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Perception of Youth on Hornet (*Vespa* spp.) Larvae as Food Sources in Malaysia

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DECLARATION

I hereby declare that the work embodied in this report is the result of the original research except the excerpts and summaries that I have made clear of the sources.

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Perception of Youth on *Vespa* (spp.) Larvae as Food Sources in Malaysia

ABSTRACT

Every country's future depends on its youth, who are a valuable asset in terms of economic development. The most well-known wasps, which are yellow jacket relatives and belong to the Vespidae family, build eusocial colonies with laying queens and non-breeding workers. *Vespa* spp. larvae can now be used as a food source and alternative in foods and drinks due to the discovery of nutrients and advantages in the larvae. Historically, many global communities, particularly in Korea, China, Japan, Laos, and Thailand, have used these larvae as their primary food source by incorporating them into their cooking and medicinal processes. The goals of this study are to determine the level of youth perception of hornet (*Vespa* spp.) larvae as food sources in Malaysia. Using the Theory of Planned Behaviour (TPB), a non-probability purposive sampling method through a contributing questionnaire survey. The study's findings show that youth in Malaysia have a positive perception of *Vespa* spp. larvae as food sources, and that there is a positive relationship between attitude, subjective norms, and perceived behaviour toward participation, with perceived behavioural control being the most influential factor in youth's perception of *Vespa* spp. larvae as food sources.

Keywords: Perception, Youth, *Vespa* spp. Larvae, Food sources, Theory of Planned Behaviour

Persepsi Belia Terhadap Larva Tebuan Sebagai Sumber Makanan di Malaysia

ABSTRAK

Masa depan setiap negara bergantung kepada belia, yang merupakan aset berharga dari segi pembangunan ekonomi. Tebuan yang paling terkenal, yang merupakan saudara jaket kuning dan tergolong dalam keluarga Vespidae, membina koloni eusosial dengan permaisuri bertelur dan pekerja bukan pembiakan. Larva tebuan kini boleh digunakan sebagai sumber makanan dan alternatif dalam makanan dan minuman kerana penemuan khasiat dan kelebihan pada larva. Dari segi sejarah, banyak komuniti global, terutamanya di Korea, China, Jepun, Laos, dan Thailand, telah menggunakan larva ini sebagai sumber makanan utama mereka dengan memasukkannya ke dalam proses memasak dan perubatan mereka. Matlamat kajian ini adalah untuk menentukan tahap persepsi belia terhadap larva tebuan sebagai sumber makanan di Malaysia. Menggunakan Teori Tingkah Laku Terancang (TPB), kaedah persampelan bertujuan bukan kebarangkalian melalui tinjauan soal selidik yang menyumbang. Dapatan kajian menunjukkan belia di Malaysia mempunyai persepsi positif terhadap larva tebuan sebagai sumber makanan, dan terdapat hubungan positif antara sikap, norma subjektif, dan tingkah laku yang dirasakan terhadap penyertaan, dengan kawalan tingkah laku yang dianggap sebagai faktor yang paling berpengaruh dalam persepsi belia terhadap larva tebuan sebagai sumber makanan.

Kata kunci: Persepsi, Belia, Larva Tebuan, Sumber makanan, Teori Tingkah Laku Terancan

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LIST OF ABBREVIATIONS AND SYMBOLS

KMO	Keiser-Meyer-Olkin
TPB	Theory of Planned Behaviour
TRA	Theory of Reason Action
&	And
%	Percent

CHAPTER 1

INTRODUCTION

1.1   Research Background

1.1.1   Youth in Malaysia

Youth refers to the period between childhood and adult age which is followed by mental and physical development growth from being children to being adolescents. Harlan (2016) stated youth adopt various identities such as daughter-son, sibling, child, teen, peer, friend, and student which is each of these identities has influenced the way to construct an understanding of participants in research on youth.

Based on Institute for Youth Research Malaysia (2021), age of the youth is between 15-40. The highest youth population is male with the percentage 52.3% (7,825,500 million). Follow by female wth percentage 47.7 % (7,146,500). Graph 1 shows the youth population in Malaysia 2021.

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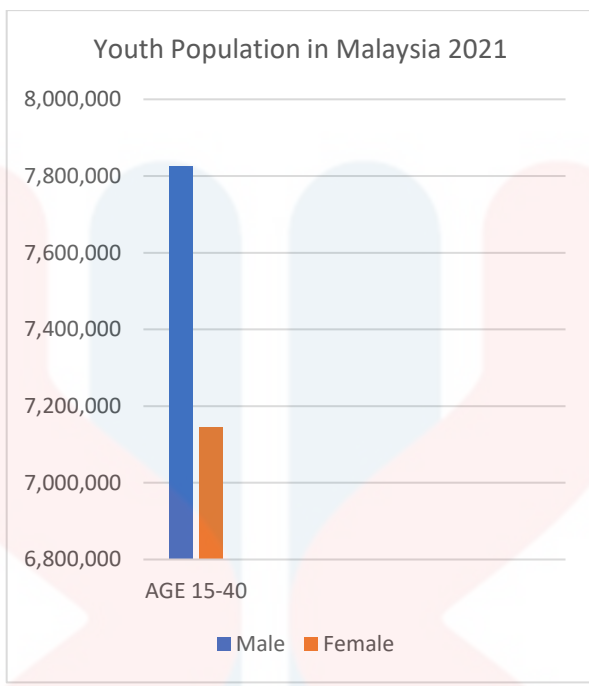
Figure 1.1: The youth population in Malaysia 2021

Sources From: Institute for Youth Research Malaysia (2021)

1.1.2 *Vespa* spp.

The most well-known wasps or hornet, which are related to yellow jackets and are members of the family Vespidae, nest in eusocial colonies with laying queens and non-breeding workers. Wasps or hornet (Vespidae) exhibit a wide spectrum of social complexity, from solitary existence to eusocial colonies, making them ideal models for studying the genesis and maintenance of animal social behavior (Richards, 1971).

Eusociality demands the presence of reproductive castes or group members with fundamentally distinct reproductive capacities in a social environment. Hymenoptera's uncommon haploid diploid sex determination system encourages eusociality by allowing sisters to be extremely closely related to one another (O'Donell, 1998). Depending on

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whether they are eating or making their nests, some are predators and others are pollinators.

There are 24 wasp species; ground wasps (*V. tropica*) are the most frequent and popular *Vespa* species in Malaysia, while *V. affinis* is also found there, albeit not as widespread as *V. tropica*. Although the hue of this *Vespa* spp. is almost the same, it is often a yellow and black *Vespa* spp. with an oval body shape. Certain types of *V. tropica* and *V. affinis* are homeothermic and look similar (Richards, 1971).

Vespa spp. nests on trees in Malaysia, similar to paper formed from crushing plants, with doors and plenty of space within. A wasp head controls the nest, which is light grey to white. Wasp colonies are not as numerous as bee colonies, which number between 10 and 25. *Vespa* spp. will attack humans, animals, and anything else that approaches and stings its nest. *Vespa* spp. is a predatory or predatory bug that captures or consumes other insects and passes them on to the nest's larvae (Anem,1970).

V.tropica is a species of insect with distinct head, body (thorax), and stomach segments (abdomen or gaster). The tip of the tail is a stinging area that contains venom or poison that may be used as a weapon or defensive device against an adversary. The wasp's head is approximately the same size as its black or reddish-brown thorax. *Vespa* spp. has complex eyes, and wasps also have a pair of hairy dark brown or reddish tentacles. Female wasps are around 30mm in length, whereas male wasps are approximately 26mm in length. They differ from other *Vespa* species in that they have a very broad upper head border and a rounded abdomen segment slightly beyond the waist. *Vespa* spp. has a critical function as a natural biological control insect that eliminates other pests (Anem,1970).

Species of *V. affinis*, the head is brownish red or black, pubescent, with some red markings on the front and vertex, and a black temple; the compound eyes and ocelli are

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black; the antennae are dark brown and usually pale brown beneath; the clypeus is black, coarsely punctate, with broadly rounded lobes on the posterior side of the clypeus; and the mandibles and teeth are black. Thorax is black or the pronotum contains slight ferruginous markings. Read in black or a dull ferruginous hue. Legs are primarily black. Tegulae are dark brown, whereas the wings are a dark fuscous brown color. Gaster with little punctures and dark brown segments except for the first and second segments, which are golden orange in color. Certain specimens' vivid orange initial tergite may be reduced to two transverse spots and a narrow apical band. The lesser banded hornet is small to a medium-sized hornet, with queens reaching a maximum length of 30mm, males reaching a maximum length of 26mm, and workers reaching a maximum length of 22 to 25mm (Bequaert, 1936).

Wasps are notorious for being aggressive and destructive insects. Wasps nest in areas that are not accessible to humans or trees. Does not have a farming system comparable to that of bees. They haphazardly build nests on trees in the forests, distant from humans. Additionally, they build nests on tall and ancient trees. These larval harvesters have been used historically. Harvesting larvae requires certain expertise and skills. Not all communities are aware of the gathering process for these larvae. It requires the appropriate abilities and competence to avoid self-inflicted harm. Summer is required for harvesting these larvae since fire is used to destroy the nest, causing it to fall and drive away from the adult wasps. This streamlines the larval recruitment procedure. Harvesting is often done at night or in the evening to avoid posing a hazard to the inhabitants. When nests are destroyed, adult wasps will swarm and pose a threat to people (Anem, 1970).

Vespa spp. is a stinging creature that is deadly to humans, yet the larvae of *Vespa* spp. are consumed and utilized in Asian nations as food and medicine. For instance, in East Asian nations, sociable *Vespa* spp. has long been employed as a source of biological

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for medicinal and culinary uses. Social *Vespa* spp. nests (Nidus Vespa) have been employed as a raw medicinal component or a traditional liquor ingredient for health in Korea and China (Jeong, Kim, Nam, Hahn & Choi 2020).

1.2   Problem Statement

The world's population is expected to reach 9.6 billion by 2050, resulting in an increase in demand for food, particularly animal proteins. Animal proteins make up about 40% of global protein consumption, but their production is inefficient, requiring 2–15 kg of plant material to produce 1 kilogramme of animal products.

Furthermore, both cattle farming and meat consumption have significant environmental consequences and contribute to greenhouse gas emissions, making both activities unsustainable. Insects, algae, and meat grown in vitro offer a compelling alternative to animal proteins for human consumption and animal feed production. While eating insects, also known as entomophagy, is unusual in Western culture, it is an essential part of the diets of at least 2 billion people in Asia, Latin America, Africa, and Australia. Hymenoptera is one of the most commonly eaten insect group (Orkusz, Wolariska, Harasym, Piwowar &kapelko, 2020).

Vespa spp. is regarded as a dangerous and venomous bug by the Malaysian community. Furthermore, they are averse to eating *Vespa* spp. larvae because they regard them as a repulsive and inedible bug. Insects are a good source of protein, minerals like iron, and vitamins that the human body needs on a regular basis. Entomophagy, or the daily consumption of insects, is still uncommon in Malaysia due to a variety of

unavoidable circumstances. This is due to a lack of knowledge about the benefits and nutrients associated with *Vespa* spp. as a regular meal in life, as well as a lack of information about the advantages and nutrients associated with *Vespa* spp. as a regular meal in life (Anem,1970).

The next issue is that a lack of knowledge about *Vespa* spp. larvae could result in a societal economic benefit. I'm not sure what these larvae are used for, but I'm guessing they're for sale. Harvesting these larvae is a time-consuming process that could be turned into a group effort. Not all groups are skilled at capturing *Vespa* spp. larvae. Because of their difficulty in harvesting and scarcity, these larvae may command a premium price. There is a lack of knowledge about how to market these *Vespa* spp. larvae (Wardhana, 2016).

Finally, because of psychological barriers like neophobia and distaste. Edible insects are an excellent and sustainable source of animal proteins due to their high nutritional value and low production costs. To completely replace meat with edible insects, however, a shift in consumer attitudes is required. Acceptance of novel meals is largely determined by the degree of food neophobia, or the fear of novel foods in the human psyche. People who have a lower level of food anxiety eat a wider variety of foods than those who have a higher level of food anxiety (Orkusz et al., 2020).

1.3   Hypothesis of the Study

H_0: There is no significant value between the relationship of attitude, subjective norms, and perceived behavioural control towards the perception of youth on *Vespa* spp. larvae as food sources.

H_1: There is a significant value relationship between the relationship of attitude, subjective norms, and perceived behavioural control towards the perception of youth on *Vespa* spp. larvae as food sources.

H_0: There is no most significant factor of perception of youth on *Vespa* spp. larvae as a food source.

H_1: There is most influence factor the perception of youth on *Vespa* spp. larvae as a food source.

1.4   Research Question

1. What is the perception level of youth toward *Vespa* spp. larvae as food sources in Malaysia?

2. What are the relationships between attitudes, subjective norms, and perceived behavioural control with youth's perceptions of *Vespa* spp. larvae as food sources in Malaysia?

3. What is the most influence factor in perceptions of Youth on *Vespa* spp. larvae as food sources in Malaysia?

1.5 Scope of the study

The purpose of this study is to examine youth perceptions of *Vespa* spp. larvae as food sources. Attitudes, subjective norms, and perceived behavioural control of conduct are used as independent factors in this study. 200 Malaysian youth aged 15-40 years old were chosen as respondents.

1.6 Research Objective

1. To determine the level of perception of youth on *Vespa* spp. larvae as food sources in Malaysia.

2. To analyse the relationship between attitudes, subjective norm, and perceived behavioural control with the perception of youth on *Vespa* spp. larvae as food sources in Malaysia.

3. To identify the most influence factor of the youth perception on *Vespa* spp. larvae as food sources in Malaysia.

1.7   Significant of the Study

This study was conducted to study the perception of youth in *Vespa* spp. larvae as food sources in Malaysia. Important of this study to know the perception factors of youth in *Vespa* spp. larvae as food sources in Malaysia that can help increase knowledge about the benefits of *Vespa* spp. larvae to health and increase the number of studies on *Vespa* spp. larvae.

This study can help increase the knowledge of youth about the benefits of *Vespa* spp. larvae to their health. Therefore, this study will further increase their acceptance to accept *Vespa* spp. larvae as a food source in Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 *Vespa* spp. Biology and species in Malaysia and World

2.1.1 Biology *Vespa* spp.

The social hornet, or Vespidae, are classified into three distinct subfamilies, the largest of which may be divided into three distinct tribes. Begin by identifying the names, sizes, and geographic distributions of many major genera. Unpublished research was utilized to assess the genus's size. Each group, except the Polybiini, contains a limited number of genera but a great number of species. On the other hand, the Polybiini is a far more diversified species. It is critical to understand the relationships and probable histories of these species to investigate their biology (Richards, 1971). Wasps have four life stages: egg, larva, pupa, and adult. Adult wasps typically have four scant wings, membrane wings, and a small waist connecting their bellies to their thorax. Wasps have a chewing portion of their mouths that they use to chew their food and dig through the wood to get the paper used to make nest-like cell walls.

Male and female wasp species exist. Males are created from unfertilized eggs, as is the case with the majority of Hymenoptera species, by a developmental process known as parthenogenesis. Female wasps are much larger than male wasps and are produced from fertilized eggs. Male wasps are believed to have become extinct in several species. Female wasps are much larger than male wasps and are produced from fertilized eggs. Male wasps are believed to have become extinct in several species. Solitary wasps are little insects that dig holes on the ground or make nests out of the mud on exposed surfaces (Richards, 1971).

