

MINIMIZING FOOD WASTE THROUGH PATTIRO VEGGIE

Mengurangkan Sisa Makanan Melalui Pattiro Veggie

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Abstract

The need to minimize food waste is essential since the waste will contribute to global warming. It is reported that the level of food waste generated by Malaysians in 2014 is high, which is equivalent to feed almost 7.5 million people. These food wastes could be converted to other consumable foods. Along with the growth pace of lifestyle and the increase number of women working outside, encourage more people to go for convenience food. Consequently, the researchers do study on producing convenience food, vegetable patty using ingredients from food leftovers. The aim of the study is to produce processed food that serve vegetarian while supporting nature through minimizing food wastage. The study is beneficial to sustain the environment as well as educating the society into new habits in recycling food waste. The study focuses on developing the patty for pesco-vegetarians for health and dietary reasons. Most of the ingredients used in preparing the patty come from food waste such as bread leftover, biscuits leftovers, potato skins, and carrot skins. The use of food additives and food enhancers are in minimal level to maximize the products' health benefits. The product acceptance is carried out among 91 respondents. The instrument used is questionnaires, analyzed using SPSS version 20, and mean of each items are computed. The findings show that, the mean of overall product acceptance is above 3.0, which is considered as the respondents like the product. This product will helps Malaysians to minimize food waste by recycling them into new product.

Keywords: Vegetable patty, Food waste, Pesco-vegetarian

Abstrak

Keperluan untuk meminimumkan sisa makanan adalah mustahak kerana sampah akan menyumbang kepada pemanasan global. Dilaporkan bahawa tahap sisa makanan yang dihasilkan oleh rakyat Malaysia pada tahun 2014 adalah tinggi, yang setara dengan makanan hampir 7.5 juta orang. Sisa makanan ini dapat ditukar menjadi makanan habis yang lain. Seiring dengan pertumbuhan gaya hidup dan peningkatan jumlah wanita yang bekerja di luar, mendorong lebih banyak orang untuk mencari makanan selesa. Oleh itu, para penyelidik membuat kajian mengenai penghasilan makanan mudah, 'patty' sayur-sayur menggunakan

bahan-bahan dari sisa makanan. Tujuan kajian ini adalah untuk menghasilkan makanan yang diproses yang menyajikan vegetarian sambil menyokong alam semula jadi dengan meminimumkan pembaziran makanan. Kajian ini bermanfaat untuk menjaga alam sekitar serta mendidik masyarakat tentang kebiasaan baru dalam mengitar semula sisa makanan. Kajian ini memfokuskan pada pengembangan patty-vegetarian untuk kesihatan dan diet. Sebilangan besar bahan yang digunakan dalam menyediakan roti itu berasal dari sisa makanan seperti sisa roti, sisa biskut, kulit kentang, dan kulit lobak merah. Penggunaan bahan tambahan makanan dan penambah makanan berada pada tahap minimum untuk memaksimumkan manfaat kesihatan produk. Penerimaan produk dilakukan di kalangan 91 responden. Instrumen yang digunakan adalah soal selidik, dianalisis menggunakan SPSS versi 20, dan nilai setiap item dikira. Hasil kajian menunjukkan bahawa, min keseluruhan penerimaan produk melebihi 3.0, yang dianggap sebagai responden menyukai produk tersebut. Produk ini akan membantu rakyat Malaysia untuk meminimumkan sisa makanan dengan mengitar semula mereka menjadi produk baru.

