Consumers' attitudes on the organic laser marked fruit

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Marketing and Consumer Behaviour

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INTRODUCTION

1. Problem statement

The sales of organic product have been increasing. According to IFOAM in 2016, in Europe, the market faced a growth of 7,4% in 2014. European consumers spent more on organic products as they encountered an increase organic product expenditure of 110%, from €22.4 to €47.4 per capita per year from 2005 and 2014. However, Europe still has huge potential for organic market growth. Organic market stakeholders need to close the gap between supply and demand. For example, in IFOAM report in 2016, it is mentioned that organic supply chain had a high operating cost. This forced both policymakers and producers to improve their activities.

The raising of organic market and the room for improvement can also be seen from the increased awareness of environmental sustainability within the consumers which has become a mainstream trend (Steenis et al., 2017). Schleenbecker and Hamm (2013) stated that environmental sustainability is one of product characteristics which consumers expect from organic product. In fact, the increased awareness also affects the consumers to consider the packaging of organic products in which they tend to like sustainable packaging (Steenis et al., 2017, Lindh et al., 2016). By sustainable packaging we mean packaging which causes low environmental impact via its structural, graphical and informational elements (Magnier et al., 2016; Wikström and Williams, 2010). Unpacked product is also considered to be the most sustainable way to sell fruits and vegetables (van Herpen et al., 2016). However, unpacked product has several disadvantages as according to van Herpen et al. (2016), packaging itself provides at least three functions which are:

1. Containment and handling
   Packaging keeps the product throughout the supply chain process from the production to the end consumers.
2. Protection and preservation
   It protects the products from external contamination and keeps the quality as original as possible.
3. Information and communication
   Brand, information, certification logo, and packaging design can help to attract consumers by giving relevant information to them.

That means that unpacked product loses those functions of packaging.

To make the packaging more sustainable, the producer needs to consider at least those three things. Some packaging methods may have better performance in one function but its trade-off the other function. For example, plastic may give more protection compared to paper (Marsh and Bugusu, 2007) but it gives more negative packaging impact to the environment (Steenis et al., 2017). For organic product, EOSTA (2016) has the example of the need to use plastic for containing and handling organic avocado. It is to separate the product from its conventional counterpart. It is not said whether the plastic also had the function of providing information and communication or whether labels were used to provide information to consumers. Nevertheless, Schleenbecker and Hamm (2013) expressed that labels are important to gain attractiveness and trust from consumers. Thus, it comes to the paradox that packaging is needed to preserve the product and to give information to consumers, but packaging is also not needed because its waste gives negative impact to the environment, in other words, it is not sustainable.

In the Netherlands, EOSTA has adopted the technology and currently has a collaboration with a Swedish supermarket chain, ICA, to sell several fruits that are marked with a laser technology. EOSTA said that the technology serves as an alternative to separate the organic fruits from the conventional ones. Moreover, it is claimed to be more sustainable because it eliminates the use of plastic packaging of organic product which was used to separate the organic product. They claimed that on avocado alone, the laser technology has eliminated at least 2,042 kg plastic packaging units which were used to pack 725,380 organic avocados (EOSTA, 2016). The problem for this technology is how the attitude of consumers will be. One characteristic of organic products is naturalness (Vega-Zamora et al., 2013; Wirth et al., 2011). In contrary, a laser technology is considered as modern and less natural technology. It is interesting to see the fit of these two contradicting parts.

To measure the attitude, according to Solomon et al. (2014), one needs to measure the strength and the evaluation of the belief. Some people might have different strength or perception of the belief of one same object and some people also consider another attribute of the belief is evaluated more importantly than the other attributes while other people do not have the same evaluation. For example, consumer A might believe that lasered fruit is not natural, but she does not consider naturalness as an importance in choosing a fruit. Thus, her attitude towards the fruit might not become negative. Samoggia and Nicolodi (2017) stated that the lasered fruit did not influence the naturalness negatively but in fact it influenced the perception of environmental-friendliness positively. However, they have not tried to combine the laser technology and organic fruit and the they did not provide picture of the fruit in their research. Back to the example, while consumer A does not care about naturalness, consumer B does. People who belong to different groups could make this difference, for example conventional and organic buyers. Each of them has different priority in choosing food (Janssen et al., 2009). To conclude, it is interesting to see the consumers' attitude towards the combination of packaging and product type of fruit.

1.1. Research questions

1. How is the combination of packaging and product types influencing consumers' attitude?
2. How does the combination of packaging and product types form the perception?
3. How does the perception of the combinations mediate the combination of packaging and product types with the attitude?
4. How do the buyers' types moderate the process of forming perception and attitude?

2. Theoretical Background

In this model, attitude is formed by the perception of the combination of packaging and product type. The perception has ten factors which are taken and modified from the Food Choice Questionnaire (Steptoe et al., 1995). The process is moderated by buyers' types, due to difference in how important they consider the perceptual beliefs are.