The nest is then introduced with a sting-paralyzed bug or spider, where one or more eggs are placed. The victim supplies a living but immobile food source for the wasp's growing larvae. Despite their tiny size, parasitic wasps may be fairly numerous and can have a significant influence on their target species' numbers. On the other hand, social wasps are gigantic insects that dwell in colonies of varied sizes. Wasp colonies are divided into three classes: queens, drones, and workers. Drones are males who exist solely to impregnate the queens. Queens are large, long-lived wasps whose primary duty is to establish colonies before spending the remainder of their lives producing eggs. Once the colony is established, workers look after the eggs and young. Workers are non-fertile female wasps that can be fairly numerous in big colonies. Wasps feed their offspring frequently, often with chewed-up insects and other animal products (Ross, Matthews, 2019).

Are the biggest eusocial wasps and look similar to yellow jackets. Certain species can reach a maximum length of 5.5 cm (2.2 in). Their rather large upper border and rounded abdomen just below the waist distinguish them from other vespine wasps. *Vespa* spp. inhabits 22 distinct environments worldwide. Except for parasitic species, all species exhibit similar behaviors, and whether nests are placed in bushes, hollow trees, or

underground is a matter of individual, not generic, variation. In the United States, some of the larger Vespa species are called 'hornets,' while the smaller ones are called 'yellow jackets.' Under temperate conditions, the Vespidae must have moved north and west from Indo-Malaya, resulting in the development of *Vespa* spp. with annual colonies, hibernating queens, and a separate worker caste. *Vespa* spp., which is more tropical, is less frequent in temperate regions, even though the West European species has a similar life cycle and caste structure (Richards, 1971).

2.1.2   Type of *Vespa* spp. in Malaysia

2.1.2.1 *Vespa tropica*

Vespa spp. exhibits two distinct characteristics: wasps and hornets. There are distinctions in terms of color and size. Hornets are a bigger species with a pale-yellow tint and blackish white-striped wings. Wasps are smaller and have yellow-black stripes on their bodies. The wasp is the most prevalent insect in Malaysia. There are 24 species of wasps; ground wasps, or (*V. tropica*), are the most frequent and widespread *Vespa* species in Malaysia. Workers of *V. tropica* measure 24–26 millimeters (1516–1 in) in length and queens measure 30 millimeters (1 14 in). The head is dark brown/red, while the abdomen is black with a yellow stripe running down the length of the second abdominal segment.

The most evident indication of this wasp is a brilliant yellow abdomen on the second section of the tail, which is darker in color than the other part. A pair of broad

wings enable the wasp to fly fast in diverse directions. Additionally, three pairs of legs assist the wasp in ascending to the link. Wasps in Malaysia build nests on trees using paper manufactured from crushing plants. The nests feature entrances and plenty of space within. The nest is pale grey to white and is guarded by worker wasps. Wasps are present in numbers ranging from ten to twenty-five inches. *Vespa* spp. has a critical function as a natural biological control insect that eliminates other pests (Anem, 1970).

a) Queen and worker

Vespa spp. is classified as wasps and hornets. There are color and size differences. Hornets are a larger species with pale yellow wings that are patterned with blackish white. Wasps are tiny and their bodies are striped in yellow and black. In Malaysia, the hornet is the most common bug. There are 24 wasp species in Malaysia; ground wasps, or (*V. tropica*), are the most ubiquitous *Vespa* species. *V. tropica* workers are 24–26 millimeters (1516–1 in) in length, whereas queens are 30 millimeters (1516–1 in) (1 14 in). While the head is dark brown/red, the abdomen is black with a yellow stripe spanning the length of the second abdominal segment (Anem, 1970).

The most obvious sign of this wasp is a dazzling yellow abdomen on the second segment of the tail, which is deeper in color than the first section. The wasp's large wings enable it to fly quickly in a variety of directions. Additionally, the wasp has three pairs of legs that aid it in climbing to the link. In Malaysia, wasps construct nests on trees using paper made from crushed plants. The nests have openings and plenty of interior room. The nest varies in color from pale-grey to white and is guarded by worker wasps. Wasps

range in size from ten to twenty-five inches. *Vespa* spp. serves an essential role as a natural biological control insect, eradicating other pests (Anem, 1970).

b) Male

Males are comparable to females except for the following. The oculo-malar gap occupies approximately half of the length of the fourth antennal segment. The clypeus is approximately as long as it is wide in the middle, with its sides never touching the eyes, which are separated by exceedingly tiny inner orbital extensions; the front edge is nearly straight, with sharply rounded apical ends. On the underside of the antennae, tyloides are extremely rare and nonexistent on the third segment; on the fourth segment, only the basal thyroid is discernible; and the thirteenth segment is somewhat longer than the twelfth segment. A large, semielliptical excision is made at the apex of the sixth abdominal sternite, with the margins gradually bending toward the sides of the hind border (Bequaert, 1936).

The seventh tergite is straight or slightly curved inward at the apical edge. Apical borders of seventh sternites form short and wide, rounded, somewhat projecting lobes connected by a slightly curved or nearly straight hind border. Genitalia: the outer edge of stipes (of valva externa) is uniformly rounded; the upper (or dorsal) inner edge is very obtuse; the lower (or ventral) inner edge is produced into a very broad lobe, irregularly rounded at the apex, and with a prominent, oblique crest on the ventral side; the squama (of valva externa) is slender (Bequaert, 1936).

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2.1.2.2 *Vespa affinis*

In tropical and subtropical Asia, the smaller banded hornet is found. This species is found in Sri Lanka, Hong Kong, Taiwan, Burma, Thailand, Laos, Vietnam, Sumatra, the Philippines (Palawan), and Malaysia, albeit not as widespread as *V. tropica*. *V. affinis* has the very same color variation as *V. tropica*. The names of four of the six color forms discovered in the subjoined key are given. All varieties are imprecisely defined and connected by transitional specimens; and some may just be extreme individual variances, in which case they should be omitted from naming (Bequaert, 1936).

a) **Queen or Workers**

The ocular malar space is approximately half the length of the sixth antennal shield trapezoidal, due to its more heavily keeled sides. The posterior ocelli are approximately one and a half times as far apart as the inner orbits. The front clypeus margin is moderately thin but has a deep, arcuate median excision; the apical margins are low, very wide, and consistently arcuate, gradually progressing into the median excision but abruptly terminating on the outer side. The forefemora are expanded but not much flattened underneath, and there is no external sharp, blunt ridge (Bequaert, 1936).

The early intercubitus is often straight. Punctuations of moderate intensity in the vertex, thorax, and abdomen, but extremely closely spaced, provide a coarser granulose sculpture (the contrast with *V. tropica* is especially sharp on propodeum and

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postscutellum). The body is slimmer, with a slightly narrower first abdominal tergite. The forewing is shorter, ranging in length from 15 to 23 mm (Bequaert, 1936).

b) Male

Approximately one-half the length of the seventh antennal segment is devoted to oculo-malar space. The clypeus is somewhat wider than it is long, with its sides touching the eyes in the bottom half; the anterior margin is gently curled inward (more so than in *V. tropica*), and the apical edges are extremely broadly rounded. Tyloides on the underside of the antennae are rather noticeable; a pair is found on the fourth segment; the third segment also has a tyloide near the apex, and the thirteenth segment is barely or not longer than the twelfth. Sixth abdominal sternite near the apex with a small, semicircular excision, the edges of which make sharp angles with the sides of the hind border (Bequaert, 1936).

A short, acute, middle, apical notch in the seventh tergite. The apical borders of the seventh sternite are densely formed and bluntly triangular, with the hind margin producing a deep, even, bow-like inward bend. Squama short, acute, barely extending beyond the lower inner edge of the stipes; volsella of valva interns not bifid, terminating ventrally in a narrow, digitiform lobe, dorsally in a blunt angle; penis-shaped similarly to *V. tropica*, but the shaft relatively shorter and slightly expanded in its apical third (Bequaert, 1936).

2.1.3 Comparison and similarity between *V. tropica and V. affinis*

First, the appearances are similar, however, the *V. tropica* is larger and has more deadly venom. Second, *V. tropica* is a subterranean bird, whereas *V. affinis* builds its nest on trees near people. Next, Hyaluronidase, phospholipase, and dipeptidyl peptidase were the most important venom components. *V. tropica* venom contains 2.5 times more hyaluronidase than *V. affinis* venom. Lastly, three main enzymes were found to be more active in the venom of *V. tropica* (Bequaert, 1936).

2.2 Alternative Food Sources *Vespa* spp. Larvae

Throughout history, many civilizations have used these larvae as their primary food source, inserting them every time they cook. In Korea, *Vespa* spp. larvae are collected for medicinal purposes and are occasionally edible, especially *V. mandarinia.* Throughout history, many civilizations have used these larvae as their primary food source, inserting them every time they cook. In Korea, *Vespa* spp. larvae are collected for medicinal purposes and are occasionally edible, especially *V. mandarinia*. Many species of *V. cincta* larvae are eaten in Thailand. Both *V. affinis* and *V. tropica* are common in Laos (Ghosh, Namin, Meyer-Rochow & Jung, 2021).

Frying or frying with chicken eggs is the preferred method of preparation in Yunnan. Their cultures, unlike those in southern Yunnan, favour steaming and mixing the larvae with vinegar. In Korea, frying and grilling are the preferred cooking methods.

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While the Japanese prefer to cook with soy sauce and mirin (sweet cooked rice wine). Furthermore, the Korean civilization uses these larvae to treat a variety of illnesses (Ghosh et al., 2021).

The *Vespa* spp. on the other hand, is a bio-resource that has been used for medicinal and culinary purposes for centuries, especially in East Asia. In Korea and China, it is used as a raw or medicinal ingredient, making it one of the best traditional liquor ingredients for health. Attempts are being made to create *Vespa* spp. breeding procedures to maintain a sufficient supply of material, particularly in China and Japan, where *Vespa* spp. brought by hunters are exchanged at a premium and have historically been used as a food source or for pharmacology (Jeong et al, 2020).

2.3   Protein Content in *Vespa* spp. Larvae

Vespa spp. larvae are nutrient-dense, yet their nutritional content varies significantly depending on species, life stage (adults contain more protein than larval lining stages), habitat, and insect diet. The protein content of certain *Vespa* spp. larvae varies between 13% and 80%, which is typically greater than the protein content of beef and chicken, as well as fish and shellfish, which ranges between 19–26% and 13–28%, respectively. *Vespa* spp. larvae can also be utilized as a supplement to a cereal-based plant diet due to their high concentration of exogenous amino acids (Orkusz et al., 2020).

2.3.1 Amino Acid

All *Vespa* spp. samples included seventeen amino acids. The wild-collected *V. velutina* brood in Korea exhibited significantly higher amounts of practically all amino acids. The results indicate that *V. velutina* and *V. mandarinia* received from a commercial production plant in Shizong province (China) had comparable protein levels, but *V. basalis* had much lower amounts. The highest concentration of amino acid was discovered in *V. velutina* broods collected from the forest surrounding Andong (Korea). Leucine was the most frequently occurring essential amino acid, followed by lysine and valine. Tryptophan was not measured, and cysteine and methionine levels were not discovered in their entirety due to the acid hydrolysis process. Because lysine is a limiting amino acid in cereals such as rice, wheat, and maize, it's worth considering from a nutritional standpoint. The saccharopine pathway, which generates glutamate and - aminoadipate, is involved in the degradation of lysine, an amino acid that is entirely ketogenic (Ghosh et al., 2021).

Additionally, lysine serves as a precursor for the synthesis of carnitine, which is required for oxidation. Tyrosine is an aromatic amino acid that plays a role in melanogenesis and functions as a precursor for catecholamines such as dopamine, norepinephrine, and epinephrine. Tyrosine is a conditionally essential amino acid, and its synthesis requires phenylalanine. Broods of *Vespa* spp. would supplement human nutritional requirements since they include practically all proteinogenic and estimated necessary amino acids, save methionine, and conform to the needed protein pattern (Ghosh et al., 2021).

2.3.2 Fatty acid

The elevated polyunsaturated acid content of *V. mandarinia* and *V. basalis* is probably due to their diet of grasshoppers and crickets, which are both rich in polyunsaturated fatty acids (cf. grasshopper, Chondacris Rosea, and crickets, Gryllus sp. and Teleogryllus sp.). Linoleic acid, followed by linolenic acid, was the most abundant polyunsaturated fatty acid in *V. mandarinia* and *V. basalis*. In vitro, oleic acid inhibits prolyl-endopeptidase (PEP), an enzyme involved in the synthesis of amyloid in the brain and implicated in diseases such as dementia and Alzheimer's disease. Polyunsaturated fatty acids are required for the synthesis of cellular hormones such as eicosanoids and other signaling molecules that affect human health. As a result, the presence of linolenic acid in *V. mandarinia* and *V. basalis* may confer nutritional benefits to those suffering from cardiovascular disease (Ghosh et al., 2021).

2.3.3 Mineral Content

Minerals are critical micronutrients required for human health. Among the nutritional minerals, potassium was detected in abundance, followed by phosphorus. The findings corroborated prior research on Hymenoptera and edible insects from other orders. According to a significant body of data, potassium ingestion lowers blood pressure. A high potassium-to-sodium ratio is beneficial for human nutrition because it reduces cardiovascular risk and improves blood pressure. All of the hornet broods had a

higher potassium content and a lower salt content, making them healthier for humans (Ghosh et al., 2021).

Zinc participates in a wide number of biological processes, including catalytic, structural, and regulatory functions in a wide variety of enzymes, gene transcription, and signal transduction pathways, among others. *Vespa* spp. brood may be capable of providing a significant portion of daily mineral needs, notably for iron, zinc, and copper. Even if it cannot provide all mineral requirements, *Vespa* spp. brood ingestion, assuming high bioavailability, may at the very least supplement mineral nutritional requirements and contribute to the reduction of mineral shortages in vulnerable people (Ghosh et al., 2021).

2.4   VAAM

Dr. Takashi Abe, RIKEN Special Chief Scientist, invented the sports drink VAAM, which works in a unique way. Rather than giving nutrition, Dr. Abe's technology assists the body in using the energy reserves (i.e. body fat) it already has in storage. The Vespa amino acid mixture seen in hornet saliva is synthesised by VAAM. It comprises important amino acids such as Alanine, Proline, and Glycine, as well as 17 amino acids found in *Vespa* spp. water. VAAM contains the same amino acid components as a hornet (*V. mandarinia*) larvae saliva (*Vespa* spp. amino acid mixture). VAAM can retain fat and generate energy, hence improving the body's hydration.

This experiment was demonstrated by administering a VAAM drink to a rat and allowing it to swim. Mice given this drink swam faster and longer just by intermittently

sipping water, which is 25% more active than mice given milk-containing casein (protein). Dr. Takhashi Abe demonstrated in 1995 in the Japanese Journal of Health and Sports Medicine that this combination burns fat and lowers tiredness through this experiment. Then they are offered to athletes, who gain an increased appreciation for their performance by minimizing dehydration and sustaining longer energy levels through the use of fat storage (Shinozaki, Abe, Kamei, Watanabe, Yusuaoka, Shimada, Kaori 2016).

This means that VAAM lowers lactate production and glucose catabolism during exercise. The effects of hornet larval saliva were significantly stronger than those of VAAM. As a result, VAAM established saliva's primary effect. According to the data, VAAM appears to improve physiological condition during endurance exercise (Shinozaki et al., 2016).

2.5 Customary Hunting/Farming

Wasps, or *Vespa* spp., are well-known as harmful and wild insects. Wasps nest in areas that are not accessible to humans or trees. Does not have a farming system comparable to that of bees. They nest indiscriminately on trees in the forests, distant from humans. Additionally, they build nests on tall and ancient trees. These larval harvesters have been used historically. Harvesting larvae takes specialized expertise and skills. Not all communities are aware of the gathering process for these larvae (Anem, 1970).

It requires the appropriate abilities and competence to avoid self-inflicted harm. Summer is required for harvesting these larvae since fire is used to destroy the nest, causing it to fall and drive away from the adult wasps. This streamlines the larval

recruitment procedure. Harvesting is often done at night or in the evening to avoid posing a hazard to the inhabitants. When nests are destroyed, adult wasps will swarm and pose a threat to people (Anem, 1970).