Kata kunci: Patty sayur, Sisa makanan, Pesco-vegetarian

1.0 BACKGROUND OF THE STUDY

Most of the countries pay serious attention in preserving environment since the temperature of earth is rising. This is due to pollution created by human throughout their daily life such as land pollution, air pollution, and water pollution. These pollutions are generated through clinical waste, agriculture waste, food waste, radioactive waste, sewage waste and chemical waste. An increasing attention in food waste has taken place in most of the country. The majority of people are unaware of how much food they waste on a daily basis, from uneaten leftovers to spoiled produce. EPA (United States Environmental Protection Agency) estimates that in 2018, about 68 percent of the wasted food were generated, or about 42.8 million tons ended up in landfills or combustion facilities. By managing food sustainably and reducing waste, we can help businesses and consumers save money, provide a bridge in our communities for those who do not have enough to eat, and conserve resources for future generations (www.epa.gov/recycle/reducing-wasted-food-home). In the studies recently, it is found that, the average annual food waste was 23 kg per capita, 63 kg per household, and in total about 120 million kg per year (Ferreira, 2013).

Meanwhile, in our country, according to SWCorp Malaysia (Solid Waste and Public Cleansing Management Corporation), the households sector accounts for 44.5 percent of the 16,667.5 tonnes of food waste generated in Malaysia daily. About 24 percent or 4,005 tonnes of the food waste is classified as still edible, with the quantity sufficient to provide three meals to 2,970,000 people for a day. Chief executive officer of Solid Waste management and Public Cleansing Corporation (PPSPPA), Datuk Ab Rahim Md Noor (2014) said food waste will be dumped in landfills, which will eventually release greenhouse gases that destroy the ozone layer. It is very alarming that Malaysians produced such a large food waste, which is enough to feed almost 2.9 million people. According to Mohd Pauze Mohamad Taha (2014), Director of Research and Technology, Construction & Industrial Waste in PPSPPA, one of the possible factors that contribute to food waste among Malaysian is buffet concept, which is widely practiced in most hotels in Malaysia. Nadzim (2014) suggests that a serious action should be taken in dealing with food wastage among Malaysian, such as enforcing penalties to those who are involved in order to control the situation.

Nowadays, the growth pace of lifestyle and the increase number of women working outside, encourage more people to go for convenience food (or processed food). Convenience food is commercially prepared food which is designed for ease of consumption. Besides that, convenience food lasts longer and taste better. Therefore, in order to control the volume of food leftover in Malaysia and to serve the Malaysians need for convenience food, the researchers do study on producing convenience food, vegetable patty using ingredients from food leftovers. Aside from that, realizing the importance of a well-balanced food, especially the intakes of vegetables, the researchers replace the use of chicken in patty with other ingredients, but ensure the taste of patty would be as close as chicken patty. Therefore, the product produced at the end of the study could be eaten by a pesco-vegetarian who does not consume chicken for various health reasons as well as ethical reasons.

1.1 Problem Statement

A growing interest in food waste has arisen because about one-third of food produced globally is thought to be lost or wasted, amounting to about 1.3 billion tonnes each year (Gustavsson et al., 2011). The statistics show that Malaysians produced 15,000 tonnes food waste (New Straits Times, 22nd September 2014); research among Finnish households indicates 120 million kg per year was disposed as food waste (Silvennoinen et al., 2014); study on food waste in Portuguese University states 280 g of food waste is thrown per month (Ferreira,2013). Figures released by the Association for the Defence and Orientation of Consumers (ADOC, 2009) show that 35 per cent of fresh products (milk and dairy products, meat and seafood), 9 per cent of bread and 16 per cent of fruit and vegetables are wasted within the home.

Realizing high percentage of food waste comes from vegetables and bakery product, therefore, the aim of the study is to produce convenience food as to minimize food waste using bread and vegetables such as potato and carrot skin where it involves peeling process. This will help to promote environmentally friendly and beneficial for economic reason. Recent studies have shown that individuals with high environmental and civic consciousness waste less food (Williams et al., 2012;Parfitt et al., 2010; Barr, 2007). Therefore, it is assumed that individuals who are more concerned towards the environmental impacts caused by food waste are individuals who are more likely to change their behaviour towards the wastage of food.

1.2 Aim

To produce convenience food that serve pesco-vegetarians while supporting nature through minimizing food wastage.