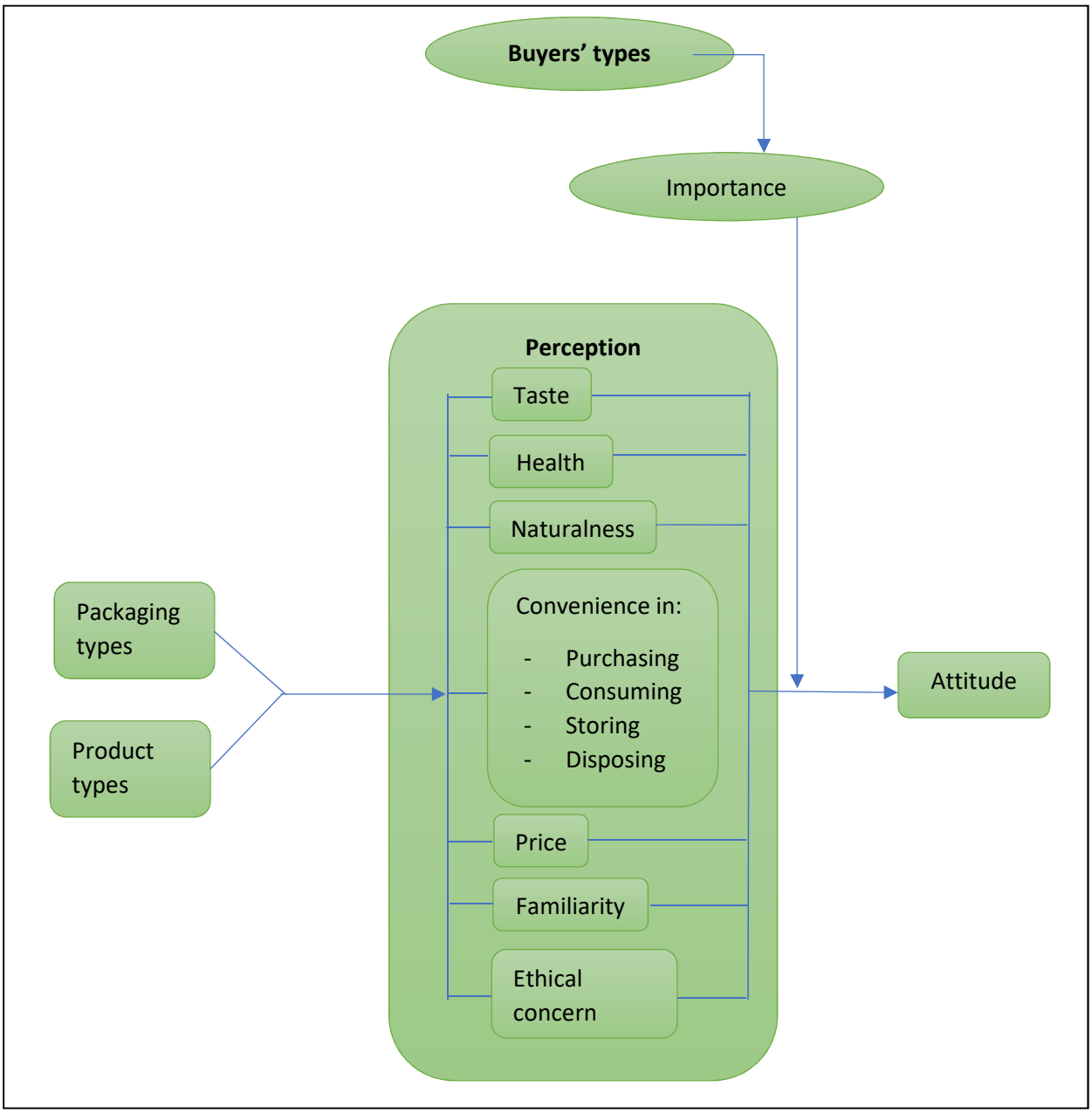


Figure 1. Theoretical framework

2.1. Attitude

According to Ajzen (1991), attitude is how the consumer has a favourable or unfavourable evaluation towards certain variables in question. Attitude is formed from the beliefs toward the object of the attitude. The beliefs are formed by associating the object with several attributes. Thus, the consumers relate to how important the belief is. The formula for the attitude is:

$$A \propto \sum_{i=1}^{n} b_i e_i$$

A is the attitude value, b is the strength or the importance of the belief, e is the evaluation or perception of the belief, and n is the number of the attributes associated with the belief (Solomon et al., 2014). According to Xie et al. (2015) and Teng and Wang (2015), attitude towards organic foods can be built up by taste, health concern, food safety, nutritional concerns, environmental friendliness, animal welfare, and naturalness (no GMO involved).

