KNOWLEDGE, ATTITUDE AND BEHAVIOR TOWARDS THE INTENTION OF FARMERS IN APPLYING FOOD WASTE AS FERTILIZERS IN PERAK

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UNIVERSITI PENDIDIKAN SULTAN IDRIS

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ABSTRACT

Around 1.3 billion tons of the total food production and land that also use to produce food is 0.9 million hectares was wasted every year. This is become a problem that has not yet been resolved. One of the way to reduce food waste is covert into fertilizer. Therefore, the purpose of this study to examine knowledge, attitude and perceive behavior towards small scale farmers' inattention in applying food waste as fertilizer by adopting Theory Planned Behavior and Knowledge Attitude Practice Model. A field of survey was used; out of 450 survey distributed, only 370 small scale farmers responded to the questionnaire, were identified using purposive sampling and analysed through SPSS, IBM-AMOS and PLS-SEM. The result found that the fitness indices met the acceptance level using Modification Indices (MI) (CFI= 0.933; TLI=0.908; RMSEA=0.08). Result indicated that the initial model was partially supported where attitude, subjective norm and behavior were significantly predicted farmers' intention. In addition, a mediating effect was found in the model as hypothesized; knowledge had a significant indirect effect on farmers' intention. However, there was no significant interaction between knowledge and farmers' intention. This study expends the literature on food waste research particularly focusing on small farmer. Overall, this study verified that attitude, subjective norms and perceive behavior control have significant impacts on farmers' intention. This study will help the agriculture agencies, farmer in improving the quality of fertilizer as well as the contribution on expending the new model and instrument.

PENGETAHUAN, SIKAP DAN TINGKAH LAKU TERHADAP KECENDERUNGAN PETANI DALAM PENGGUNAAN SISA MAKANAN SEBAGAI BAJA DI PERAK

ABSTRAK

Sekitar 1.3 bilion tan daripada jumlah pengeluaran makanan dan tanah yang turut digunakan untuk menghasilkan makanan ialah 0.9 juta hektar dibazirkan setiap tahun. Ini telah menjadi masalah yang masih belum selesai. Salah satu cara untuk mengurangkan sisa makanan adalah secara rahsia menjadi baja. Oleh itu, tujuan kajian untuk mengkaji hubungkait sikap dengan mengubahsuai TPB theori dan KAP model. Satu tinjauan dijalankan, daripada 450 tinjauan yang diedarkan, hanya 370 petani skala kecil menjawab soal selidik; dikenal pasti menggunakan persampelan bertujuan dan dianalisis melalui SPSS, IBM-AMOS dan PLS-SEM. Hasil kajian mendapati indeks kecergasan memenuhi tahap penerimaan menggunakan Indeks Pengubahsuaian (MI) (CFI= 0.933; TLI=0.908; RMSEA=0.08). Keputusan menunjukkan model awal sebahagiannya disokong di mana sikap, norma subjektif dan tingkah laku diramalkan dengan kecenderungan petani. Di samping itu, kesan hubungan didapati dalam model seperti yang dihipotesiskan; pengetahuan mempunyai kesan tidak langsung yang signifikan terhadap niat petani. Walau bagaimanapun, tiada kesan hubungan yang signifikan pengetahuan terhadap kecenderungan petani. Kajian ini akan membantu agensi pertanian, petani dalam meningkatkan kualiti baja serta sumbangan dalam memanjangkan model dan instrumen baharu

.

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LIST OF ABBREVIATION

%	Percentage
3R	Reduce, Reuse, Recycle
AMOS	Analysis Model of Structure
ATT	Attitude
CFA	Confirmation Factorial Analysis
CO_2	Carbon Dioxide
FAO	Food and Agriculture Organization of the United
GHG	Greenhouse Gases
Ha	Hectare
IADA	Integrated Agriculture Development Area
KAP	Knowledge, Attitude, Practice
kg	Kilogram

KW	Knowledge
MJ	MegaJoule
NGO	Non-Government
PBC	Perceived Behavior Control
RM	Ringgit Malaysia
SDG	Sustainable Development Goal
SEM	Structural Equation Modeling
SN	Subjective Norm
SPSS	Statistical Package Social Science
TPB	Theory Planned Behavior
UNDP	United Nations Development Programme
UNSC	United Nations Statistical Commission

CHAPTER 1

INTRODUCTION

1.1 Introduction

For the first chapter serves as the foundation of the research study. This chapter discussed the study's background, problem statement, research aim, research question, and research hypotheses. A few definitions of terms are provided as guideline for the reader to comprehend without being confused. The end section of this chapter will dicuss the study's limitations and significance as well as conceptual framework.