1.3 Objectives

1. To use food leftover as ingredients in producing the product as to sustain the environment by minimizing food waste.
2. To create chicken patty that serves pesco-vegetarian people for dietary and health reason.

1.4 Significance of the Study

The study is important as to help reduce food waste which could contribute to green environment. These food wastes usually will be dumped at landfills, and eventually will produce methane that is harmful to human. Hence, the study is essential in promoting environmental friendly by recycling food leftovers into new product. The product is expected

to fill up the modern and fast lifestyle which requires for easy serving food that is convenience food.

Aside from that, the study is beneficial to those who cannot consume chicken for various reasons to substitute their chicken nutrients intake because the product developed has iron, calcium, and protein. (The result is generated through nutritiondata.self.com)

2.0 FOOD WASTE

In our society, most people would agree that wastage of any sort is not a desirable feature in which some resources are becoming increasingly scarce. It may, of course, be essential to discard some ageing food and, indeed, ideas, from time to time, in order to replace them with redesigned or novel items and concepts. Food waste may be defined as 'a potential source of food that has knowingly been discarded or destroyed' (Osner, 1982).

Previous study done by Silvennoinen (2012) food waste volume and composition in Finnish household, the households produced a total of 882 kg avoidable food waste (0-23.4 kg per household). On average households discarded 2.3 kg (837 g/p). Most discarded food was fresh and perishable, or leftovers from cooking and dining. Discarded food was diverse: the main discarded foodstuffs were vegetables 19 per cent, home cooked food 18 per cent, milk products 17 per cent, bakery and grain products 13 per cent, and fruits and berries 13 per cent. In terms of weight, in Europe food waste at household level is on average 47 kg per capita per year. The same values can be seen in Italy where post-consumer food waste at household level is about 46 kg per capita per year (BIO Intelligence Service, European Commission (DG Environment), 2010).

2.1 Food Waste Management

According to Osner (1982), there are three ways of ensuring that the consumer and the caterer produce less waste include the following:

1. A clear decision on the quantity of food to be purchased. It is important to buy food such as cuts of meat or bacon which will be appropriate for the purpose intended. Caterers must specify carefully what they want in relation to consumer/customers' needs and wants.
2. A policy of careful buying and utilization of food in terms of sell-by dates, length of time food is stored in the refrigerator and 'recycling' of food that has been cooked once but not eaten (réchauffé). Caterers may keep preparation waste low by utilizing bacon and sausage fat in the fryer. Efficient stock control on the 'first out' principle helps to ensure food is used before it goes bad.
3. Consumers' preferences for foods or dishes must be identified positively, and unpopular foods not offered.

Based on the above study, recycling or reuse may become one of the ways to reduce food waste. With this idea, we decided to reuse unavoidable waste comes from bread and vegetables to make it as a convenience food in a form of vegetables patty which can be eaten by Pesco-Vegetarian.

2.2 Convenience Food

The terms "convenience food" and "convenience store" indicated that arrangements or commodities might be "designed for convenience or used when convenient". The emergence of convenience food reflects the re-ordering of the time-space relations of everyday life in

contemporary society. The problem of timing supersedes the problem of shortage of time. Basically, “modern” conveniences were ones oriented towards comfort and saving labour: the instruments of modern convenience reduce the amount of toil required in the accomplishment of routine domestic tasks. A general lack of time, knowledge, skills and abilities to prepare home meals (Gofton, 1995) influences our global food attitudes and choices in the direction of more convenience food. With the above statement, convenience food is preferred by the society as it is simple and easy to cook as it does not require skill and long hours to prepare the food. Consumers buying and consuming convenience food are so much associated with saving time or saving money.