2.6 Theoretical Framework

In TRA, it is aims to explain the influence sought by individuals based on all behaviors. Theory Planned Activity (TPB) is a technique for forecasting an individual's intention to engage in a certain behavior at a given time and location. The theory stated that a person's intention toward activity is determined by two primary factors: attitude toward the behavior and subjective norms (Fishbein and Ajzen, 1975), however, TPB adds an element, namely perceived behavioral control. TPB is a frequently used technique for predicting and characterizing a wide variety of domains (Azura, 2018).

2.6.1 Theory of Planned Behaviour (TPB)

According to Ajzen (1985), TPB is a continuation of the theory of reasoned action (TRA), in that it establishes a framework for examining the elements impacting individual decision-making behaviors. According to this theory, human behaviour was guided by three components such as opinion about predictable results or other characteristics of the behavior (behavioral beliefs), beliefs about the normative desires of other individuals

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(normative beliefs), and convictions about the presence of variables that may further or hinder performance of the behavior (control beliefs) (Ajzen, 2002). The most important component of TPB was the upward attitude behaviour, which is the attitude that comes from the belief in collective behaviour (Widodo & Teguh, 2013).

The attitude relates to a person's opinion of their performance, whether good or bad. An individual's conduct will be determined by his or her attitude toward behavior. The way an individual views good conduct is how he will later choose to act in his life. As a result, attitude is used to direct an individual's conduct (Achmat, 2010).

Subjective norms are the social elements that are anticipated to be consistent with the behavior's performance. This suggests that society is a powerful influencer, influencing people to engage in or abstain from particular activities. Attitudes and subjective standards affect perceived behavior control. This suggests that society is a powerful influencer, influencing people to engage in or abstain from particular activities. Attitudes and subjective standards affect how conduct is seen to be controlled. It is more probable that the person would engage in the conduct based on the link between attitude and subjective standards in situations when the individual is under control (Ismail dan Zain, 2008).

The relative importance of attitude, subjective norm, and perceived behavioral control in the predictable intention was expected to across behaviors and situations. Before TPB theory, one of theory (TRA) was developed by Fishbein and Ajzen in 1975 which was defined the relation between beliefs, attitudes, subjective norms, intentions, and individual behaviors. However, a study from Madden, Ellen, and Ajzen, (2007) said the theory of planned behaviour as extension of theory reasoned action due to TPB theory explained on average and more variety in social aims than TRA regardless of level of

control. In this study, this theory was applied as a basis to support the relationship between the concepts of perception of youth on *Vespa* spp. larvae as food sources in Malaysia.

The Figure 2.1 shows the Theory of Planned Behaviour model by Ajzen, 1991 with attitudes, subjective norms, perceived behaviour control influences the intention and behaviour and Figure 2.2 shows the Theory of Reasoned Action model by Fishbien and Ajzen (1975) describes only attitude and subjective norms influence intention and behaviour.
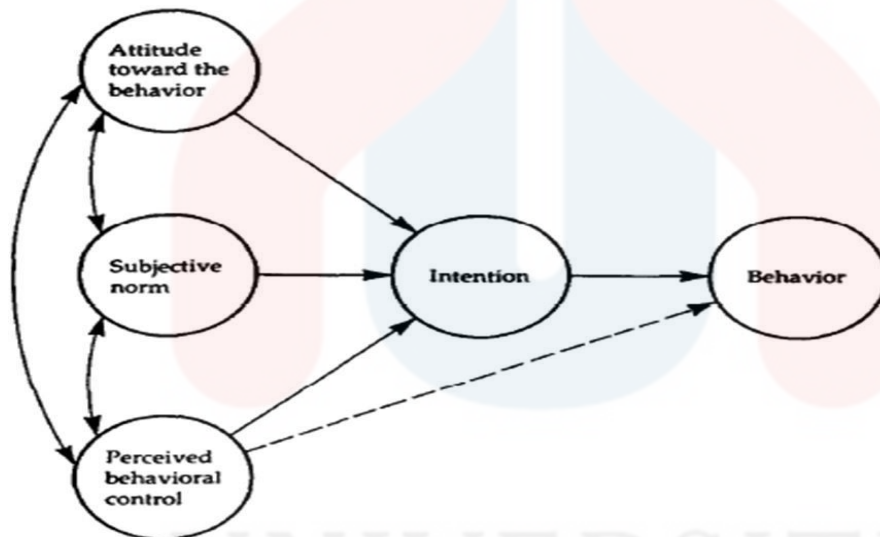
Figure 2.1: Theory of Planned Behaviour (Ajzen, 1991)
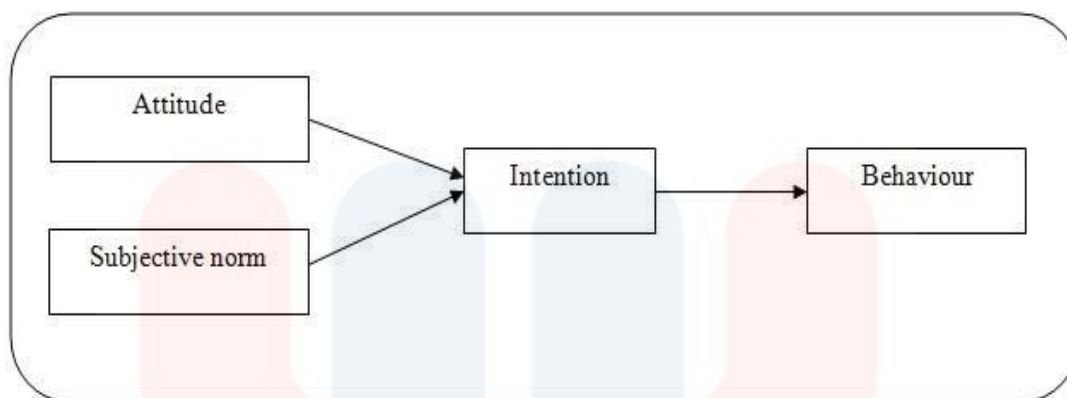
Figure 2.2: Theory of Reasoned Action (Fishbein and Ajzen, 1975)

2.6.2   Attitude of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia

The majority of social psychologists today take a cognitive or information-processing approach to attitude development. Attitudes emerge naturally from people's perspectives on the subject of the attitude. In general, we form beliefs about things by associating them with specific characteristics, such as other objects, traits, or events. When it comes to attitudes toward an action, each belief connects the behaviour to a specific outcome or another feature, such as the cost of carrying out the action.

We adopt an attitude toward the behaviour automatically and instantly because the characteristics associated with the activity are already regarded favourably or negatively. As a result, we develop positive attitudes toward activities that we believe have a high likelihood of positive outcomes and negative attitudes toward behaviours that we believe have a high likelihood of negative outcomes (Ajzen,1991).

Gender and location had no effect on entomophagy expertise in some cases. Edible insects were consumed more frequently by those with a higher monthly income

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than by those with a lower monthly income. A short- or long-term shift in attitude toward larvae as a food source may be required to ensure their acceptance as a food source. Food neophobia, or the degree to which fear of novel foods is a mental trait, has an impact on how new foods are accepted. People who have lower levels of food phobia consume more food than people who have higher levels of food phobia (Orkusz et al., 2020).

The attitude of a person is also influenced by their gender. Men have a strong desire to try new things and fall in love with them. The prevoius study found that females were more likely than males to find eating insects unpleasant and sickening (Orkusz et al., 2020).

In this study, attitudes significantly influence the respondents' intentions to purchase the *Vespa* spp. food and this result is consistent with previous literature. The findings show that when the respondents perceive that insect food is nutritious and tastes good, they are more inclined to buy it. This finding is supported by a previous study that shows customers' attitudes highly correlate with their intentions to purchase healthy foods (Chang, Ma & Chen, 2019). The reason is that attitude is related to psychological impediments such as neophobia and distaste. Due to their high nutritional value and cheap production costs, edible insects are an excellent and sustainable source compared to animal proteins. However, completely replacing meat with edible insects requires a shift in consumer attitude. Acceptance of novel meals is mostly governed by the degree of food neophobia, or the human psyche's fear of novel foods. Individuals with a lower level of food fear consume a larger variety of foods than those with a higher level of food anxiety (Orkusz et al., 2020).

2.6.3 Subjective Norms of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia

Subjective norms, like a great deal of other social phenomena, are the unintentional and unplanned consequences of people's experiences. Social norms, it has been claimed, might be understood as a form of social interaction language. A system of standards, similar to grammar, establishes what is and is not acceptable behavior in a community or organization. And, like language, it is not the result of deliberate human design and planning. This perspective implies that distinguishing social norms from other types of injunctions, such as hypothetical imperatives, moral codes, or legal statutes, needs an examination of the conditions under which norms originate, rather than an examination of the functions supplied by social norms (Bicchieri & Muldon, 2011).

Subjective norms refer to perceived societal influences/pressures to engage in or abstain from a particular action. Subjective norms reflect individuals' perceptions about how they would be seen by their reference groups if they engaged in particular conduct (Ajzen,1991).

Subjective norms are based on a person's sense of social pressure to perform or not perform a behavior (Ajzen,1991), which states that a person's perception of social pressure to perform or not do a behavior. These independent variables affect how adolescents perceive *Vespa* spp. larvae as food sources. Youth behavior is subjective; they prefer to eat larvae but are unaware of the benefits larvae may provide as a source of nourishment. According to previous research, subjective standards are critical for classifying youth's growing perception of *Vespa* spp. larvae as food sources.

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Thus, subjective standards can have a considerable impact on how kids perceive *Vespa* spp. larvae as food sources. According to subjective standards, the most significant factor determining juvenile perceptions of *Vespa* spp. larvae as food sources in Malaysia is the effect of peers, family encouragement, and online resources. The hypothesis is that there is a strong association between subjective norms and how adolescents perceive *Vespa* spp. larvae as a food source. To test and validate the idea, a survey of Malaysian adolescents about their perceptions of *Vespa* spp. larvae as food sources would be undertaken.

In this study, the subjective norm is not significant, and this result is consistent with that of (Chang et al., 2019). These findings indicate that the respondents' subjective norms are not influencing their purchase intention. Therefore, the marketing of *Vespa* spp. food by surrounding people does not affect the respondents' purchase intention (Chang et al., 2019). The lack of understanding of *Vespa* spp. and the absence of awareness campaigns on the nutritional benefits of wasp larvae to the public in Malaysia influences the youth's purchase intentions (Anem,1970). This study is considered the first report of the youth perception of *Vespa* spp. larvae as food sources in Malaysia, hence there is relatively limited literature to compare this factor.

2.6.4 Perceived Behavioural Control of Youth Towards Vespa *spp.* Larvae as Food Sources in Malaysia

Positive or negative behavioral attitudes are defined as human behavioural emotions. This is assessed by examining one's viewpoints on the influence of acts and the

consequences of such activities. The following factors contribute to the formation of behavioral attitudes (conduct attitudes): 1). Conduction convection (belief behaviour), that is, the belief that one's actions result in or rely on the outcomes of one's actions. 2). Consequences Measuring/evaluating the effect (impact assessment), i.e., assessing the consequences or evaluating the influence of behavioral convictions (Armitage & Cornor, 1999).

Fisbein and Ajzen define behaviour as the intention to purchase or try something new that offers advantages before an intervention. Consumers' purchase intents or expectations are first gleaned from personal experience, community-based product knowledge, and their holiday experience in a foreign nation. For example, Thailand, Laos, China, Japan, and Korea, transform into larvae as their primary food source. Many people, particularly in Thailand, sell tasty insects in stores and night markets (Orkusz et al., 2020).

According to the findings of this study, perceived behavioural control is the most important factor influencing youth purchase intentions toward insect foods. The results imply that when the respondents perceive the *Vespa* spp. to contain high nutrients, promote a healthy eating lifestyle, and have easy access to getting the *Vespa* spp. stock, they are more likely to purchase and consume this product. The current findings are supported by the theory of planned behavior (TPB), wherein customers' intentions and behaviors are influenced by perceived behavioural control (Ajzen,1991). Perceived behavioural control refers to the degree to which an individual is capable of, or has control over, performing a given behaviour (Ajzen,1991). As a result, respondents in this study are significantly motivated to purchase this food when they believe that the *Vespa* spp. provides valuable nutrients for a healthy diet, that this product has the potential to commercialize for social and economic development in Malaysia, and that there are health programs designed to educate the society about this product. In addition, a

convenient channel that gives clear and transparent information about the process from purchase to delivery can enhance the perceived behavior control of an individual to purchase this product (Chang et al., 2019).

CHAPTER 3

METHODOLOGY

3.1   Introduction

This chapter are explaining about methods and procedures used in conducting this survey. The first part will discuss the data, research design, and questionnaire respectively. The second part explaining about the temporary framework of the research. In the third part of the research, instrumentation procedures, population, sampling, and data preparation will be performed.

3.2   Research Design

The quantitative research design was used to gather information from the respondents for this study. In Malaysia, the dependent variable is youth perceptions of *Vespa* spp. larvae as food sources. SPSS will be used to analyse data on demographic profiles and independent variables.

3.3   Research Framework

In this study, the best theory that be able to implant was the Theory of Planned Behaviour (TPB) that was proposed by Icek Ajzen in 1985, that was developed from Theory of Reasoned Action, Icek Ajzen and Martin Fishbien in 1980 (Ajzen,1991). This theory is related to the method used for investigating the perception of youth on *Vespa* spp. larvae as food sources in Malaysia. This theory is relevantly used to explain the objectives of this survey which is to determine the level of perception of youth on *Vespa* spp. larvae as food sources, to analyse the relationship between attitudes, subjective norm, and perceived behavioural control with the perception of youth on *Vespa* spp. larvae as food sources in Malaysia and to identify the most influence factor of the perception of youth on *Vespa* spp. larvae as food sources in Malaysia. The dependent variable perception of youth on *Vespa* spp. as food sources in Malaysia and the independent variable was attitudes, subjective norms, and perceived behaviours that had been adapted from the Theory of Planned Behavior (TPB).

Independent Variables   **Dependent Variables**
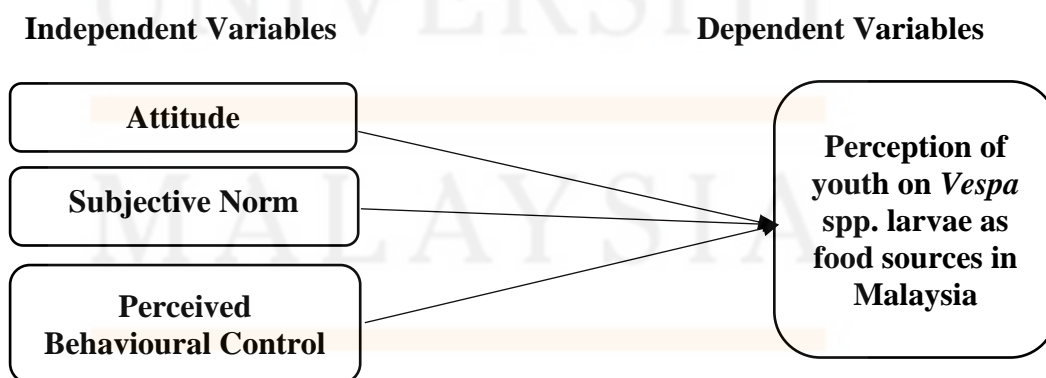
Figure 3.1: The conceptual frameworks adapted from Theory of Planned Behaviour

(Source: Adapted model from Ajzen,1991)

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3.4   Instrumentation

The instrument used for data collection is a questionnaire. This questionnaire is designed by a previous researcher and used as a tool to gather all the data of the perception of youth on *Vespa* spp. larvae as food sources in Malaysia. The questionnaire consists of 5 sections. Sections A, B, C, D, and E. The detail of this questionnaire is listed below:

1. Section A: Demographic profile. This sections questions containing 10 questions about the perception of youth on *Vespa* spp. larvae as food sources. Tick and write the answers to the question.