1.2 Resarch Background

This study was discussing several variables such as knowledge, attitude, behavior and intentions. Knowledge is a structured collection of claims, truths, and concepts. A knowledgeable individual can conduct information searches using sound judgement (Kuria, et al, 2018). A familiarity, awareness, or understanding of someone or something is referred to as knowledge, and it can be gained by experience or education through perceiving, discovering, or studying (Nguyen, Seddaiu & Roggero, 2019; Fidelugwuowu, 2021). In this study knowledge variable was focused on the understand of farmer in application of food waste as fertilizer.

Worldwide, estimated around 1.3 billion tons of the total food production and land that also use to produce food is 0.9 million hectares was wasted every year (Fiore, Pellegrini, Sala, Conte, & Liu, 2017; Magalhaes, Ferreira & Silva, 2020; Ramirez, Rodriguez & Marin, 2020). Almost 17,000 tons of food waste ended up on a landfill that could feed twelve million people thrice a day (Oswald, 2018; Raseetha, 2020). Surprisingly, Ismail et al, (2020) reported that the residential sector contributes for 44.5 percent of total solid waste collection, totaling 6.1 million tons per year. At 2020, the amount of methane that release was estimated to be 370, 000 tons and the inexpensive option for the country especially Malaysia is become a solution to discharge of all types of waste (Mohd-Saleh, Shaylinda, Othman, Yashni, & Norshila, 2020).

This number gives a big impact on our nation because it creates a lot of environmental problem such as emission greenhouses gas, destruction of jungles and pollution (Innocent, Chamhuri, Rawshan, & Basri, 2017). The amount of food waste is increasing amount during the festival day. This waste originated from commercial, industrial and household (Daud et al., 2020). This has become a serious issue to the country that is not only just wasting edible food but also influence economic growth (Fazini, & Asmida, 2018; Daud, et al, 2020). The amount of waste generation implies serious issue not only for the environment but also human health.

Tons of food waste is produced daily in a highly populated area. Kitchen waste is usually leftover organic matter from restaurant, hotels and household (Sani, Khadir, Sulaiman, Adamu, Ahmad & Agema, 2020). This portion of food waste will produce continuously increase. Lim, Chin, Yusof, Yahya and Tee (2016) described food waste as food that wasted, lost or uneaten during the agriculture process, industrial process and domestic activities. Most of food waste sources come from residential, commercial, institutional, and city area (Ismail et al, 2020). All of these was led to general problems of substantial food waste each year.

Moreover, food waste brings a big issue that very closely related to future global environmental and socio-economic challenges (Viachaslau, Marija, & Frederica, 2019). Reducing food waste will improve food availability and increasing the resources of the global population (Thyberg & Tonjes, 2016). Food waste has a number of severe financial, environmental and social consequences (Werf, Searbrook & Gilliland, 2019). It is believed that up to half of the food available for eating is thrown away.

To address these challenges, comprehensive solid waste management techniques must be implemented, including reduction, reuse, recycling and much more (Fagundes, et al, 2020). Solid waste management is important for the safe disposal of waste, reduction of environment contamination and avoidance of any health concerns. Landfills are the most frequent way to dispose of solid waste but, there are also modern landfills are constructed with various of environmental variables and waste kinds in mins in order to reduce pollution (Zhang, 2021).

So, a sustainable system will aim to use environmental goods like composting solid waste without harming any living things. The application of composted manures in sustainable agricultural system results in high yields and produce of comparable or higher quality (Pergola et al, 2018). Therefore, sustainable agriculture is the best solution to reducing pollution by integrating modern technology or practices with the natural environment (Jules, 2007).

