation is one of the factors faced by researcher. The researcher has only given less than 6 months to complete the research. Hence, the duration for this study is insufficient for researcher to obtain more relevant information about the study.

The second limitation in this research paper is the sample size. The researcher only target three retail industries those operate in Melaka to conduct the study. Of course there are more than three retail industries operate in Melaka Tengah but because of the time constrain, researcher only can focus on three retail industry. Result of this research would be more solid and convincing if researcher can do study on more than 3 retail industry.

The last limitation of this research would be the location. This research only carried out in Melaka. Therefore, future research on this study should be carried out in other state to explore the differences and similarities impact of packaging on food waste study on retail industries between the organization in Melaka and other states.

1.7 Significance of Study

This study will beneficial to academician by giving an in-depth knowledge about the impact of packaging towards food waste in retail industry. Furthermore, this study also can be served as future reference for academician in conducting future research regarding to the food waste topic.

Besides that, industry practitioner can also be beneficial from this study. This study not only provide the impact of packaging towards food waste but much more knowledge that retailer can used to reduce or prevent food waste in that industry. By understanding

the impact of packaging on food waste, the organization such as food industry in Malaysia can take the knowledge as to improve their packaging and prevent food waste from occurring in future.

1.8 Summary

This chapter briefly explain about the introduction of this study, research questions and objectives are pointed out in this chapter. Besides that, this chapter also explain the scope will be covered in the study and limitations faced by the researcher in conducting the research. The following chapter will describe in detail the literature review of food waste and packaging. Conceptual framework will also be proposed in chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.1 Definition of Food Waste

Generally, there is no common definition of food waste. But according to the European project FUSIONS (Östergren et al., 2014), *Food waste is any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including - composted, crops ploughed in/not harvested, anaerobic digestion, bioenergy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)*. While food waste defined by (Giroto, Alibardi and Cossu, 2015), food waste is made up of materials intended for human consumption that are subsequently discharged, lost, degraded or contaminated. To be clear what is the definition of food waste is, based on the previous study researcher conclude that food waste is any food that are lost or discarded along the supply chain and also from household.

Food waste can be classified into three categories. Where first is food loses, which means food products lost during production phase. Followed by, unavoidable food waste where it referring to food product lost during the consumption phase. For example banana peelings and fruit cores. Lastly is avoidable food waste, meaning product that could have been eaten but were lost during the consumption phase. No matter which categories it falls to, food waste is really a serious matter at every stages of supply chain. As stated by (Jalil, 2010), in Malaysia, waste is dominated by organic waste whereby is comprises more than

40% of the total waste stream. He mention that in the 90s and 80s, the average organic waste was approximately 50% consisted of the processed kitchen waste and food waste. According to (Otterbring and Gustafsson, 2012), large quantities of produced food are wasted along the distribution chain and by consumers. They said that food waste are represent a waste of the world's limited resources and this can lead to an unnecessary environmental impact. Such as greenhouse effect, climate change (Jalil, 2010), groundwater contamination, leachate, and release of toxic gases and odor (Ismail & Manaf, 2013).

Thus along the chain, they need to reduce or prevent food waste from happening. According to Marsh and Bugusu, 2007, packaging maintains the benefits of food processing after the process is complete, enabling foods to travel safely for long distances from their point of origin and still be wholesome at the time of consumption. Nevertheless, packaging technology must balance food protection with other issues, such as energy and material costs, heightened social and environmental consciousness, and strict regulations on pollutants and disposal of municipal solid waste. Researched that have been done by (Karli *et al.*, 2013), they analyze that around 40% of all food intended for human consumption in developed countries ends up as waste.

2.2 Method used on Reducing Food Waste

There are many ways on reducing food waste, landfilling is the main method of waste disposal (80% usage) in Malaysia (Ghafar, 2017). While (Jalil, 2010) also mention that Malaysia usually disposed waste by using landfills method. This method was expected to reach down to 65% in 2020. This method not the main ways on reducing food waste in European countries, only those that cannot be recycled will be taken to the landfill. Most landfills in the country are in bad conditions, and operated without proper protective measures, such as lining systems, leachate treatment and gas venting (Ismail & Manaf, 2013). Various environment problems such as leachate, groundwater

contamination, potential release of toxic gases and odor are coming from landfills. As studied by (Jalil, 2010), he said that when waste dumped in landfills, it emits methane gas which contributes to the greenhouse effect and climate change.

According to (Karli *et al.*, 2013), packaging play the important role on reducing food waste and give 10 opportunities to reduce food waste through packaging. First is distribution packaging that provides better protection and shelf life for fresh produce as it moves from the farm to the processor, wholesaler or retailer. Secondly is distribution packaging that supports recovery of surplus and unsaleable fresh produce from farms and redirects it to food rescue organizations. Followed by improved design of secondary packaging to ensure that it is fit-for-purpose. Next is, the packaging itself also needs to be recoverable to minimize overall environmental impacts. Fifth opportunities is adoption of new packaging materials and technologies, such as modified atmosphere packaging and oxygen scavengers, to extend the shelf life of foods. Giving education to manufacturers, retailers and consumers about the meaning of use-by and best- before date marks on primary packaging to ensure that these are used appropriately is also one of opportunities mention by (Karli *et al.*, 2013). Besides that, product and packaging development to cater for changing consumption patterns and smaller households. Single and smaller serve products will reduce waste by meeting the needs of single and two person households. Furthermore, collaboration between manufacturers and retailers to improve the industry's understanding of food waste in the supply chain. Ninth is, more synchronised supply chains that use intelligent packaging and data sharing to reduce excess or out-of-date stock. Last but not least is,) Increased use of retail ready packaging to reduce double handling and damage and improve stock turnover, while ensuring that it is designed for effective product protection and recoverability (reuse or recycling) at end of life.