2. Section B: This section contains 6 questions about the perception of youth on *Vespa* spp. larvae as food sources. 1-5-Likert scale' question.

3. Section C: This section contains 7 questions pertaining attitude of youth *Vespa* spp. larvae as food sources. 1-5-Likert scale' question.

4. Section D: This section contains 5 questions about subjective norms of youth *Vespa* spp. larvae as food sources. 1-5-Likert scale' question.

5. Section E: This section contains question 7 about Perceived Behavioural Control of youth *Vespa* spp. larvae as food sources.1-5-likert scale questions.

3.4.1 Part A Demographic Profile

The question posed in this section is to review youth. The question in this section includes age, gender, marital status, education level, state, location of residence, race, occupation sector, religion, and monthly income.

3.4.2 Part B Dependent Variable

This part contains the Perception of Youth on *Vespa* spp. Larvae as Food Sources that will have 6 items of questions.

3.4.3 Part C, D, E Independent Variable

This question that was answered by respondents in this section is based on the independent variables. Part C was Attitude, part D was Subjective Norm while part E was Perceived Behavioural Control.

3.5 Population and Sample

The target population in this study is Youth in Malaysia, which involves Youth in Malaysia because every country's future depends on its youth, who are a valuable asset in terms of economic development. The total respondents for this study are 200 people only due to lack of time.

3.5.1 Sample Size

This study will target especially youth in Malaysia aged between 15-40 years old to identify the level of perception of youth on *Vespa* spp. larvae as food sources. The sampling technique that will be used for this study is non-probability purposive sampling where the sample will be selected randomly based on suitability for a particular profile. The sample size is 200 respondents and all of them will answer the questionnaire provided. The recommended sample size is more than 100. If the sample is to be provided as many as 150 can already be categorized in a suitable condition. Because the more respondents and samples provided, the more data and opinions obtained to support this study (Guarter & Barrios, 2006).

3.5.2 Sampling Technique

Non-probability sampling is a technique for selecting individuals from a population when it is unknown which individuals will be chosen as a sample. Purposive sampling entails the identification of persons who satisfy specific criteria. Purposive sampling is subjective since it depends on the researcher's skill and judgment to select the sample units. Because the current ones are all related to probability sampling, there are no design unbiased variance estimators available for this sampling approach. Despite this issue, social scientists, particularly in market research, continue to utilize purposive sampling extensively. Purposive sampling is defined as the process of selecting units randomly from a population segment without replacement to get samples that provide the best estimate of the population parameter of interest. If the primary objective is to estimate the population mean, units at random from the distribution's center must be chosen, while units towards the tails are ignored (Guarter et al., 2006).

This study has been selected by using non-probability purposive sampling. The non-probability sampling method has been chosen as respondents on the perception of Youth on *Vespa* spp. larvae as food sources in Malaysia. This google form will be sent through WhatsApp group, FB, and Instagram in Malaysia by respondents aged 15-40 years. Non-probability sampling is a method of sampling in which, it is not known that individuals from a population will be selected as a sample. No specific person. All respondents aged between 15-40 can answer this survey if they are willing to answer.

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3.6 Data Preparation

The completed questionnaire will be tested by the pilot study to check the questionnaire. After that, the pilot test analyzed by using the reliability test.

3.6.1 Pilot Study

Pilot studies are critical components of the research process. The purpose of a pilot study is to determine the feasibility of a technique that will be used in larger research. The purpose and limitations of pilot studies are explored using clinical research as an example. A pilot study can be used to determine the feasibility of the innovative intervention's recruitment, randomization, retention, assessment, and implementation processes. Pilot studies are not synonymous with hypothesis tests. A pilot is not responsible for determining the safety, efficacy, or effectiveness of a product. Contrary to common assumption, the pilot study does not provide a reliable indication of the impact size for developing subsequent investigations due to the imprecision inherent in data from small samples. The results of feasibility studies may not necessarily apply beyond the inclusion and exclusion criteria specified in the pilot design. A pilot study is a necessary first step in determining the feasibility of a novel intervention or innovative use of an existing intervention. Pilot data can be used to determine feasibility and to make necessary revisions to the design of a larger, subsequent hypothesis-testing research. Investigators should be candid while expressing the pilot study's aims. No more should

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be expected of grant reviewers and other stakeholders (Leon, Davis & Kraemer, 2011). In this study, I utilize the pilot test to identify flaws with the questionnaire, such as poor questions, unclear directions, and tough blacks to respond. Second, verify that all goods and instructions are in order. Following that, delete any things that create superfluous data. With this pilot test, you may determine the survey questions' errors and weaknesses and how they might be changed to be more effective.

Before the questionnaire able be used in this study, the questionnaire will be pre-test 30 respondents were used in the pre-test process to ensure the feasibility of consumer response, the outcomes, and the level of understanding. The previous study had stated that samples with several respondents between 10 to 30 give a lot of practical advantages (Isaac & Michael, 1995).

Pre-testing will be done by distributing it to 30 respondents aged between 15-40 years old around Malaysia to ensure the likelihood of their response so that significant results will reach the level of perception of youth on *Vespa* spp. *l*arvae as food sources in Malaysia. Statistical Package for Social Science Software (SPSS) will be used in this study to analyze the data to be collected through reliability and study for seeking the value of Cronbach alpha.

3.6.2 Reliability Test

The reliability test was run at each independent variable (attitude, subjective norms, and perceived behavioural) to know if the questions were reliable According to Hatcher (1994). Reliability analysis is commonly used to measure the scale reliability and

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to measure the questionnaires' reliability that also provided information of that Cronbach's alpha relationship between individual items used in this study.

Cronbach"s alpha was an indicator index of reliability that was related to variation accounted for the true score of "underlying construct" and the construct was the hypothetical variable that was being evaluated. Cronbach"s alpha was used in this study to assess the reliability of the questionnaire. When a stable response was obtained after repeated administration of the test, the variable was reliable. The range could be between 0.00 – 1.00 and the value is differs based on the number of items of scale and inter-item links. The reliable variable can be accepted if Cronbach's Alpha is at least 0.7 and more reliable when the test is greater (Subarto, Solihin & Qurbani 2021).

All of the variables are good for this study if the Cronbach's alpha reading is above 0.7. But if the value is below 0.7 it is still acceptable and can be concluded that TPB is suited for this study as the result will indicate there is a consistency among variables of the TPB and its relevance.

The result of the reliability analysis is shown in Table 3.1 which includes the perceptions, attitudes, subjective norms, and perceived behaviour control on the perception of youth on *Vespa* spp. larvae as food sources in Malaysia. All variables were good for this study if Cronbach's alpha reading is above 0.7. It can be concluded that TPB is suited for this study as the result shows that there is a consistency among variables of the TPB and its relevance.

Table 3.1: Reliability Test

Variable	Cronbach's Alpha	Number of Items
Attitude	0.954	7
Subjective Norms	0.879	6
Perceived Behavioural	0.971	7
Perception of Youth on *Vespa* spp. Larvae as Food Sources	0.805	7

3.7 Data Analysis

The data have been checked to prove the accuracy of the data collected from the survey. The data cleaning has been carried out by checking the frequency and descriptive statistics as well as the coding and the data entry. The descriptive statistics such as the measurement of mean, minimum, maximum, frequency, percentages, and standard deviation have been analyzed interpreting the data collected by using the SPSS program. After completing collecting data, to achieve the objectives of this study SPSS Statistics version 20.0 this data has been analyzed the data through reliability tests, descriptive analysis, normality test, correlation test, factor analysis and regression.

3.7.1 Descriptive Analysis

Descriptive analysis was used to define the basic features in the data for this research. It was the raw data in the form that is easy to understand and able to interpret. Descriptive data has been used to measure the mean of the nominal data was achieved from the research. The descriptive analysis was used in order to determine the frequency and percentage of the demographic background of youth and data was analyzed based on mean values for perception of youth, attitude, subjective norm, and perceived behaviour control towards the perception of Youth on *Vespa* spp. larvae as food sources in Malaysia.

3.7.2 Correlation Coefficient

The correlation coefficient describes the relationship between two variables. A positive correlation means the two are moving in the same direction, with a +1.0 correlation indicating that they are moving in lockstep. They move in opposite directions, according to a negative correlation coefficient. A correlation of 0 implies that there is no association at all. This Correlation has five types. Pearson's correlation coefficient and Spearman's correlation coefficient are the two most common types of correlation coefficients. The sort of correlation coefficient to use depends on the variables being investigated. In statistics, different types of correlations are used to measure how variables relate to one another

In this study use, the Spearman correlation coefficient was computed to assess the relationship between two variables (Schober, Boer & Schwarte, 2018). The correlations test aims to examine the strength and direction of the relationship between the researched variables (Thirumalai, Chandhini & Vaishnavi, 2017). The coefficient value could be at range from -1 for perfect to negative linear relationship to +1 for a perfect positive linear relationship. Zero value indicates no relationship between two variables.

3.7.3   Factor Analysis

This analysis is used to measure underlying structure between attitide, subjective norms and perceived behavioural control of the items that make up positive or negative affect scale and to know how many factors are involved towards the perception of Youth on *Vespa* spp. larvae as food sources in Malaysia (Pallant, 2020). The Kiser-Meyer-Olkin (KMO) sampling adequacy test and Bartlett's Test of Sphericity were used in this study to check the sampling adequacy and the presence of correlation between all variables before proceeding to factor analysis.

3.7.4   Regression

Regression analysis is a statistical method for determining the relationship between two or more variables. To investigate such concerns, the investigator gathers

data on the underlying factors of interest and uses regression to determine the causal variables' quantitative effect on the variable that they influence. In most cases, the investigator additionally evaluates the estimated relationships' "statistical significance," or the degree of confidence that the genuine relationship is similar to the estimated relationship (Sykes, 1993). This analysis is used to know the significant factor in this study towards the perception of Youth on *Vespa* spp. larvae as food sources in Malaysia (Pallant, 2020).

3.8   Summary

In the nutshell, this chapter discusses the research design and methodology of the present study. In research design, the quantitative method has been demonstrated by using SPSS. This is used to analyze the data according to the study objectives. The research framework indicates the dependent variable which perception of Youth on *Vespa* spp. larvae as food sources in Malaysia three independent variables are attitude, subjective norm, and perceived behavioural control. Besides that, 200 respondents among youth in Malaysia have been chosen as the sample size. This described the participants of the study, the measurement instruments, the variables, the method adopted in collecting data as well as the preparation of the data and statistical procedures. The reliability of the constructs and the validity of the instruments utilized have also been described in detail for the pilot study report. To analyze the three factors, which are knowledge and attitude, and perception, regression analysis was used for the variable and the result should be 0.005 and below.

CHAPTER 4

RESULT AND DISCUSSION

4.1   Introduction

This chapter covers the result and discussion of the study. From the study conducted toward Youth in Malaysia, the data were collected and obtained the results from the data analysis. The perception of youth on *Vespa* spp. larvae as food sources in Malaysia was identified by approaching the respondents. All the factors that influenced the perception of youth on *Vespa* spp. larvae as food sources in Malaysia were also defined from this study. The analysis discussing on the objectives of the study which are based on level of perception, attitude, subjective norms, and the perceived behaviour control towards perception on youth on *Vespa* spp. larvae as food sources in Malaysia.

4.2 Descriptive Analysis

Descriptive analysis is based on data collected through reviews. It contains a level of perception, attitude, subjective norm, and perceived behavioural control perception on the youth of *Vespa* spp. larvae as food sources in Malaysia including percentage and frequency. This analysis was also used on the Likert Scale questionnaire for attitude, subjective norm, perceived behaviour control to show the percentage and mean of each question.

4.2.1 Demographic Profile

The descriptive analyses are carried out to measure the demographic profile perception of Youth on *Vespa* spp. larvae as food sources in Malaysia. Demographic information includes age, gender, race, religion, marital status, education level, occupation sector, location of residence, state, and monthly income.

For the age group, the majority of the respondents were from young respondents which in their early twenties 21-25 years old with 103 (51.5%), followed by 26-30 with 46 (23.0%), 15-20 years old with 27 (13.5%), 16 (8.0%) for respondents in age 31-35, and the least was 8 (4.0%) for peoples 36-40 years old.
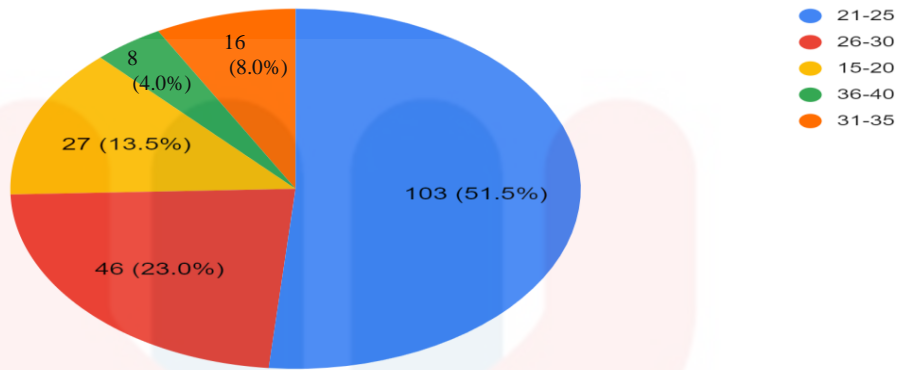
Figure 4.1: The percentage of age

According to overall results, the proportion of male and female respondents in this study are 47 (23.5 %) consist of male and 153 (76.5%) are female.

2. Gender
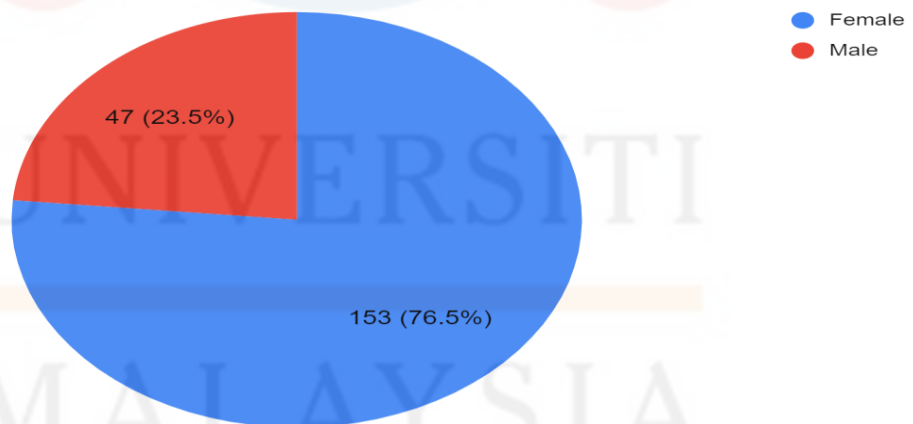
Figure 4.2: The percentage of gender

Most of the respondents were from Malay that has the highest percentage with (88.0%) which involves about 176 Malays" respondents. Then followed with Chinese with (9%) which 18 respondents, Indian with only (2.5%) 5 respondents, and the minority were others are Bumiputera (0.5%) with 1 respondent. Since Malays are the largest group of races, so the majority of the respondents were Malays.