There are various sustainable methods in agriculture practices that can be applied, namely rotating crops; planting cover crops; reducing or eliminating tilage; applying integrated pest management (IPM); integrating livestock and crops; adopting agroforestry practices, and many more. In this study, sustainable agriculture practices that was discuss only on using food waste as a fertilizer as a method to reducing food waste and help in improving soil condition, crops as well as increasing farmer standard life.

Next variable is attitude which defined the positive and negative. Pan, He and Kong, (2020) mention that, controlling farmers' pesticide and fertilizer behavior is

essential for ensuring food safety and environmental sustainability because pesticide used has not only caused serious environmental degration but also endangered human health and food safety.

It is argued by Sok, Borges, Schmidt and Ajzen, (2021) state that a behavior moderates the influence of intention on behavior when intentions are more likely to result in the performance of the behavior when actual control is high. The level to which people think they have control over their behavior can affect their intentions and, in turn, indirectly affect behavior. As a result, a third factor determining purpose has been added: behavioral control, which is defined as people's opinions of their capacity to carry out a particular behavior (Munoz, et al, 2019). Overall, these variables were a combination of theory planned behavior and knowledge attitude practice.

1.3 Problem Statement

The main factor influencing farmers' intentions to use fertilizer was their knowledge of the risks associated with such chemicals. Knowledge mostly affected attitudes and perceived behavioral control of fertilize usage. Thus, it was found by Bagheri et al, (2019) mentions that attitudes regarding fertilizer had a higher impact on farmers' intentions when they were more knowledgeable about them. Moral standards, subjective standards, and attitudes toward pesticide usage in turn had an impact on how behavioral control of pesticide use was seen. Attitudes regarding pesticides were also influenced by moral and subjective standards.

About 300 paddy farmers under the supervision of the Young Agricultural Development Board (MADA), lost RM 1.5 million due to rice crops being attacked by bacterial panicle blight (BPB) (Osman, 2020). Bacterial panicle blight (BPB) disease causes the rice grains to become empty which in turn reduces the weight of the scales after the crop is harvested. Since, the cost of cultivating rice crops such as chemicals and fertilizers has increased but the yield obtained has decreased. The main caused of this bacterial is influence by the factors of uncertain climate change (Osman, 2020; Pauzi, 2019). The rice disease mentioned at the beginning of the problem statement is the purpose of this study. It is because, this disease still cannot be solved by agricultural experts. In addition, the best material or method to solve the problem of rice disease is still not enough to help solve the problem of this disease.

The attack of this disease is closely related to hot and dry weather, especially when the night temperature is high for a long time. Overall, the paddy cultivation area in the Muda area is 96,558 hectares, covering 77,882 hectares in Kedah and another 18,676 hectares in Perlis (Hamid 2022; Pauzi, 2019). In the Muda area, the symptoms of this disease began to be detected in the first cycle of 2017 season until the first cycle of 2022 season with the prevalence of this disease (Hamid, 2022). But yet, the average rice yield obtained by the rice farmers this time was 1.2 metric tons for an area of 0.3 hectares. Usually this area is the largest rice production area of MADA but this time the amount of yield obtained dropped sharply (Hamid, 2022; Osman, 2020). Most of the rice plants are attacked by bacteria panicle blight disease which sill definitely affect rice production. Therefore, this is a serious problem that needs to be solved

immediately because it will affect the country's food supply and the country will lose a lot of food resources.

According to Pauzi, (2019) the symptoms of bacterial panicle blight disease attack can be identified and confirmed visually or symptomatically in the rice fields after the rice plant reaches 90 days because at this stage the symptoms of bacterial panicle blight disease is clearly visible. Osman, (2020) stated that this bacterial panicle blight disease has its own characteristics that are different from other rice diseases, among which there is a change in the color of the rice grains and the infected grains are spread unevenly on the grains (paddy fruits). This clearly shows that this disease can be detected from the beginning if the farmer knows about the condition, physical and characteristics of the disease attack before the losing of crop production. All of these are important to provide useful guidance and knowledge to farmers so that they do not rely entirely on agencies such as MADA, the Department of Agriculture and other agencies that manage crops in Malaysia.