2.3 Vegetarian

Over recent years there have been considerable changes in eating habits. Lifestyle changes, the recognition of the importance of healthy eating and the number of highly publicized food safety issues have all contributed to these changes and, are recognized as key factors responsible for the growth in vegetarianism (Mintel, 2000). Vegetarian food is on the rise among both vegetarians and non-vegetarians, resulting in unprecedented demand for meatless options (Greenway, 2010 and Lanou, 2007). Robinson and Hackett (1995) described different grades of vegetarianism, which ranged from people who just avoid “red” meat and those who avoid all foods of animal origin and might restrict their intake of some plant foods also. The type of vegetarian diet followed by an individual may reflect the motive to be vegetarian; motives for being vegetarian include, amongst others, ethical and ecological issues, health concerns, sensory and taste preferences and philosophical teachings. (Phillips, 2005).

Throughout history the vegetarian diet has been advocated by various religious and cultural groups for ethical or idiosyncratic reasons, which resulted in vegetarians being looked upon as deviant (Whorton, 1994). Increasing concern for animal welfare is also seen as contributory to the growth of vegetarianism. In addition there has been a growth in awareness of the need for a healthy lifestyle, which has resulted in an increased awareness of the need for what is perceived to be a healthy diet. With that, we came out with a product names Pesco Pattiro Veggie as a convenience food which cater to Pesco-Vegetarian to fulfill consumer dietary and healthy reason.

3.0 METHODOLOGY

Quantitative method is used in the study, where statistics and numbers from the questionnaires are being used as to analyze the need of the product in resolving the issues in problem statement and in generating analysis for the product acceptance after the product has been developed. In order to obtain the results, the data is analyzed using Statistical Package for the Social Science (SPSS) version 20, descriptive analysis is undertaken to ascertain the mean of each items in the questionnaires.

Both data collection methods are used in carrying out the study, they are through primary source and secondary source. In order to obtain primary data, the researchers distribute questionnaires to determine the product acceptance among 91 respondents in Selangor using simple random sampling. The questionnaires developed consist of 9 likert-scale questions and 3 sections. Due to the number of respondents involved are only 91, the data gathered through questionnaires distributed will not be generalized since 91 respondents cannot represent 5.46 million residents in Selangor. However, the study provides essential information to respond to the researchers’ objectives of carrying out the research.

The reliability of the questionnaires is tested to ensure the stability and consistency of the instruments across time and across various items in the instruments. In order to measure the reliability of the instruments used, the researchers distributed the questionnaires to 30 respondents using convenience sampling. The alpha Cronbach value is generated from SPSS. The alpha Cronbach value for the questionnaires is 0.927. The alpha Cronbach value is above 0.9. Thus, all the items in the questionnaires indicate good reliability value, and could be accepted and trusted.

Besides that, the researchers spend time to carry out two structured interviews with head of the food technology processing unit in Kolej Komuniti Sabak Bernam and a senior staff in the same unit to gather information on proper methods of producing convenience food, types of available convenience food, food enhancers and appropriate chicken substitutes to be used in the product. Even though structured interviews are being used in data collection, the study is considered as a quantitative study since the interviews are only a minor part of the data gathering process. The data obtained through interviews sessions are mainly used for product formulation and production. As for the secondary data collection, the reseachers go through the cooking books, ingredients books, and journals from existing authors.

4.0 DISCUSSION

4.1 Product Acceptance Analysis

Product Acceptance analysis is carried out through sensory evaluation to 91 respondents in Selangor. Sensory aspects such as neutral taste or tastiness, crispiness, chicken-like texture, or granular texture were seen as positive attributes (Elzerman, 2013). Therefore, sensory evaluation for the product is tested on its texture, flavor, size and portion, appearance, and aroma. Sensory evaluation is carried out for both flavors of pesco-pattiro vegie, which are the original flavor and blackpepper flavor. The respondents were instructed to drink water to cleanse the palate between samples (Quadros, Rocha, Ferreira and Bolini, 2015). All samples were monadically presented using balanced complete blocks on a plastic plate with a three digit code as noted by Macfie et al. (1989). Moreover, no other information was provided in order to avoid bias. The researchers try to avoid negative sensory aspects that were mentioned by Elzerman which were uniform taste, compactness, dryness and softness.