3. Race

	Malay
	Bumiputera
	Indian
	Chinese

5 (2.5%) 18 (9.0%)

176 (88.0%)
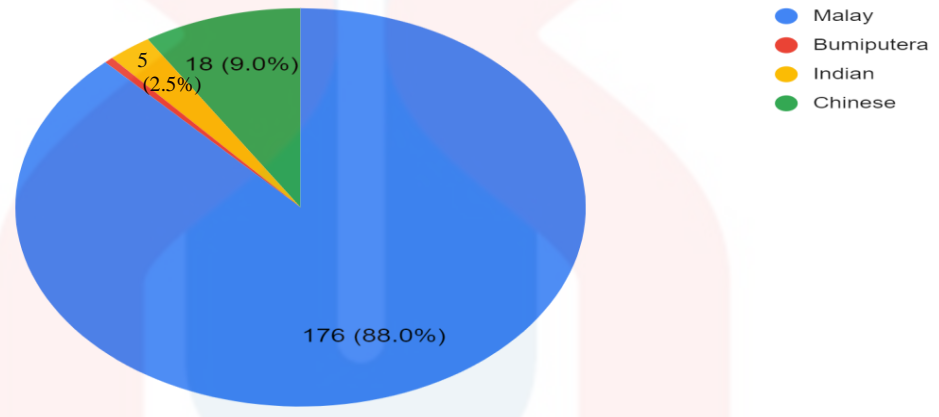
Figure 4.3: The percentage of race

For the religion group, Islam the majority of the respondents were 177 (88.5%) because in Malaysia majority religion is Islam, followed by Buddhist 12 (6%), Christian 6 (3%), and Hindu 4 (2%).

4. Religion
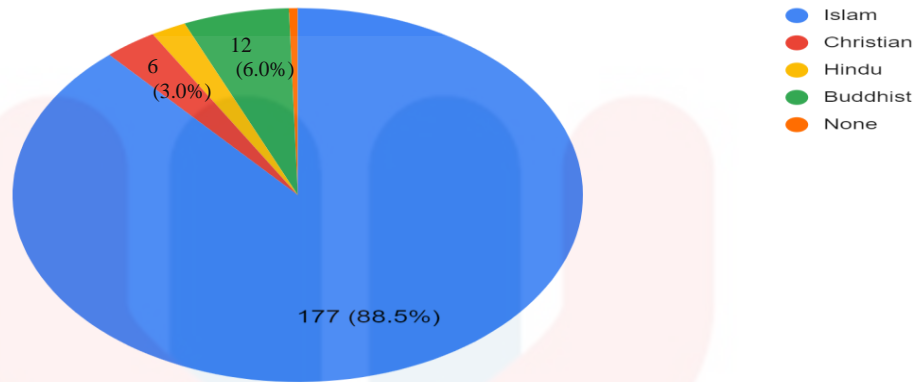
Figure 4.4: The percentage of religion

For marital status, the highest percentage is single 164 (82.0%) and followed by married 36 (18.0%).

5. Marital status
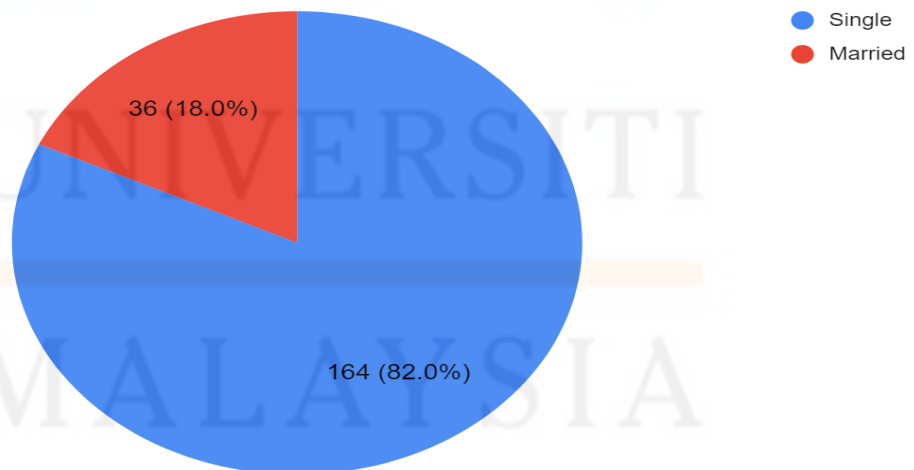
Figure 4.5: The percentage of marital status

Pertaining to the educational level degree 122 (61.0 %) showed the highest percentage, then the diploma 40 (20 %) followed by STPM/STAM 14 (7.0 %), SPM 13 (6.5%), others 10 (5.0%) such as master 8 (4%), upsr 1 (0.5%), PHD 1 (0.5%) and the lowest percentages is PMR/PT3 1 (0.5 %).

6. Education level
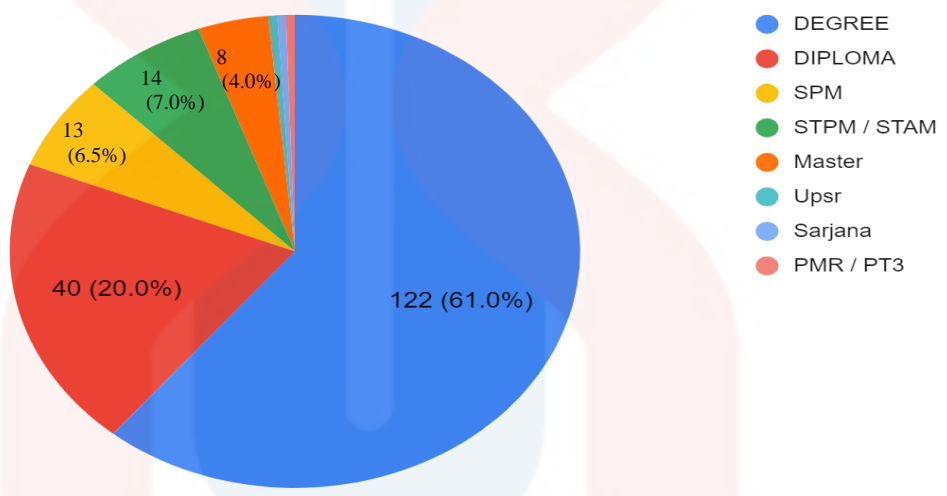
Figure 4.6: The percentage of education level

For the occupation sector, most of the respondents are IPT students with (52.0%) which involves 104 respondents. Then followed by private sector 34 with (17.0%), 32 (16.0%) of them working in self-employed, 27 (13.5%) public sector and the rest of 3 (1.5%) are consists of secondary school.

7. Occupation sector

Legend:
- IPT Student
- Public Sector
- Private Sector
- Self-Employed
- Secondary Student

32 (16.0%)
34 (17.0%)
104 (52.0%)
27 (13.5%)
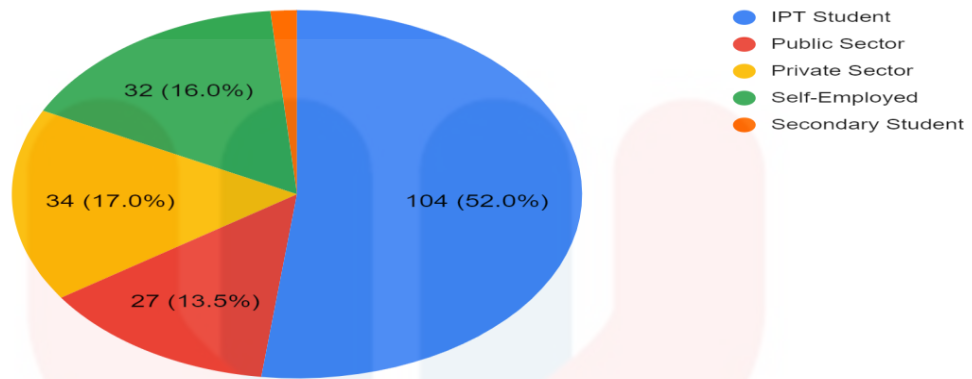
Figure 4.7: The percentage of occupation sector

For the location of the residential area, many respondents lived in the urban area 115 (57.5%) and followed by rural area 85 (42.5%).

8. Location of residence

Legend:
- Rural
- Urban

84 (42.0%)
116 (58.0%)
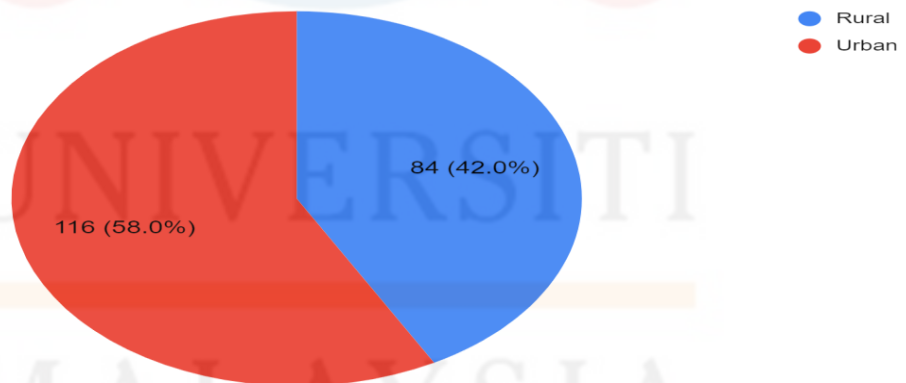
Figure 4.8: The percentage of location of residence

The majority state from Kelantan 71 (35.5%), secondly states Selangor 32 (16.0%), followed by Terengganu 15 and Johor has the same respondents (7.5%), Pahang 12 (6.0%), Perak 11 (5.5%), Kedah and Kuala Lumpur/W.P same respondents 10 (5.0%), N.9 7 (3.5 %), P.Pinang 5 (2.5%), Sarawak 4 (2.0%) ,Perlis and Sabah with 3 respondents (1.5%) and minority is melaka 2(1.0%)

9. State
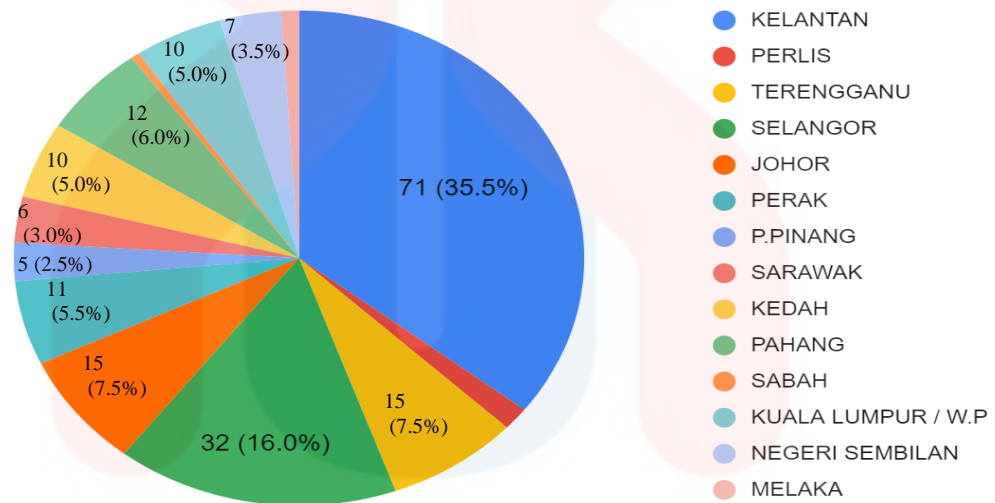
Figure 4.9: The percentage of state

The highest estimation monthly income is < RM2000 which is 99 (49.5 %), secondly have monthly income about RM 2,001 – RM 4,000 54 (27.0 %), followed by monthly income between RM 4,001 – RM 6,000 24 (12.0 %), > RM 8,000 13 (6.5 %) and ultimately the lowest monthly income between RM 6,001 – RM 8,000 8 (4.0 %).

10. Monthly Income
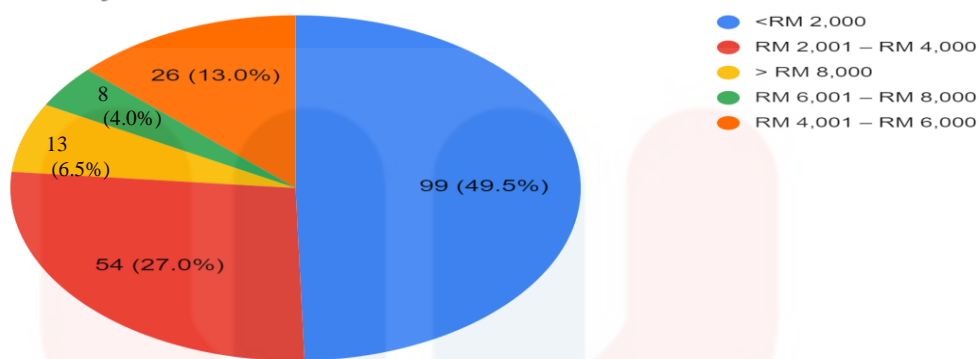
Figure 4.10: The percentage of monthly income

4.2.2 Level of perceptions on the youth of *Vespa* spp. larvae as food sources in Malaysia

The first objective of this study was to determine the level of perception of youth on *Vespa* spp. larvae as food sources in Malaysia. Table 4.1 shows mean score of the. The level of perception of youth on *Vespa* spp. larvae as food sources in Malaysia mean score of this study was categorized into three categories which are low (1.0-2.33), moderate (2.34-3.66) and high (3.67-5.0).

The descriptive analysis result for perception on the youth of *Vespa* spp. larvae as food sources in Malaysia is shown in Table 4.1. It is about 34.7 % of youth answer on average with the statement "*Vespa* spp. larvae can be eaten.", and 27.0% of youth agree with the statement. Followed by 22.5 % of youth strongly agree with this statement, 10.5 % of youth strongly disagree and 5.5 % of food youth disagree with the statement. It shows that half of the youth still confuses the status of larvae.

The result shows that 39.5% of youth answer average with the statement "*Vespa* spp. larvae are not suitable for use as a food source in Malaysia because they resemble caterpillars and are disgusting", 30.5 % of youth agree and 25.0 % of youth strongly agree with the statement. For disagree with the statement, it is about 3.0 % of youth while the other 2.7% of youth strongly disagree with the statement.

For the statement of "*Vespa* spp. larvae are good and nutritious for human health.", 34.0 % of youth answer average for this statement. Followed by 29.5 % of youth agree with the statement. 24.5% of youth strongly agree, 7.5% youth disagree, and lastly 4.5 % of youth strongly disagree with the statement.

For the statement of "*Vespa* spp. larvae are suitable for use as a food source in Malaysia because it provides a lot of energy and nutrition to the human body", 40.0 % of youth answer average in this statement, 22.5 %of youth agree and 19.5 % of youth strongly agree with the statement. It is about 11.0% of youth disagree and 7.0 % strongly disagree with the statement.

"*Vespa* spp. larvae are not suitable as a food source in Malaysia because it is difficult to find and the price is expensive" is a statement with the response 38.5% of youth answer average and 23.5 of youth agree with the statement. About 22.5% strongly agree and 10.0% of youth disagree with the statement. Lastly, 5.5% of youth strongly disagree with the statement.

According to the graf the statement "*Vespa* spp. larvae are suitable for daily dietary practice." has 41.5 % of youth answer average for this statement followed by 21.5 % of youth strongly agree with it. Next, 13.5 % of youth disagree and 3.0 % strongly disagree with the statement.

"*Vespa* spp. larvae are also suitable to be used as a source of protein in the daily diet and a substitute for the existing protein source", is a statement with the response

45.0% of youth answer average and 27.0% of youth agree with the statement. About 18.5% of youth strongly agree and 7.0 % of youth disagree with the statement. Lastly, 2.5 % of youth strongly disagree with the statement.

Based on the result in table 4.2 the mean score of perception on *Vespa* spp. larvae as food sources in Malaysia is (M= 3.5229, SD=0.6800). The result shows a leaning towards medium mean values which is between 2.34-3.67. This indicated that all of the respondents showed a significant disposition towards all sub-variables measured through questions in perception factor. Thus, objective one of this research was achieved due to medium level of perception of youth on *Vespa* spp. larvae as food sources in Malaysia.