Apart of that, the main causes of rice bacterial panicle blight disease caused by climate change. A study has been proven by Aftab et al, (2022) found that the use of fertilizers from nature as well as organic fertilizers such as animal manure in solving this disease can help reduce rice bacterial panicle blight diseases. Environmental factors affected both the biological activities of the pathogen and the host plant, which was crucial in the progression of the disease (Gangopadhyay et al, 2022; Rollon, Golis & Salas, 2021). Even though the pathogen is virulent, in unfavorable circumstances, it would not be able to cause infection in the host plant, allowing the plant to escape the diseases. One of the possible ways to control this disease is to use biological or

environmentally friendly methods. Therefore, further study is necessary to educate farmer in handling disease expecially in paddy crop.

Farmers have traditionally employed chemical (inorganic) and organic fertilizers (OFs) to enhance soil nutrients. Artificially created chemical fertilizers are used to give plants quick nutrients. High amounts of soluble, quickly available, and mineral nutrients (N, P, and K) are found in chemical fertilizers. Conversely, crop leftovers, animal dung and solid waste are the sources of organic fertilizers. When applied to soil, organic fertilizer has a number of advantages, including improving soil structure, increasing soil porosity, reducing soil compaction, and increasing soil organic matter (Zhou, 2018; Rollon et al, 2022). The use of biological methods can help in reducing rice diseases and can also reduce solid waste, especially wasted food that is proven to contain many nutrients that are good for human consumption and of course also nutrients that are equally good for plants. Thus, this study is important to guide farmers and also give an idea for expert to apply organic fertilizer.

In Malaysia, municipal solid waste generates more than 30,000 tons a day and this number will be predicted to increase by 10.9 million tons in 2020 (Raseetha, 2020; Sin, Chen, Hwang, 2016). Malaysia mostly contains organic wastes including fruits and vegetables that undergo some industrial process. Innocent et al. (2017), state that separation of food waste with other waste can help the country reduce the cost of waste management and produce biogas to generate energy. Food Aid Foundation reported that almost 15,000 tons of food have been waste by Malaysians including 3,000 tons of edible food every day (Raseetha, 2020; Tan, 2019). Therefore, there is

a need to further study food waste management as suggested in the current study; compositing.

Organic waste was treated in Malaysia that undergoes anaerobic digester was 1, 500 kilograms per day and for composting, the plant was 150 kilograms per day (Global Recycling, 2017). Fertilizers, manufacturing packaging, cooking and disposal may produce unnecessary greenhouse gas emission. (Konstadinos, Katia, Vassiliki, & Christina, 2015; Kandemir, et al, 2020). In additions, it gives more impact on land, water and other resources due to agriculture production that may result in climate change. Too much food waste quantities can cause many negative effects, economically as well as environmentally (Kandemir, et al, 2020). Although the issues rise every year, however, little attention has been paid to obtain awareness among small-scale farmers. This indicates the need for more extensive studies to understand knowledge, behavior and intention among farmers.

Oswald (2018); Lacovido and Ng, (2020) reported that Malaysia has 165 waste disposal sites and 17 of the waste disposal has sanitary land status. Meanwhile, Global Recycling, (2017) reported that Malaysia have only fourteen sanitary landfills all over the country and 161 landfills are still in operation. The reminding which is 141 landfills are closed. There are several incinerators in the country with a capacity of 75 tons per day in total (Global Recycling, 2017). Ministry of Housing and Local Government Malaysia recorded that majority of landfill is operated in full capacity with minimal leachate and landfill gas control (Oswald, 2018). Research has been limited to the consequences to industry but has rarely examined consumer research to understand their users. Thus, further study is needed to contribute to future literature.

It shows that Malaysia has running out of waste disposal space. Reduce, recycle and reuse (3R) programs and MySave Food that was conducted by the Malaysian Agricultural Research and Development Institute (MARDI); and the Ministry of Agriculture and Agro-based Industry (MOA) is an ideal program not only to extend the landfills but also can reduce greenhouse gas emissions (Ghafar, 2017; Raseetha, 2020). According to Daud et al., (2020) mention that landfilling in Malaysia consists of thirteen states and three federal areas with a total area of 329,700 km^2. Kuala Lumpur which is the capital country in Malaysia will estimate 511 kg per capita of waste in 2025 (Daud, 2020). While a lot of agencies take part in food waste program, however little know research has studies the effectiveness of the program in order to understand the future intention of the farmers.