The data obtained from the questionnaires are being analyzed using descriptive analysis. The data are computed into new variables to prepare the data for the analysis. Then, the mean for the required variables are generated. For all the descriptive analysis used in the study, the following indicators are being used.

Table 4.1: Indicators for All the Descriptive Analysis Used

	Scale
Like Extremely / *Strongly Agree	4.0
Like / *Agree	3.0 – 3.99
Dislike / *Disagree	2.0 – 2.99
Dislike Extremely / *Strongly Disagree	0 – 1.99
* used for Figure 4.3 and Table 4.4	

Figure 4.1 and Table 4.2 (which is on the following page) indicate the results of product acceptance test for both flavors. It is shown that all the elements measured; texture, flavor, size and portion, appearance, and aroma are at good readings which are above 3.0. (Please refer to table 4.1 for the indicators used). It indicates that all the respondents like Pesco-Pattiro Veggie for both flavors. Both flavors show that the mean for flavor are the highest which 3.32 and 3.42 for original and blackpepper flavor respectively. This displays that the product developed is mostly acceptable for their tastes. It is also shown that the lowest mean for both flavors is for size and portion.

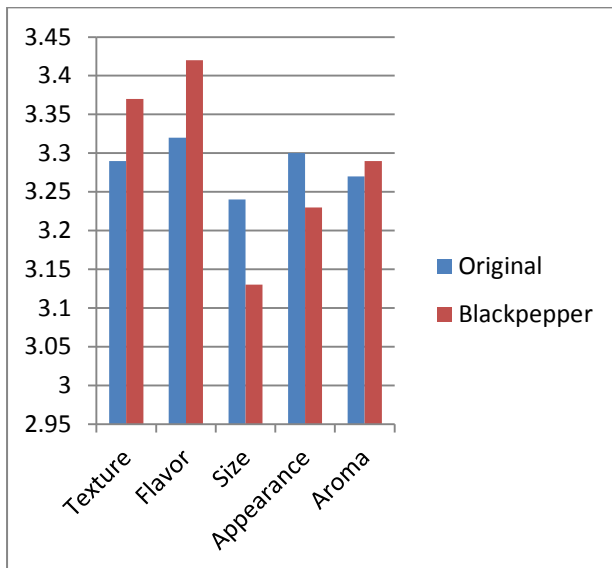


Figure 4.1: Mean Comparisons of Original and Blackpepper Flavor of Pesco-Pattiro Veggie

Table 4.2: Mean Comparisons of Original and Blackpepper Flavor of Pesco-Pattiro Veggie

	Original	Blackpepper
Texture	3.29	3.37
Flavor	3.32	3.42
Size	3.24	3.13
Appearance	3.30	3.23
Aroma	3.27	3.29

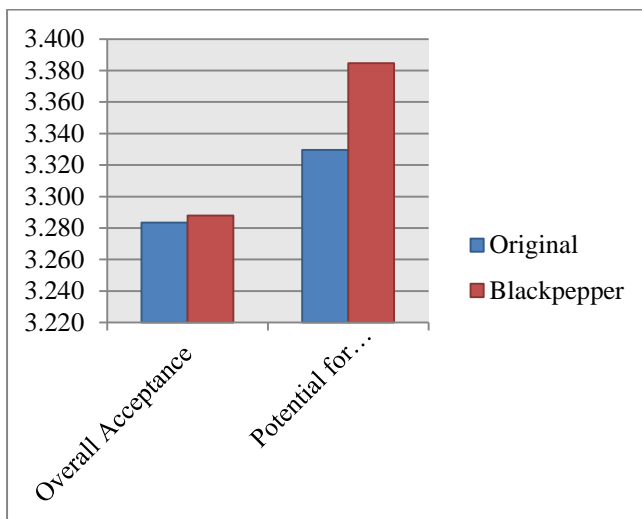


Figure 4.2: Overall Acceptance of Original and Blackpepper Flavor of Pesco-Pattiro Veggie