Most of the answer to all the statements is average and medium mean score for the perception of youth on *Vespa* spp. larvae as food sources in Malaysia. It shows that most youth lack understanding regarding *Vespa* spp. larvae (Wardhana, 2016). The Malaysian community's attitude regarding *Vespa* spp. is that it is a deadly and venomous bug. Furthermore, they are averse to eating *Vespa* spp. larvae because they regard them as a repulsive and inedible bug. This is due to a lack of knowledge about the benefits and nutrients associated with *Vespa* spp. as a regular meal in life, as well as a lack of information about the advantages and nutrients associated with *Vespa* spp. as a regular meal in life (Anem,1970). This study is considered the first report of the youth perception of *Vespa* spp. larvae as food sources in Malaysia, hence there is relatively limited literature to compare this factor.

Table 4.1: Descriptive analysis for the perception of youth on *Vespa* spp. larvae as food sources

Statement	Percentage 100%					Mean±s.d
	1	2	3	4	5	
Vespa spp. larvae can be eaten.	5.5	10.5	34.5	27.0	22.5	3.51±1.116
Vespa spp. larvae are not suitable for use as a food source in Malaysia because they resemble caterpillars and are disgusting.	2.0	3.0	39.5	30.5	25.0	3.74±0.938
Vespa spp. larvae are good and nutritious for human health.	4.5	7.5	34.0	29.5	24.5	3.62±1.073
Vespa spp. larvae are suitable for use as a food source in Malaysia because it provides a lot of energy and nutrition to the human body	7.0	11.0	40.0	22.5	19.5	3.37±1.126
Vespa spp. larvae are not suitable as a food source in Malaysia because it is difficult to find and the price is expensive.	5.5	10.0	38.5	23.5	22.5	3.48±1.112
Vespa spp. larvae are suitable for daily dietary practice.	3.0	13.5	41.5	20.5	21.5	3.44±1.064
Vespa spp. larvae are also suitable to be used as a source of protein in	2.5	7.0	45.0	27.0	18.5	3.52±0.956

the daily diet and a substitute for

the existing protein source

*Indicator: 1. Strongly Disagree 2. Disagree 3. Average 4. Agree 5. Strongly Agree

Table 4.2: Mean Score of perception of youth on *Vespa* spp. larvae as food sources in

Malaysia

Variable	Frequency	Percentage %	Mean±s.d
Perception			3.5229±0.68
Low (1.00-2.33)	8	4.0	
Medium (2.34-3.67)	113	56.5	
High (3.68-5.00)	79	39.5	

* Notes: mean values correspond to 1.0-2.33: low; 2.34-3.66: medium; 3.67-5.0: high

4.3   Normality Test

A normality test is used to determine whether sample data was obtained from a population normally distributed (within some tolerance). From table 4.3, a Kolmogorov-Smirnova was used in this study as the number of respondents are more than 50 populations. The variable of perceptions of youth on *Vespa* spp. larvae as food sources in Malaysia is not significant as the value is <0.05.

Table 4.3: Normality Test

	Kolmogorov- Smirnova			Shapiro-Wilk		
	Statistics	df	Sig	Statistics	df	Sig
Perceptions of youth on *Vespa* spp. larvae as food sources in Malaysia	0.343	200	0.000	0.719	200	0.000

a. Lilliefors Significance Correction

4.4   Correlation Analyses

In this section, correlation analysis was used to examine the relationship between youth's perceptions of *Vespa* spp. larvae as food sources in Malaysia and their attitudes, subjective norms, and perceived behavioural control. To examine these connections, the Spearman correlation was used.

4.4.1   Spearman Correlation

To determine the relationship between two variables, the Spearman correlation coefficient was calculated (Schober et al., 2018). The spearman's correlation is used to determine the relationship between youth's perceptions of *Vespa* spp. larvae as food sources in Malaysia and their attitude, subjective norm, and perceived behavioural

control. The purpose of the correlations test is to determine the strength and direction of the relationship between the variables being studied (Thirumalai et al., 2017).

In order to determine the significant relationship of attitude, subjective norms, and perceived behavioural control towards the perception of *Vespa* spp. larvae as food sources in Malaysia, Spearman's correlation was used to achieve the second objective. Attitudes, subjective norms, and perceived behaviour control were the independent variables, while participation was the dependent variable. The secondary goal of this test was to see if the null hypothesis, H0, was accepted or rejected. The H0 indicates that there was no significant value relationship between attitudes, subjective norms, and perceived behaviour control in Malaysian youth's perceptions of *Vespa* spp. larvae as food sources. Meanwhile, H1 indicates that there was a significant value relationship between attitude, subjective norms, and perceived behaviour control in relation to the perception of youth in Malaysia on *Vespa* spp. larvae as food sources.

The correlation coefficient is a statistical measure that determines how strong a relationship exists between two variables' relative movements. The values range from -1.0 to 1.0. A number greater than 1.0 or less than -1.0 indicates a correlation measure error. A perfect negative correlation is represented by a correlation of -0.0, while a perfect positive correlation is represented by a correlation of 1.0. A correlation of 0.0 does not indicate a link between the movements of two variables (Meng et al., 2019). The size of the correlation coefficient was calculated, as shown in the table 4.4 below.

Table 4.4: Interpreting the Size of a Correlation Coefficient (Muhamad, 2016; Hinkle *et al*., 2003)

Size of Correlation	Interpretation
0.90 to 1.00 (-0.90 to -1.00)	Very high positive (negative) correlation
0.70 to 0.90 (-0.70 to -0.90)	High positive (negative) correlation
0.50 to 0.70 (-0.50 to -0.70)	Moderate positive (negativ]e) correlation
0.30 to 0.50 (-0.30 to -0.50)	Low positive (negative) correlation
0.00 to 0.30 (0.00 to -0.30)	Negligible correlation

4.4.2   The Relationship between Attitude with the perception of youth on *Vespa* spp. *l*arvae as food sources in Malaysia

The correlation coefficient between attitude and youth perceptions of *Vespa* spp. larvae as food sources in Malaysia is significant at the 0.579 level in Table 4.5. Table 4.4 shows a moderate positive correlation between attitude and youth perceptions of *Vespa* spp. larvae as food sources in Malaysia, which can be used to interpret the size of the correlation coefficient. Meaning that youth's perceptions of *Vespa* spp. larvae as food sources in Malaysia are moderately positive correlated and significant. A person's attitude toward variables that affect an individual's participation can be either positive or negative. According to my observations, there is a moderate positive correlation in the attitude factor because some of the youth in Malaysia are unconcerned about *Vespa* spp. larvae as food sources. This finding supported by Anem 1970, due to a lack of knowledge about

the benefits and nutrients associated with *Vespa* spp. as a regular meal in life, as well as a lack of information about the advantages and nutrients associated with *Vespa* spp. as a regular meal in life. This study is considered the first report of the youth perception of *Vespa* spp. larvae as food sources in Malaysia, hence there is relatively limited literature to compare this factor.

4.4.3 The Relationship between Subjective norm with the perception of youth on *Vespa* spp. larvae as food sources in Malaysia

Table 4.5 shows that the correlation coefficient between subjective norm and youth perceptions of *Vespa* spp. larvae as food sources in Malaysia is significant at the 0.569 level. Table 4.4 shows a moderate positive correlation between subjective norm and youth perceptions of *Vespa* spp. larvae as food sources in Malaysia, using the rule of thumb for interpreting the size of a correlation coefficient.

Subjective norms are variables such as opinions, viewpoints, and important factors from reference groups (families, friends, coworkers, and benefits) that can influence a person's perception of *Vespa* spp. larvae as food sources in Malaysia. The subjective norm was that youth's perceptions of *Vespa* spp. larvae as food sources were influenced by perceived social pressure. Based on my self evaluation, *Vespa* spp. larvae are a new thing among malaysian youth and these larvae are no longer widespread. The findings indicate, the marketing of *Vespa* spp. food by surrounding people does not affect the respondents' purchase intention (Chang et al., 2019). This study is considered the first

report of the youth perception of *Vespa* spp. larvae as food sources in Malaysia, hence there is relatively limited literature to compare this factor.

4.4.4 The Relationship between Perceived Behavioural Control with the perception of youth on *Vespa* spp. *l*arvae as food sources in Malaysia

The correlation coefficient is used to estimate the relationship between perceived behavioural control and youth perceptions of *Vespa* spp. larvae as food sources. In table 4.5, the relationship between perceived behavioural control and youth perceptions of *Vespa* spp. larvae as food sources is significant at the 0.612 level. Based on the rule of thumb for interpreting the size of a correlation coefficient in Table 4.4, it means that perceived behavioural control and youth perceptions of *Vespa* spp. larvae as food sources have a moderate positive correlation.

The perceived behavioral control perceptions of youth perceptions refer to one's beliefs about the benefits of such larvae to the human body. Therefore, the perception of behavioral control has a significant relationship with the perception of youth on *Vespa* spp. larvae as a food source in Malaysia. The results imply that when the respondents perceive the *Vespa* spp. to contain high nutrients, promote a healthy eating lifestyle, and have easy access to getting the *Vespa* spp. stock, they are more likely to purchase and consume this product. The current finding, respondents in this study are significantly motivated to purchase this food when they believe that the *Vespa* spp. provides valuable nutrients for a healthy diet, that this product has the potential to commercialize for social

and economic development in Malaysia, and that there are health programs designed to educate the society about this product. (Chang et al., 2019).

Since, all of the variables were led to a positive relationship of attitudes, subjective norms, and perceived behavioral control towards the perception of youth on *Vespa* spp. larvae as food sources in Malaysia. Thus, H_1 was accepted and failed to reject H_1 meanwhile H_0 was rejected.

Table 4.5: The Spearman's Correlation Analysis

				perception_mean	attitude_mean	sn_mean	sn_pbc
Spearman's rho perception_mean	perception_mean	Correlation	Coefficient	1.000	.579	.569	.612
		sig. (2-tailed)		.	.000	.000	.000
		N		200	200	200	200
	attitude_mean	Correlation	Coefficient	.579	1.000	.727	.743
		sig. (2-tailed)		.000	.000	.000	.000
		N		200	200	200	200
	sn_mean	Correlation	Coefficient	.569	.727	1.000	.800
		sig. (2-tailed)		.000	.000	.	.000
		N		200	200	200	200
	pbc_mean	Correlation	Coefficient	.612	.743	.800	1.000
		sig. (2-tailed)		.000	.000	.000	.
		N		200	200	200	200

**. Correlation is significant at the 0.01 level (2-tailed).

4.5   **Factor Analysis**

4.5.1   **The Most Significant Factor Towards the Perception of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia**

4.5.1.1 KMO and Bartlett's Test

The most significant factor of the Perception of youth on *Vespa* spp. larvae as food sources in Malaysia was identified using exploratory factor analysis. The Kaiser-Meyer-Olkin (KMO) and Bartlett's Tests of attitude, subjective norm, perceived behaviour control, and participation in the perception of youth on *Vespa* spp. larvae as food sources in Malaysia are shown in Table 4.6. The results of all KMO tests and Bartlett's Test of Sphericity were significant. The KMO and Bartlett tests reveal that all of the variables have values greater than 0.5, indicating that factor analysis can be performed (Tabachnick & Fidell, 2007). The data was analysed using exploratory factor analysis, which interpreted the data into the total variance explained. The significance of Bartlett's Test of Sphericity at the 0.0 level is significant. As a result, inter-correlations exist between variables.

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Table 4.6: KMO and Bartlett's Test of Attitude, Subjective Norm & Perceived

Behaviour Control

		Attitude	Subjective Norm	Perceived Behaviour Control
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.938	.911	.913
Bartlett's Test of Sphericity	Approx. Chi-Square	1354.699	1016.029	1279.119
	df	21	15	21
	Sig.	.000	.000	.000

4.5.1.2 Attitudes towards Perception of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia

Section of attitudes consists of 7 statement statements were measured by 5-point Likert scale and all statements were greater than 0.5. The respondents had responded whether they strongly disagree, disagree, average, agree, or strongly agree. Table 4.7 showed the factor analysis of attitude towards Youth on *Vespa* Spp. Larvae as Food Sources in Malaysia with each factor loading which was 0.857 "I am interested in buying products that contain *Vespa* spp. larvae" statement,0.890 for "I am aware that products

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that contain *Vespa* spp. larvae are better for my health" statement, 0.909 for "I believe foods that contain these *Vespa* spp. larvae have a high level of health and safety assurance", 0.891 for "I am confident that foods that contain *Vespa* spp. larvae are healthier than other food", 0.896 for "I will support these *Vespa* spp. larvae to be a source of food because these larvae provide many benefits to human health" and 0.894 for "I am confident the food products containing these *Vespa* spp. larvae are of high quality" statement. This result indicated that was the perception of Youth on *Vespa* Spp. Larvae as Food Sources in Malaysia influenced by attitude. The percentage of variance explained for attitudes factors was 78.800%.

Table 4.7: The Factor analysis of attitude towards the perception of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia

Statement	Factor Loading
I am interested in buying products that contain *Vespa* spp. larvae	0.857
I am aware that products that contain *Vespa* spp. larvae are better for my health	0.890
I believe foods that contain these *Vespa* spp. larvae have a high level of health and safety assurance	0.909
I am confident that foods that contain *Vespa* spp. larvae are healthier than other food	0.891
I will support these *Vespa* spp. larvae to be a source of food because these larvae provide many benefits to human health	0.896
I am confident the food products containing these *Vespa* spp. larvae are of high quality	0.894

Variance (percent of explained)	78.800

4.5.1.3 Subjective norms towards Perception of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia

Based on Table 4.8, the subjective norms obtain 6 sub-variables and but only 5 statements were recorded above 0.5. The factor loading of subjective norm towards the perception of youth on *Vespa* spp. Larvae as Food Sources in Malaysia 0.430 for "The eating habits of people around me influence me to buy healthy food and have good nutrition was", 0.862 for "My family and friends encouraged me to consume foods that contain *Vespa* spp. larvae because they are nutritious and good for health", 0.926 for "Information on good nutrition in *Vespa* spp. larvae from social media prompted me to support *Vespa* spp. larvae as a food source in Malaysia", 0.920 for "The various nutrients and energy contained in the *Vespa* spp. larvae are able to attract my interest to support this *Vespa* spp. larva as the food source in Malaysia", 0.927 for "*Vespa* spp. larvae are more convincing to me to be used as a food source in Malaysia because there has been much research that proved that *Vespa* spp. larvae contain nutrients that are good for the health of the human body", 0.907 for "Various campaigns and awareness programs on the benefits of *Vespa* spp. larvae convinced me to support *Vespa* spp. larvae as a food source in Malaysia". All of the statements were measured by a 5-point Likert scale (strongly disagree- strongly agree). This result also proved that youth youth on *Vespa* spp. Larvae as Food Sources in Malaysia. The percent of variance explained was 71.852%.