Yako and Man, (2016) stated that the ability for farmer who are able to get the right information, explore beyond their community, obtain and practise is the best for them that will help them into resolving issues that farmers face. All of these practice can keep them current with the information, skills, and technology needed that can change the increasing standard of life (Sabran & Abas, 2021). Among the factor that farmer is lacking of training from organisations to leaders, with a lack of competency, their knowledge and abilities is due to the poor relationship or communication between leaders and their community of farmers.

Farmers that value the environment and have a positive outlook on their surroundings will use fewer pesticides, organic manure instead of chemical fertilisers, and will pay attention to soil fertility (Masrom, Hazreen, Arshad & Sabri, 2018). In other words, farmers will use appropriate agricultural methods. Farmers can comprehend

how to use effective agricultural techniques when they have the right information. They won't know what to do if they don't have enough information (Azman, Lawrence, Samah & Man, 2013).

1.4 Purpose and Objective Research

The research objective defines the precise goals of the study and should be state clearly in the study's introduction. Objective may specify which outcome measure will be utilised in their assertions. It is significant because research objectives not only assist guide the development of research designs, but also play role in sample size calculation and determining the study's power.

Therefore, the purpose of this research is to examine the knowledge, attitude, subjective norms, and perceived behavior towards farmers' intention in applying food waste as fertilizer. There are five objectives in this study.

1. To examine the effect of knowledge towards farmers' intention in applying food waste as fertilizer.
2. To explore the effect of attitude on intention among farmer towards application of food waste as fertilizer.
3. To investigate the mediating effect of attitude on the relationship between farmers' knowledge and their intention to use food waste as fertilizer

4. To assess the effect of subjective norms on farmer intention towards the application of food waste as fertilizer.
5. To determine perceived behavior control positively affect the farmer intention to apply food waste as fertilizer.

Overall, the most essential components of the research paper are the formulating of the research questions. If a research paper fails, it indicates that the aim and hypothesis are unclear and undeveloped.

1.5 Research Question

Developing an appropriate research question entails deciding which clinical uncertainty should be investigated as well as justifying the need for their examination. A research question is necessary in order to grasp what has been studied about a topic to date and to further the information that has previously been acquired on a topic.

The existence of several research question will influence and perhaps complicate the study design and statistical analysis (Farrugia et al, 2010). Based on the research objective, in this section will address the question that contained in the research objective. The questions that will be address are

1. What is the effect of knowledge among farmer about intention to application of food waste as fertilizer?
2. What is the effect of attitude towards application of food waste as fertilizer?

3. Does the farmers' attitude influence their knowledge towards the intention to use food waste fertilizer?
4. Can subjective norms affect the farmer intention towards the application of food waste as fertilizer?
5. Does perceived behavior control positively affected the farmer intention to apply food waste as fertilizer?

1.6 Research Hypothesis

The hypothesis was written before to the start of the research and was used to aid and guide the research. In this study, hypotheses are used to observe, prove, or establish an assumption about the research issue. The type of research design for the study will be influence by the research hypothesis. So, there are five hypotheses is involving in this study. The hypothesis is proposed as below.

H1: Knowledge will positively affect farmers' intention in applying food waste as fertilizer.

H2: Attitude will positively affect farmers' intention to apply food waste as fertilizer.

H3: Attitude mediates the relationship between knowledge and farmers' intention to apply food waste fertilizer.

H4: Subjective norms will positively affect the farmer intention to apply food waste as fertilizer.

H5: Perceived behavior control will positively affect the farmers' intention to apply food waste as fertilizer.

It can be challenging to design and establish an acceptable and relevant research question, hypothesis and objective, but it will assist to lead a successful research effort, affect interpretation of the results and give an impact for future study.