Table 4.3: Overall Acceptance of Original and Blackpepper Flavor of Pesco-Pattiro Veggie

	Overall Acceptance	Potential for Commercialization
Original	3.284	3.33
Blackpepper	3.288	3.38

Meanwhile, the above Figure 4.2 and Table 4.3 display the overall acceptance of both flavors of the product and the product potential for commercialization. Both flavors show that they have good potential for commercialization, which are 3.33 and 3.38 for original and blackpepper flavor respectively. It is supported by the overall acceptance results of both

flavors that illustrate the respondents like the product, which the means for each flavor is above 3.0 (Please refer to table 4.1 for the indicators used).

4.2 Nutritional Value of the Product

The product is a new invention for chicken substitution where essential nutrients such as iron, calcium and protein in chicken can be obtained through the patty. (The result is generated through nutritiondata.self.com). Anchovies, spinach, mushroom and soy bean protein is added into the formulation to attain the taste and texture similar to chicken. Soy bean protein (also called “novelty protein foods”) is product generally based on plant proteins, which are developed to replace meat in the diet as mentioned by Principato, Secondi and Pratesi (2015). They noted that soy protein was spun into fibers to form products that were aimed to mimic meat. The reseachers use spinach as one of main ingredients for good sources of iron because it is even better on a per calorie basis than meat. For this reason, vegetarians as well as pesco vegetarians do not have a higher incidence of iron deficiency than do meat eaters by consuming the product.

The product is not only unique but it was also different by comparing to another existing product for pesco vegetarians as well as it was produced by using food leftover such as potatoes and carrot skins, biscuits and bread leftover which can help to sustain our environment by minimizing food waste. In addition, it is non - preservatives but only minimal food enhancer is being used in the production process. It is hygienically prepared and blast freezing technology is being used as to extend the product’s shelf life.

Therefore those who are allergic with chicken may eat this product where it offers nutritional value as what chicken does and provide almost similar chicken patty taste. This product may be taken by everyone and specially cater for pesco-vegetarians as we know that vegetarian diets have become increasingly popular in many countries in recent years, for health, philosophical, ecologic, and religious reasons (Ball and Bartlett, 1999). They also noted that whatever the motive for avoiding the food group, care must be taken to ensure that the diet remains balanced and nutritionally complete so as to avoid any deficiencies and to ensure optimal nutritional status. Furthermore, vegetarian lifestyles and dietary practices are associated with a lower incidence of some diseases, such as obesity, ischemic heart disease, gallstones, type 2 diabetes, and colon cancer.

4.3 Meeting the objectives of the study

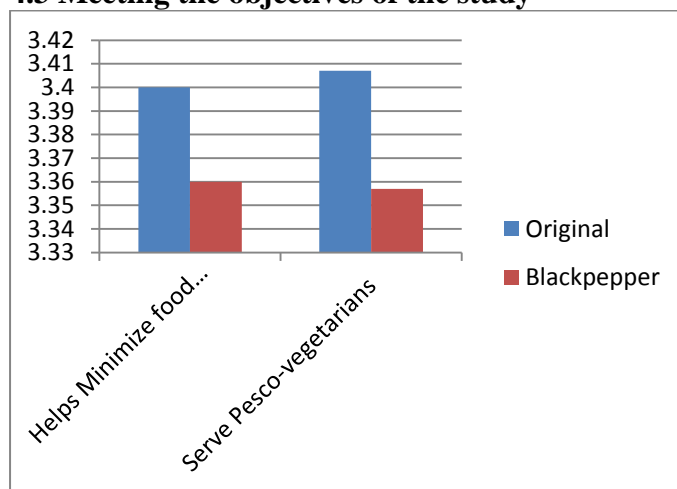


Figure 4.3: Original and Blackpepper Flavor of Pesco-Pattiro Veggie Solving Issues