Table 4.8: The Factor analysis of Subjective Norm towards Perception of Youth on

Vespa spp. Larvae as Food Sources in Malaysia

Statement	Factor Loading
The eating habits of people around me influence me to buy healthy food and have good nutrition	0.430
My family and friends encouraged me to consume foods that contain *Vespa* spp. larvae because they are nutritious and good for health	0.862
Information on good nutrition in *Vespa* spp. larvae from social media prompted me to support *Vespa* spp. larvae as a food source in Malaysia	0.926
The various nutrients and energy contained in the *Vespa* spp. larvae are able to attract my interest to support this *Vespa* spp. larva as the food source in Malaysia	0.920
Vespa spp. larvae are more convincing to me to be used as a food source in Malaysia because there has been much research that proved that *Vespa* spp. larvae contain nutrients that are good for the health of the human body	0.927
Various campaigns and awareness programs on the benefits of *Vespa* spp. larvae convinced me to support *Vespa* spp. larvae as a food source in Malaysia	0.907
Variance (percent of explained)	71.852

4.5.1.4 Perceived Behaviour Control towards Perception of Youth on *Vespa* spp.

Larvae as Food Sources in Malaysia

The perceived bahaviour control section consists of 7 statements and the factor loading of all statements was recorded above 0.5. Based on Table 4.10, 0.884 "The advantage of nutrient content in *Vespa* spp. larvae can attract me to support *Vespa spp.* larvae as a food source in Malaysia", 0.835 for "Food products that contain *Vespa* spp. *larvae* can make us healthier", 0.896 for "Buying food products that contain these *Vespa* spp. *larvae* brings me closer to a healthy lifestyle",0.806. for "It is easy to understand about *Vespa* spp. *larvae* nutrition and benefits to health through programs and activities organized by governmental and NGO organizations", 0.921 for "The purchase of nutritious food from *Vespa* spp. larvae can benefit the community and society", 0.886 for "The need to diversify products based on *Vespa* spp. larvae in the market made it easier for me to buy them and support these *Vespa* spp. larvae as a food source in Malaysia" and 0.856 for "I believe that making *Vespa* spp. larvae as a food source can improve the country's economy and create employment opportunities for youth in Malaysia. The percent of variance explained for PBC factor were 75.657%.

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Table 4.9: The Factor analysis of Perceived Behaviour Control towards Perception of

Youth on *Vespa* spp. Larvae as Food Sources in Malaysia

Statement	Factor Loading
The advantage of nutrient content in *Vespa* spp. larvae can attract me to support *Vespa spp.* larvae as a food source in Malaysia	0.884
Food products that contain *Vespa* spp. *larvae* can make us healthier	0.835
Buying food products that contain these *Vespa* spp. larvae brings me closer to a healthy lifestyle	0.896
It is easy to understand about *Vespa* spp. larvae nutrition and benefits to health through programs and activities organized by governmental and NGO organizations	0.806
The purchase of nutritious food from *Vespa* spp. larvae can benefit the community and society	0.921
The need to diversify products based on *Vespa* spp. larvae in the market made it easier for me to buy them and support these *Vespa* spp. larvae as a food source in Malaysia	0.886
I believe that making *Vespa* spp. larvae as a food source can improve the country's economy and create employment opportunities for youth in Malaysia	0.856
Variance (percent of explained)	75.657

The percentage of variance explained was used to measure the total variance accounted by the factors are involved. According to Rosenthal & Rosenthal (2011), when variance explained of factor was greater than 30% was considered as minimum consideration level, if more than 40% was most important and more than 50% were referred better prediction. All total variance for this study shows the high level such as attitude 78.000, follow by perceived behavioural 71.800 control and subjective norms 75.657. All result shows high level variance for this study. Each factor loading must have value higher than 0.4% (Kalender et al., 2019). All the result factor loading for this study shows the higher than 0.4%. It means show the positive underlying structure (Pallant, 2020).

4.6   Regression

Preliminary analyses were conducted to assess the normality, linearity, multicollinearity, and homoscedasticity of 200 samples obtained. After consideration of multicollinearity and outliers issues (Tabachnick et al., 2007), wherein the Mahalanobis distance should be less than 16.27 and Cook's distance is less than 1.0, four samples are removed from subsequent regression analysis, giving a total of 196 valid samples. Outlier and multicollinearity can decrease the reliability of statistical analysis (Jadhav & Kashid, 2011). The total variance explained by the model as a whole was 66.2 %, $F_{(3, 192)}$ = 125.49, $p < 0.001$ (Table 4.10). Out of three independent variables, only attitude and perceived behavioural control significantly predict the youth perception of consuming *Vespa* spp. as food sources ($p < 0.001$). Perceived behavioural control records the highest

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beta value (beta = 0.551, p < 0.001), follows by attitude (beta = 0.442, p < 0.001). The Beta values demonstrate that the perceived behavioural control is the strongest factor that determines the youth's perceptions of consuming *Vespa* spp. in Malaysia when other factors are controlled. The subjective norms variable is insignificant (p > 0.05).

According to the findings of this study, perceived behavioural control (p < 0.001) is the most important factor influencing youth purchase intentions toward insect foods (Table 4.11). The results imply that when the respondents perceive the *Vespa* spp. to contain high nutrients, promote a healthy eating lifestyle, and have easy access to getting the *Vespa* spp. stock, they are more likely to purchase and consume this product. The current findings are supported by the theory of planned behavior (TPB), wherein customers' intentions and behaviors are influenced by perceived behavioural control (Ajzen,1991). Perceived behavioural control refers to the degree to which an individual is capable of, or has control over, performing a given behaviour (Ajzen,1991). As a result, respondents in this study are significantly motivated to purchase this food when they believe that the *Vespa* spp. provides valuable nutrients for a healthy diet, that this product has the potential to commercialize for social and economic development in Malaysia, and that there are health programs designed to educate the society about this product. In addition, a convenient channel that gives clear and transparent information about the process from purchase to delivery can enhance the perceived behavior control of an individual to purchase this product (Chang et al., 2019).

Attitudes significantly influence the respondents' intentions to purchase the *Vespa* spp. food (p < 0.001) and this result is consistent with previous literature. The findings show that when the respondents perceive that insect food is nutritious and tastes good, they are more inclined to buy it. This finding is supported by a previous study that shows customers' attitudes highly correlate with their intentions to purchase healthy foods

(Chang et al., 2019). The reason is that attitude is related to psychological impediments such as neophobia and distaste (Orkusz et al., 2020). Due to their high nutritional value and cheap production costs, edible insects are an excellent and sustainable source compared to animal proteins. However, completely replacing meat with edible insects requires a shift in consumer attitude (Orkusz et al., 2020). Acceptance of novel meals is mostly governed by the degree of food neophobia, or the human psyche's fear of novel foods. Individuals with a lower level of food fear consume a larger variety of foods than those with a higher level of food anxiety (Orkusz et al., 2020).

In this study, the subjective norm is not significant, and this result is consistent with that of (Chang et al., 2019). These findings indicate that the respondents' subjective norms are not influencing their purchase intention ($p > 0.05$). Therefore, the marketing of *Vespa* spp. food by surrounding people does not affect the respondents' purchase intention (Chang et al., 2019). The lack of understanding of *Vespa* spp. and the absence of awareness campaigns on the nutritional benefits of wasp larvae to the public in Malaysia influences the youth's purchase intentions (Anem, 1970). This study is considered the first report of the youth perception of *Vespa* spp. larvae as food sources in Malaysia, hence there is relatively limited literature to compare this factor.

The study has valuable implications for promoting *Vespa* spp. as healthy food to the younger generation in Malaysia. In this view, the government, food industries, and policymakers need to focus on the significant factors that influence the youth purchase intention of *Vespa* spp. larvae, namely the perceived behavioural control and attitude. These organizations can conduct various campaigns and programs to educate the youth on the health benefits of *Vespa* spp. larvae. *Vespa* spp. larvae are nutrient-dense, yet their nutritional content varies significantly depending on species, life stage (adults contain more protein than larval lining stages), habitat, and insect diet (Orkusz et al., 2020). The

protein content of *Vespa* spp. larvae varies between 13% and 80%, which is typically greater than the protein content of beef and chicken, as well as fish and shellfish, which range between 19–26% and 13–28%, respectively (Orkusz et al., 2020). *Vespa* spp. larvae can also be utilized as a supplement to a cereal-based plant diet due to their high concentration of exogenous amino acids (Orkusz et al., 2020).

Numerous civilizations across the world have traditionally used these larvae as their primary food source and an ingredient in their daily cooking (Ghosh et al., 2021). *Vespa* spp. is also a bio-resource that has been used for medicinal and food purposes for centuries, particularly in East Asia. It is utilized as a raw or medicinal component in Korea and China, making it one of the greatest traditional liquor ingredients for health (Ghosh et al., 2021). In this study, it is crucial to encourage the youth to adopt *Vespa* spp. as a healthy diet. Perceived behavioural control and attitude are regarded as relevant predictors of the youth's perception of purchasing or consuming *Vespa* spp. larvae as food sources in Malaysia, so relevant organizations must promote knowledge about *Vespa* spp. larvae and their nutritional value (Chu, 2018).

Table 4.10: Results of regression model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	59.901	3	19.967	125.498	0.000[b]
Residual	30.548	192	0.159		
Total	90.449	195			

a. Dependent Variable: Perception of Youth on *Vespa* spp. Larvae as Food Sources

in Malaysia

b. Predictors: (Constant), purchase behavioural control, attitude, subjective norm

Table 4.11: Results of regression analysis

Model	Standardized Coefficients Beta	t	Sig.	Tolerance	VIF	Mahalanobis distance	Cook's distance
(Constant)	-	13.398	0.000	-	-		
Attitude	0.442	4.245	0.000**	0.162	6.165		
Subjective Norm	-0.168	-1.510	0.133	0.142	7.025	14.556	0.123
Perceived Behavioural control	0.551	4.988	0.000**	0.144	6.945		

**Significant at p < 0.001

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CHAPTER 5

CONCLUSION

5.1 Conclusion

The first of the three objectives of this study is to determine the level of youth perception of *Vespa* spp. larvae as food sources in Malaysia. Second, look into the relationship between youth's perceptions of *Vespa* spp. larvae as food sources in Malaysia and their attitudes, subjective norms, and perceived behavioural control. The third goal is to identify the most important factor influencing youth perceptions of *Vespa* spp. larvae as food sources in Malaysia.

The first goal is met when all of the variables show response trends that lean toward the medium mean, as measured by the mean score of 2.34–3.67, which is the average of attitudes (M=3.32), social norm (M=3.34), PBC (M=3.53), and perception (M=3.52). The second goal was also accomplished by rejecting the null hypothesis, H0, because there is a significant value relationship between attitude, subjective norms, and perceived behaviour control towards the perception of *Vespa* spp. larvae as food sources in Malaysia, as measured by Spearman Correlation Analysis. The third objective achieved with the influence factor is perceived behavioural control among perception of youth on *Vespa* spp larvae as food sources in Malaysia because the significant value of perceived

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behaviour control (0.000) and beta value (0.551), followed by attitude (0.000) and beta value (0.442), and the subjective norms is not significant (0.133) and beta value (-0.168).

Overall, the larvae of *Vespa* spp. are nutrient-dense and beneficial to human health. These *Vespa* spp. larvae are the main food source in Thailand, Laos, China, and Vietnam. Furthermore, such a survey will be used to investigate youth perceptions of *Vespa* spp. larvae as food sources in Malaysia, as well as to expand the study of *Vespa* spp. larvae.

5.2   Limitations of Study

The difficulty in collecting information due to a lack of supporting information and recent previous literature in the study of youth on *Vespa* spp. larvae as food sources in Malaysia is the study's main limitation. In the case of this study, the time limit and the data collection process from respondents are the two main limitations. Due to issues such as obtaining data from respondents, the timeline for this research study has been pushed back. A number of respondents refused to complete the Google form because they believed it would be of no use to them, wasting time and taking a long time to respond because they did not understand the question.

5.3   Recommendations

Several recommendations for improving future research work will be made based on the findings and conclusions. First and foremost, a public awareness campaign about the benefits of *Vespa* spp. larvae to children is required. In Malaysia, to raise awareness and support *Vespa* spp. larvae as a food source. The second point is that more research on *Vespa* spp. larvae is required.

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Dear respondent,

I am Hanis Syazwani Bt Haron (F18B0036), Degree in Bachelor of Applied Science Agrotechnology with Honour Faculty of Agro Based Industry. I am currently conducting a research survey about Perception of Youth on *Vespa* spp. Larvae as Food Sources in Malaysia for my final year project.

Congratulations, you have been selected as a respondent for this research. Your sincere cooperation is crucial in determining the success of this study. Please read carefully all the instructions pertaining to every section and answer every question sincerely. There is no right or wrong answer. All responses provided will be treated with strict confidential and will be used for this academic research only.

Thank you very much for your cooperation.

Responden yang dihormati,

Saya Hanis Syazwani Bt Haron (F18B0036), Ijazah Sarjana Muda Sains Gunaan Agroteknologi dengan Kepujian Fakulti Industri Asas Tani. Saya sedang menjalankan satu kajian mengenai Persepsi Belia Terhadap Larva Tebuan sebagai Sumber Makanan di Malaysia untuk projek akhir.

Tahniah, anda telah dipilih sebagai responden kajian ini. Kerjasama ikhlas anda sangat penting dalam menentukan kejayaan kajian ini. Sila baca dengan teliti semua arahan yangi berkaitan dengan setiap bahagian dan jawab setiap soalan dengan ikhlas. Tidak ada jawapan yang betul atau salah. Semua respons yang diberikan akan dirahsiakan dan akan digunakan untuk penyelidikan akademik ini sahaja.

 Terima kasih atas kerjasama anda.

SECTION A – DEMOGRAPHIC INFORMATION /

BAHAGIAN A - MAKLUMAT DEMOGRAFI

Instruction: Please tick (√) in the appropriated box and fill in the blank. /

Arahan: Tandakan (√) di kotak yang sesuai dan isikan tempat kosong.

E-mail: _____

1.	Age */ Umur*
	☐ 15-20 ☐ 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40
2.	Gender / *Jantina*
	☐ Male */ Lelaki* ☐ Female */ Perempuan*
3.	Race / Bangsa
	☐ Malay / Melayu ☐ Chinese / Cina ☐ Indian / India Others. If any. */ Lain- lain. Jika ada*: _____
4.	Religion / *Agama*
	☐ Islam ☐ Christian / *Kristian* ☐ Hindu ☐ Buddhist / *Buddha* Others. If any. / *Lain- lain. Jika ada*: _____
5.	Maritalstatus / *Taraf perkahwinan*
	☐ Single / *Bujang* ☐ Married / *Berkahwin* ☐ Widowed */ Janda*
6.	Educationlevel / *Tahap pendidikan*
	☐ PMR ☐ SPM ☐ STPM/ STAM ☐ Diploma ☐ Degree / *Ijazah* Others. If any. */ Lain- lain. Jika ada*: _____
7.	Occupation sector / *Sektor pekerjaan*

	☐ Self-employed / *Bekerja sendiri* ☐ Private sector / *Sektor swasta* ☐ Public sector / *Sektor awam* ☐ IPT Students / *Pelajar IPT* ☐ Secondary Students / *Pelajar Sekolah Menengah*	
8.	Location of residence / *Lokasi tempat tinggal*	
	☐ Urban / *Bandar* ☐ Rural */ Luar Bandar*	
9.	State / *Negeri*	
	Specify / Nyatakan*:* _____ _____	
10.	Monthly Income / *Pendapatan Bulanan Isi Rumah*	
	☐ <RM 2,000 ☐ RM 2,001 – RM 4,000 ☐ RM 4,001 – RM 6,000 ☐ RM 6,001 – RM 8,000 ☐ > RM 8,000	

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Instruction: For statement on SECTION B, C, D & E please read for each item and indicate your answer between one (1) to five (5). Your score (1) would indicate you strongly disagree with the statement and score (5) would indicate you strongly agree with respective statement.

Arahan: Untuk pernyataan mengenai BAHAGIAN B, C, D & E sila baca untuk setiap item dan nyatakan jawapan anda antara satu (1) hingga lima (5). Skor anda (1) akan menunjukkan anda sangat tidak setuju dengan pernyataan tersebut dan skor (5) menunjukkan anda sangat setuju dengan pernyataan masing-masing.

STRONGLY DISAGREE *(Sangat tidak setuju)*	*DISAGREE* *(Tidak setuju)*	*AVERAGE* *(Sederhana)*	*AGREE* *(Setuju)*	*STRONGLY AGREE* *(Sangat setuju)*
1	**2**	**3**	**4**	**5**

SECTION B: PERCEPTION OF YOUTH ON *VESPA SPP.* LARVAE AS FOOD SOURCES.