1.7 Conceptual Framework

The study will use model and theory. This theory and model will adapt and construct a new framework that fit in this study. The model of KAP which is knowledge, attitude and practice is related in this study. The other adaptation that involve construction of framework is Theory of Planned Behavior. In this theory, attitude, subjective norms and perceived behavior control as well as intention is main key in Theory of Planned Behavior. Each of relationship was explain in chapter 2.

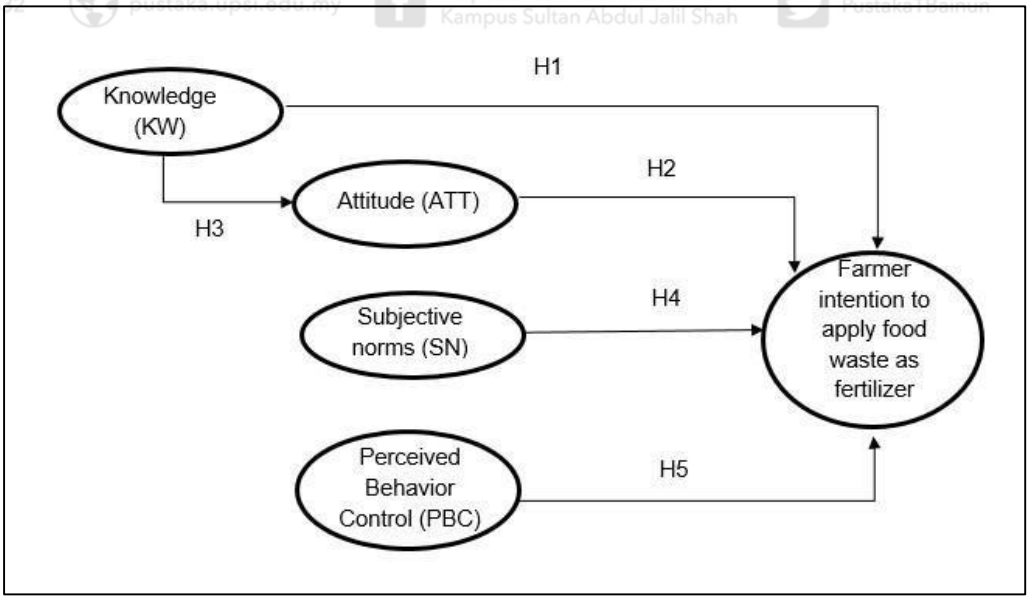

Figure 1.1. Conceptual framework

1.8 Definition of Term

There are several term that can help the reader to be more understand and clarity about the contents in this paper. The term was included are food waste; farmers; sustainable agriculture; knowledge attitude and practice; theory of planned behavior; knowledge; attitude; perceive behavior control; and lastly subjective norms. These term was described in shot explanation and was explain more in literature review. All the term was applied in this study and help to define based on the content needed in this paper.

1.8.1 Food Waste

Food waste is including uneaten food and leftover food that comes from residences, restaurant, school cafeterias and food manufacture factory (Ruihong, et al., 2007). It can be divided into few categories which is edible and inedible as well as preventable and unavoidable waste. To assess the possible reduction potential of food waste through waste prevention must be done (Scherhaufer, et al, 2018). The production food waste start from agriculture stage, process by industrial factory and finalize in domestic handling (Ahmed, et al., 2015). Food waste can be disposed by many ways such as compositing, sanitary landfills and incineration (Kadir, Ismail & Jamaludin, 2015). One of method to disposed food waste is compositing. Only this method will be focusing in study.

1.8.2 Farmer

Crop area that has less than 2.48 hectare is called as small scale or smallholder farmer (Abd et al, 2016). Small scale farmer is a sample that will use in this study. The character that sample which is fit in this study is farmer who is has less than 2.48 hectare with any crops in randomly location.

1.8.3 Sustainable Agriculture

Sustainable agriculture is combination of plan and animal production practices for long term. The production practices include minimize human waste, improving human quality, the efficiency of non-renewable resources with appropriate control in biological cycle, manage the quality life of farmers as well as society (MacRae, Hill, Henning, Mehuys, 1989). The sustainable agriculture practice is applied in this study which is environmental aspect and reducing the usage of chemical fertilizer (Sarah, Julia, Nicolas & Jens, 2015; Zulfiqar et al, 2019). This paper can help in explaining about the sustainable in farming operation especially in converting food waste into usable which is fertilizer with minimize the environmental risk.