Table 4.4: Original and Blackpepper Flavor of Pesco-Pattiro Veggie Solving Issues

	Helps Minimize food waste	Serve Pesco-vegetarians
Original	3.4	3.407
Blackpepper	3.36	3.357

The product produced serve for meeting the objectives of the study; to use food leftover as ingredients in producing the product as to minimize food waste, and to create chicken patty that serves pesco-vegetarian people for dietary and health reason. The result of the study is shown in the above Figure 4.3 and Table 4.4. The first objective of the study is fulfilled because through Pesco-Pattiro Veggie, it helps society to minimize food waste through recycling food leftovers into new menu. Unavoidable food leftover (carrot skins and potato skins) and avoidable food leftover (biscuits and bread leftover) are being used as ingredients in producing the patty. The researchers defined the bread leftover as any bread which is close to expiry date but still not be used up and any bread which has passed the expiry date and still not be used up but still in good condition without any fungus. The biscuits leftover are defined as any biscuits which are close to expiry date but still not be used up, or any biscuits which have passed the expiry date and still not be used up but still in good condition without any fungus, or any biscuits which are soggy. These food leftovers contribute 41.29% of the product formulation. Therefore, through mass production, more food leftover and food waste will be used. These food leftovers could be obtained from factories (for bread and biscuits leftovers) and market (for potato and carrot skins). Even though product formulation of the patty consists of food leftover, it is safe to be consumed because food wastage or food leftover is the material which could be consumed by the average person without risk but which for any reason is not utilized for human food (Derek, 1977). Furthermore, it is supported by the mean result that is above 3.0, which shows that the respondents agree that the product helps minimizing food wastage.

Besides that, the study also shows that Pesco-Pattiro Veggie is beneficial to serve those who do not consume chicken. It would be a good chicken substitute since it provides calcium, protein, iron, vitamin A, vitamin C, and carbohydrate. Pesco-pattiro Veggie is a good chicken substitute since it offers consumers non heme iron as a replacement for heme iron in chicken and other meat. The product formulation is specially made to cater to pesco-vegetarians who eat fish, dairy products, and eggs along with plant foods but do not consumed meat and chicken. The researchers believe this is the healthiest diet for most people. From the findings obtained, it is proven that objective 2 of the study is fulfilled. This is demonstrated from the mean generated in Figure 4.3 and Table 4.4 which is considered high for both flavors. They are above 3.0, which is 3.407 for original flavor and 3.357 for blackpepper flavor.

5.0 CONCLUSION AND RECOMMENDATION

The result of this study indicates that Pesco-Pattiro Veggie for Original and Blackpepper flavor are acceptable and are potential to be commercialized. The product is a good chicken substitute that is suitable for pesco-vegetarians. On top of that, the study helps to minimize food wastage by recycling food leftover into Pesco-Pattiro Veggie. Instead of throwing away carrot skin, potato skin (unavoidable leftover) , biscuit and bread leftover (avoidable leftover), there are recycled and processed to become new product name as Pesco-Pattiro Veggie or also known as vegetable patties. 41.29% of the ingredient comes from food leftover and acts as a basis in producing the vegetable patties. Therefore, through product commercialization, more food leftovers will be used in producing the product, and food waste that will be dumped at landfills will be lesser. It indirectly helps to minimize food waste through recycling process and if this processed stay longer it would help to save the environment by minimizing wastage that would result in producing methane and increasing global warming. Consequently, the product promotes a healthy life and promotes for green environment.

Recommendation for future researchers, the product acceptance analysis should follow the sensory evaluation test protocol for research and development of a product. It is also suggested that the product be evaluated by well-trained panelists by using hedonic scale in order to contribute for more precise result.

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