In my opinion / *Pada pendapat saya*	1	2	3	4	5
1	*Vespa* spp. larvae can be eaten. / *Larva tebuan boleh dimakan.*					
2	*Vespa* spp. larvae are not suitable for use as a food source in Malaysia because they resemble caterpillars and are disgusting. *Larva tebuan tidak sesuai untuk dijadikan sebagai sumber makanan di Malaysia kerana menyerupai ulat dan menjijikkan.*					
3	*Vespa* spp. larvae are good and nutritious for human health. *Larva tebuan ini mempunyai nutrisi yang baik dan bagus kepada kesihatan manusia.*					
4	*Vespa* spp. larvae are suitable for use as a food source in Malaysia because it provides a lot of energy and nutrition to the human body. *Larva tebuan sesuai untuk dijadikan sebagai sumber makanan di Malaysia kerana memberi tenaga dan nutrisi yang banyak kepada tubuh manusia.*					
5	*Vespa* spp. larvae is not suitable as a food source in Malaysia because it is difficult to find and the price is expensive. *Larva tebuan ini tidak sesuai dijadikan sumber makanan di Malaysia kerana susah untuk didapati dan harga menjadi mahal.*					
6	*Vespa* spp. larvae are suitable for daily dietary practice. *Larva tebuan sesuai untuk amalan diet pemakanan harian.*					
7	*Vespa* spp. larvae are also suitable to be used as a source of protein in the daily diet and a substitute for existing protein sources.					

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	Larva tebuan juga sesuai untuk dijadikan sebagai sumber protein dalam pemakanan harian dan pengganti dari sumber protein yang sedia ada.				

SECTION C: ATTITUDE OF YOUTH *VESPA SPP.* LARVAE AS FOOD SOURCES.

	In my opinion / Pada pendapat saya	1	2	3	4	5
1	I am interested in buying products that contain *Vespa* spp. larvae. *Saya berminat untuk membeli produk yang mengandungi larva tebuan ini.*					
2	I am aware that products that contain *Vespa* spp. larvae are better for my health. *Saya sedar bahawa produk yang mengandungi kandungan larva tebuan lebih baik untuk kesihatan saya.*					
3	I believe foods that contain these *Vespa* spp. larvae have a high level of health and safety assurance. *Saya percaya makanan yang mengandungi larva tebuan ini mempunyai tahap kesihatan dan jaminan keselamatan yang tinggi.*					
4	I am confident that foods that contain *Vespa* spp. larvae are healthier than other food. *Saya yakin makanan yang mengandungi larva tebuan ini lebih sihat berbanding makanan yang lain.*					
5	I am confident *Vespa* spp. larvae are rich in good protein and fat as well as high in calcium, iron, and zinc good for my health. *Saya yakin larva tebuan kaya dengan protein dan lemak baik serta tinggi kalsium, zat besi dan zink baik untuk kesihatan saya.*					
6	I will support these *Vespa* spp. larvae to be a source of food because these larvae provide many benefits to human health. *Saya akan menyokong larva tebuan ini menjadi sumber makanan kerana larva ini banyak memberi kebaikan kepada kesihatan manusia.*					
7	I am confident the food products containing these *Vespa* spp. larvae are of high quality. *Saya yakin makanan produk yang mengandungi larva tebuan ini berkualiti tinggi.*					

SECTION D: SUBJECTIVE NORMS OF YOUTH *VESPA SPP.* LARVAE AS FOOD SOURCES.

In my opinion / Pada pendapat saya		1	2	3	4	5
1	The eating habits of people around me influence me to buy healthy food and have good nutrition. *Cara permakanan orang di sekeliling mempengaruhi saya untuk membeli makanan yang sihat dan mempunyai nutrisi yang baik.*					
2	My family and friends encouraged me to consume foods that contain *Vespa* spp. larvae because they are nutritious and good for health. *Keluarga dan rakan saya mendorong saya untuk mengambil makanan yang mengandungi larva tebuan kerana bernutrisi dan baik untuk kesihatan.*					
3.	Information on good nutrition in *Vespa* spp. larvae from social media prompted me to support *Vespa* spp. larvae as a food source in Malaysia. *Maklumat mengenai nutrisi yang baik dalam larva tebuan dari media sosial mendorong saya untuk menyokong larva tebuan sebagai sumber makanan di Malaysia.*					
4.	The various nutrients and energy contained in the *Vespa* spp. larvae are able to attract my interest to support this *Vespa* spp. larva as the food source in Malaysia. *Pelbagai nutrisi dan tenaga yang ada di dalam larva tebuan mampu menarik minat saya untuk menyokong larva tebuan ini sebagai sumber makanan di Malaysia.*					
5	*Vespa* spp. larvae are more convincing to me to be used as a food source in Malaysia because there has been many research that proved that *Vespa spp.* larvae contain nutrients that are good for the health of the human body. *Larv tebuan lebih menyakinkan saya untuk dijadikan sebagai sumber makanan di Malaysia kerana telah ramai penyelidikan yang membutikan bahawa larva tebuan ini mengandungi nutrisi yang baik untuk kesihatan badan manunsia.*					
6	Various campaigns and awareness programs on the benefits of *Vespa* spp. larvae convinced me to support *Vespa* spp. larvae as a food source in Malaysia. *Pelbagai kempen dan program kesedaran tentang kebaikan larva tebuan meyakinkan saya untuk menyokong larva tebuan sebagai sumber makanan di Malaysia.*					

SECTION E: PERCEIVED BEHAVIOURAL CONTROL OF YOUTH *VESPA SPP.*

LARVAE AS FOOD SOURCES.

In my opinion / Pada pendapat saya	1	2	3	4	5
1 The advantage of nutrient content in *Vespa spp.* larvae can attract me to support *Vespa* spp. larvae as a food source in Malaysia. *Kelebihan kandungan nutrien di dalam larva tebuan dapat menarik minat saya untuk menyokong larva tebuan sebagai sumber makanan di Malaysia.*					
2 Food products that contain *Vespa* spp. *larvae* can make us healthier. *Produk makanan yang mengadungi larva tebuan ini boleh menjadikan kita lebih sihat.*					
3 Buying food products that contain these *Vespa* spp. *larvae* brings me closer to a healthy lifestyle. *Membeli produk makanan yang mengandungi larva tebuan ini membawa saya lebih dekat dengan gaya hidup sihat.*					
4 It is easy to understand about *Vespa* spp. *larvae* nutrition and benefits to health through programs and activities organized by governmental and NGO organizations. *Adalah mudah untuk memahami tentang nutrisi larva tebuan dan kebaikan kepada kesihatan melalui program dan aktiviti yang diadakan oleh organisasi kerajaan dan bukan kerajaan.*					
5 The purchase of nutritious food from *Vespa* spp. larvae can benefit the community and society. *Pembelian makanan yang berkhasiat daripada larva tebuan dapat memberi manfaat kepada masyarakat.*					
6 The need to diversify products based on *Vespa* spp. larvae in the market made it easier for me to buy them and support these *Vespa* spp. larvae as a food source in Malaysia. *Perlu kepelbagaian produk berasaskan larva tebuan di pasaran memudahkan saya membelinya dan menyokong larva tebuan ini sebagai sumber makanan di Malaysia.*					
7 I believe that making *Vespa* spp. larvae as a food source can improve the country's economy and create employment opportunities for youth in Malaysia. *Saya percaya dengan menjadikan larva tebuan sebagai sumber makanan boleh meningkatkan ekonomi negara dan membuka peluang pekerjaan kepada belia di Malaysia.*					

Table 1: Descriptive analysis for attitude of youth on *Vespa spp.* larvae as food sources in Malaysia.

Statement	Percentage 100%					SD	Mean
	1	2	3	4	5		
I am interested in buying products that contain *Vespa* spp. larvae.	15.0	17.5	33.5	18.0	16.0	1.266	3.03
I am aware that products that contain *Vespa* spp. larvae are better for my health.	8.0	13.0	39.5	23.0	16.5	1.128	3.27
I believe foods that contain these *Vespa* spp. larvae have a high level of health and safety assurance.	5.5	10.5	38.5	26.0	19.5	1.087	3.44
I am confident that foods that contain *Vespa* spp. larvae are healthier than other food.	7.5	11.0	47.5	18.0	16.0	1.085	3.24
I am confident *Vespa* spp. larvae are rich in good protein and fat as well as high in calcium, iron, and zinc good for my health.	5.5	8.5	36.5	31.0	18.5	1.061	3.49
I will support these *Vespa* spp. larvae to be a source of food because these larvae provide many benefits to human health.	9.5	8.5	35.5	30.5	16.0	1.138	3.35
I am confident the food products containing these *Vespa* spp. larvae are of high quality.	6.5	11.5	35.0	24.5	22.5	1.151	3.45

*Indicator: 1. Strongly Disagree 2. Disagree 3. Average 4. Agree 5. Strongly Agree

Table 2: Mean Score of Attitude

Variable	Frequency	Percentage %	Mean	SD
Attitude			3.3221	1.00302
Low (1.00-2.33)	31	15.5		
Medium (2.34-3.67)	97	48.5		
High (3.68-5.00)	72	36.0		

Table 3: Descriptive analysis for the subjective norm of youth on *Vespa* spp. larvae as food sources in Malaysia.

Statement	Percentage 100%					SD	Mean
	1	2	3	4	5		
The eating habits of people around me influence me to buy healthy food and have good nutrition.	3.5	3.5	22.0	31.5	39.5	1.037	4.00
My family and friends encouraged me to consume foods that contain *Vespa* spp. larvae because they are nutritious and good for health.	16.5	15.5	33.5	17.0	17.5	1.301	2.97
Information on good nutrition in *Vespa* spp. larvae from social media prompted me to support *Vespa* spp. larvae as a food source in Malaysia.	11.0	14.5	38.0	20.5	16.0	1.188	3.16
The various nutrients and energy contained in the *Vespa* spp. larvae are able to attract my interest to support this *Vespa* spp. larva as the food source in Malaysia.	17.5	26.5	35.5	11.5	9.0	1.159	3.32.
Vespa spp. larvae are more convincing to me to be used as a food source in Malaysia because there has much research that proved that *Vespa* spp. larvae contain nutrients that are good for the health of the human body.	9.0	11.5	35.5	26.5	17.5	1.160	3.33
Various campaigns and awareness programs on the benefits of *Vespa* spp. larvae convinced me to support *Vespa* spp. larvae as a food source in Malaysia.	10.0	9.0	36.5	27.5	17.0	1.210	3.27

*Indicator: 1. Strongly Disagree 2. Disagree 3. Average 4. Agree 5. Strongly Agree

Table 4: Mean Score of Subjective Norm

Variable	Frequency	Percentage %	Mean	SD
Subjective Norm			3.3400	0.98691
Low (1.00-2.33)	27	13.5		
Medium (2.34-3.67)	94	47.0		
High (3.68-5.00)	79	39.5		

Table 5: Descriptive analysis for the perceived behavioural control of youth on *Vespa* spp. larvae as food sources in Malaysia.

Statement	Percentage 100%					SD	Mean
	1	2	3	4	5		
The advantage of nutrient content in *Vespa* spp. larvae can attract me to support *Vespa* spp. larvae as a food source in Malaysia.	9.0	10.5	31.0	27.0	22.5	1.205	3.44
Food products that contain *Vespa* spp. *larvae* can make us healthier.	4.5	5.5	41.0	28.0	21.0	1.026	3.56
Buying food products that contain these *Vespa* spp. *larvae* brings me closer to a healthy lifestyle.	18.0	24.0	42.0	9.5	6.5	1.086	3.38
It is easy to understand *Vespa* spp. *larvae* nutrition and benefits to health through programs and activities organized by governmental and NGO organizations.	4.5	7.0	34.5	31.0	23.0	1.055	3.61
The purchase of nutritious food from *Vespa* spp. larvae can benefit the community and society.	20.0	28.5	40.0	7.5	4.0	1.022	3.53
The need to diversify products based on *Vespa* spp. larvae in the market made it easier for me to buy them and support these *Vespa* spp. larvae as a food source in Malaysia.	22.0	31.0	33.0	8.5	5.5	1.092	3.56
I believe that making *Vespa* spp. larvae as a food source can improve the country's economy and create employment opportunities for youth in Malaysia.	4.5	5.0	31.0	37.0	22.5	1.021	3.68

*Indicator: 1. Strongly Disagree 2. Disagree 3. Average 4. Agree 5. Strongly Agree

Table 6: Mean Score of perceived behavioural control

Variable	Frequency	Percentage %	Mean	SD
Perceived behavioral control			3.5343	0.93269
Low (1.00-2.33)	19	9.5		
Medium (2.34-3.67)	91	45.5		
High (3.68-5.00)	90	45.0		

APPENDIX C

REGRESSION

Descriptive Statistics

	Mean	Std. Deviation	N
Mean_DV_Regression	3.5270	0.68106	196
Mean_Attitude_IV1	3.3287	1.00148	196
Mean_SubNorm_IV2	3.3724	0.96883	196
Mean_PBC_IV3	3.5401	0.93446	196

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.814[a]	0.662	0.657	0.39888

a. Predictors: (Constant), Mean_PBC_IV3, Mean_Attitude_IV1, Mean_SubNorm_IV2

b. Dependent Variable: Mean_DV_Regression

Correlations

		Mean_DV_Regression	Mean_Attitude_IV1	Mean_SubNorm_IV2
Pearson Correlation	Mean_DV_Regression	1.000	0.784	00.727
	Mean_Attitude_IV1	0.784	1.000	0.894
	Mean_SubNorm_IV2	0.727	0.894	1.000
	Mean_PBC_IV3	0.794	0.893	0.907
Sig. (1-tailed)	Mean_DV_Regression	.	0.000	0.000
	Mean_Attitude_IV1	0.000	.	0.000
	Mean_SubNorm_IV2	0.000	0.000	.
	Mean_PBC_IV3	0.000	0.000	0.000
N	Mean_DV_Regression	196	196	196
	Mean_Attitude_IV1	196	196	196
	Mean_SubNorm_IV2	196	196	196
	Mean_PBC_IV3	196	196	196

97

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Mean_PBC_IV3, Mean_Attitude_IV1, Mean_SubNorm_IV2[b]	.	Enter

a. Dependent Variable: Mean_DV_Regression

b. All requested variables entered.

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0272	4.4436	3.5270	.55424	196
Std. Predicted Value	-2.706	1.654	0.000	1.000	196
Standard Error of Predicted Value	0.029	0.113	0.054	0.019	196
Adjusted Predicted Value	1.9974	4.4387	3.5259	0.55412	196
Residual	-.84327	1.33037	0.00000	0.39580	196
Std. Residual	-2.114	3.335	0.000	0.992	196
Stud. Residual	-2.137	3.364	0.001	1.005	196
Deleted Residual	-.86182	1.35327	0.00107	0.40599	196
Stud. Deleted Residual	-2.157	3.459	.003	1.011	196
Mahal. Distance	0.039	14.556	2.985	2.903	196
Cook's Distance	0.000	0.123	0.007	0.015	196
Centered Leverage Value	0.000	0.075	0.015	0.015	196

a. Dependent Variable: Mean_DV_Regression

Residuals Statistics^a

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	2.0272	4.4436	3.5270	0.55424	196
Std. Predicted Value	-2.706	1.654	0.000	1.000	196
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Adjusted Predicted Value	1.9974	4.4387	3.5259	0.55412	196
Residual	-.84327	1.33037	0.00000	0.39580	196
Std. Residual	-2.114	3.335	0.000	0.992	196
Stud. Residual	-2.137	3.364	0.001	1.005	196
Deleted Residual	-.86182	1.35327	.00107	.40599	196
Stud. Deleted Residual	-2.157	3.459	0.003	1.011	196
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Cook's Distance	0.000	0.123	0.007	0.015	196
Centered Leverage Value	0.000	0.075	0.015	0.015	196

a. Dependent Variable: Mean_DV_Regression

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