1.8.4 Knowledge Attitude Practice Model

KAP is use to study the knowledge, attitude and practice among a community. It is an informal in educational diagnosis for the community. The main objective of this

knowledge attitude and practice is to reveals knowledge, changes in attitude towards food waste as well as changes of practices that are regarding the management of sustainable agriculture practices (Kaliyaperumal, 2004; Sharifzadeh & Abdollahzadeh, 2021).

1.8.5 Theory of Planned Behavior (Tpb)

Theory of planned behavior is commonly used to help the understanding of people intention and decision making. This theory suggests that the behavior from one plan action that controlled by attitude, perceived behavior control (PBC) and subjective norm (Anwar, Asmy, Zubir, Amin & Hassanudin, 2019). Thus, this element will determine the stronger and more favourable towards individual behavior or intention of individual in making a decision.

1.8.6 Knowledge

Knowing is one of the most specific human process and knowledge is a result. It means that knowing and knowledge is a subject for human inquiry across the time (Bolisani & Bratianu, 2018). In this study, knowledge is an indicator to measure the understanding of farmer in using food waste as a fertilizer to apply for their own crops.

1.8.7 Attitude

Attitude is defined as a reaction of person in a certain way to certain situation and see it how she or he interpret the event occurs. Attitude also use to organize opinions in interrelated structure attitude (Bano, Alshammari, Fatima, & Alshammari, 2013). In this paper, attitude is defined as a belief of farmer in apply food waste to their crops.

1.8.8 Perceived Behavior Control (PBC)

Perceived behavior control is about perceived the difficulty in participate towards specific behavior. It also depends on the availability of resources, self-efficacy to conduct a behavior (Ru, Qin, & Wang, 2019). In this paper, perceived behavior control is about performing, motivational and outcome of behavior to action.

1.8.9 Subjective Norms

Subjective norm is described as an individual reflection of perceptions of social approval or disapproval for performing the behavior. (Cooke, Dahdah, Norman & French, 2016). In this study, focus on individual perceptions is include friends, families, community and government support.

1.9 Limitation of Study

Study limitations are those aspects of research design that effect or influence the interpretation of research paper findings. the study's limitations may have an impact in the research findings and conclusions. Therefore, this study also may have certain problems or limitation. First and foremost, this research was carried out during the pandemic COVID-19. There are several challenges to collect data.

In this situation, the researcher must consider all standard operation procedure (SOP) of responder, which will serve as a guideline for all personnel. To prevent the virus of COVID-19 from spreading, researchers have a limited amount of time to perform and distribute the survey form. However, all respondents understood and agree to participate in this study.

Besides that, the sample size for this research was based only on data from Perak, Malaysia. There were biases and other factors that might affect the data. Due to the capacity to generalization the study findings, the research design was done in quantitative research which employs a survey and knowledge test as a tool to extract data.

On the other side, benefits of qualitative research can gain an understanding of underlying reasons, opinions and motivation as compared to quantitative research which is the survey. It concludes that qualitative research could specify the problem and opinions. Meanwhile, quantitative research was decides utilising a numerical form. As a result, the research could be detailed since the survey form was distributed and

the answer were supplied in a variety of alternatives. In consequence, respondents' ability to provide ideas and options was limited.

The following limitation concerns the method of sampling used in this study, which was simple random sampling. This method of sampling selects a population because that can be derived from a wider population. Furthermore, it is free of bias and prejudice; yet this technique may fail when it comes to interpreting population and selection information.

For the future study, the study will undergo whole Malaysia and not only focus on knowledge, attitude, behavior and subjective norms but also on the skill of handling the fertilizer as well as the cost of operating in handling fertilizer. For the sample to represent the whole population, the survey is conducted in each district in Perak and this is constraining by time cause this research is used a cross-sectional concept.

Longitudinal concept research could give more finding and involve with proper time to study this matter. This paper only discusses the knowledge and farmer intention about compositing from food waste in Perak. The sample of small scale farmer uses as a representative of the farmer in whole Malaysia.

1.10 Significant of Study

Agriculture sector is one of the major sectors of food supply chain to the whole world and it is important to provide a sufficient food supply chain to the population (Ab et al,

2016). In Malaysia, agriculture sector is involved with crops, fisheries and livestock and all related activities.

Composting is the natural process that turns organic material into dark and soil smelling material. Organic material could be garden waste, vegetable of food scraps that would help to give nutrient to soil crops that was planted in garden or potted plants (Mark, 2009). One of negative environmental impact to our nation which production of food waste. This production could lead the decreasing life spending on managing of landfill. From Krista and David (2016), mentions that food waste can be reduce by diverting food waste by generate it into valuable products like compost or give to the pet.

Previous study by Stoknes, Scholwin, Krzesinski, Wojciechowska and Jasinska, (2016), stated that food waste can be used to substitute for fertilizer and it could significantly achieve the high yield production with based on commercial fertilizer. Thus, waste that converted to something that can bring benefit the environment is also one solution to government and other private agencies to look into and change it into new policy (Fazini, & Asmida, 2018).

Furthermore, this study can have benefited not only farmers but also agricultural officials who are still looking for efforts to reduce rice blight disease. This also helps the country from losing the main source of food in Malaysia which is caused by disease. In addition, this study has also provided ideas and contributions in further diversifying fertilization methods by using food waste fertilizers. This is also one of the measures to reduce the pollution of food waste which originally had to be thrown away

now, can be recycled into plant needs. The agricultural officers can also provide guidance to farmers, provide guidelines and training to farmers regarding rice plant diseases. By providing knowledge or involving farmers in providing knowledge about disease and crop management, it can reduce and help farmers to act early before it spreads and becomes more uncontrolled.

Innocent, et al, (2017) emphasized that limitation and challenge in handling food security is could to be use wasted food into valuable product. Food waste can be monitor the safety and quality of the product by using an intelligent packaging that can match with market demands (Magalhaes, Ferreira & Silva, 2020) To manage wasted food or inedible food can help farmer to use for agriculture purpose mainly in composting and animal feeding. The output of this study, farmer can gain general knowledge about using of food waste as main options to reduce risk in using chemical fertilizer. The risk includes sustainability in agriculture, environment as well as reducing toxicity in applying chemical fertilizer.

1.11 Summary of Chapter 1

In this chapter, researcher was discussed on the background of the study, problem statement, objective of the study, research question, research hypothesis, significant of the study, conceptual framework and the limitation of the study.

Table 1.1

Summary of Chapter 1

Research Hypothesis	Research Question	Research Objective
H1: Knowledge will positively affect farmers' intention in applying food waste as fertilizer.	What is the effect of knowledge among farmer about intention to application of food waste as fertilizer?	To examine the effect of knowledge towards farmers' intention in applying food waste as fertilizer.
H2: Attitude will positively affect farmers' intention to apply food waste as fertilizer.	What is the effect of attitude towards application of food waste as fertilizer?	To explore the effect of attitude on intention among farmer towards application of food waste as fertilizer.
H3: Attitude mediates the relationship between knowledge and farmers' intention to apply food waste fertilizer.	Does the farmers' knowledge influence their attitude towards the intention to use food waste fertilizer?	To investigate the farmers' knowledge, influence their attitude towards the intention to use food waste fertilizer
H4: Subjective norms will positively affect the farmer intention to apply food waste as fertilizer.	Can subjective norms affect the farmer intention towards the application of food waste as fertilizer?	To assess the effect of subjective norms on farmer intention towards the application of food waste as fertilizer.
H5: Perceived behavior control will positively affect the farmers' intention to apply food waste as fertilizer.	Does perceived behavior control positively affected the farmer intention to apply food waste as fertilizer?	To determine perceived behavior control positively affect the farmer intention to apply food waste as fertilizer.

The following chapter of this study, will explain all the variable based on the relevant literature. Also, the detail about conceptual framework with theory of planned

behavior and knowledge attitude practice. The waste, management of food waste, composition of food waste, farmer sustainable agriculture and sustainable development goal that related with this study will be discuss on chapter 2.