Solomon et al. (2014) and Katz (1960) wrote that attitude exists because it serves a function for the person and it is determined by the motive or perception. Consumers who expect that they are likely to deal with the same information in the future would start forming attitudes to anticipate that event. Attitude has several functions and the way to arouse and to change the attitude is different by function, such as:

a. Utilitarian function
   This function is related much to rewards and punishments. People strive to maximise the rewards and to minimise the punishments. This function has two types of acquirement, which are (1) to reach the desired goal and avoiding the undesired one, and (2) to repeatedly satisfy the existing needs which come from experience. The examples, respectively, are the workers who vote for political party that promises to boost the economic situation and a person who has a favourable image towards his / her favourite meal. The clarity, consistency, and nearness of the rewards and punishments influence the formation of this attitude function. Normally, a clear and near reward or punishment triggers the process more strongly than an unclear and far reward or punishment. In terms of consistency, low consistency is not going to promote this process, but 100% consistency will not do either.

   In relation to rewards, to arouse this attitude function, one needs to realise what s/he needs or to remember some old favourable cues which are related indirectly to the needs. To change the attitude according to this function, the attitude and the activities related to it has not given any more satisfaction as they did in the past, or the level of expectation has been increased. In relation to punishment, attitude may arise when there is a well-defined solution to avoid the punishment. The absence of alternative path will not arise this attitude. Furthermore, this attitude may change because of unpleasant experience or anticipation of that experience.

b. Ego-defensive function
   With this function, attitude protects the person from internal and external threats. People who has this function of attitude develops a mechanism to protect one's ego from one's own unacceptable notions and from the knowledge about the threats and s/he develops a method to reduce the anxieties which are created by those problem. The foundation of this function is the internal conflict along with its following insecurities. Thus, it concludes that the attitude is not created by object but by the individual's emotional conflict. However, that conflict can be triggered by external or internal object. The example of this function is that a deodorant advertisement scares people of having wet and stinky armpit. For example, an advertisement tells about the environmental danger of unsustainable agriculture product, then a person who does not want his / her environment becomes polluted would not purchase the product related to that unsustainable agriculture.

To evoke attitude based on this function, there are several ways. The first one is the individual needs to feel a threat to his ego. The attitude is already there but before receiving any threat, it will not elicit. The second way is that there is a social encouragement given by any group which evoke him to elicit that attitude. The third method is the appeal to authority. The insecurity of this person makes him subject to authoritarian commands. The last way is the timely built-up inhibited intentions. The defence reaction is induced when there is a frustration over a certain condition. On the other hand, to change the attitude based on ego-defensive function is not easy. The first one is that the threat should be removed. Secondly, there should be a window of feelings at which the individual can show and express the attitude when the change is being implemented. And lastly, the attitude can be changed if the person acquires some insights about his / her own mechanism of defence. Information about the problem will not affect the attitude, however information about his / her own functioning may, when presented without threat.

c. Value-expressive function

Contradicting with ego-defensive function, this attitude allows the individuals to express his core values. Value-expressive attitudes not only allows ones to express self-image, but to mould that self-image closer to ones' heart desires. When a product says or expresses something which is in line with the person's value, that product will give positive perception and build positive attitude in that person. It is relevant to lifestyle or personality analysis, where people do and have certain activities, interests, and opinions. For example, a woman has a high appreciation for a healthy product; then she will choose organic fruit because it resembles a healthy product.

The early values which are held by people are formed during the years they set the basic outline for self-concept. For example, children are taught by their parents that eating spinach is good and hitting girls is bad. The latter values are formed when they join a new group or organisation. They will often internalise the values of the group. In this moment, group support is essential for people who just acquire a new value and would like to adjust their attitudes. There are several other factors which are fundamentals for internalisation, which are: (1) the consistency / fitness between the values of the new group and of the individual, (2) the existence of a clear model of what group member should be like, (3) the opportunity to collaborate which is given to the individual, and (4) the recognition of one's effort in the group rewards.

To evoke the attitude based on this function, there must be a cue in the stimulus situation which is associated with the attitude. For example, a woman of a certain political preference believes that income tax is more than just a sales tax. At that moment in the group she is involved with, the discussion of sales tax is happening. Thus, it will trigger her reaction of the attitude that she has about the income tax. The other way for this function to elicit is that there must be a prevention of individual's expressive behaviour in the immediate past. Someone who is busy doing something and does not have time to express himself will try to do that at the first time he has a free time. On the other hand, to change attitude based on this function, some degree of dissatisfaction of self-concept or its related values is needed. The dissatisfaction can come from failures or from the incapability of the held value in preserving a favourable image of oneself. Someone with pacifist values could become dissatisfied with himself during the reign of capitalism. The second way to change the attitude is the dissatisfaction with the current attitude because it is not relevant to the value held by

one. A man who just believe in a new religion might find some of his attitudes are not relevant to the religion's values. Thus, he might want to change his attitudes.

d. Knowledge function
Individuals seek knowledge to understand things otherwise those things become chaotic for them and they find satisfaction from it. People needs standard or reference to understand how things go in the world, and attitude can help providing that. They want their knowledge to be definite, distinct, consistent, and stabile.

To arouse the attitude related to this function, a stimulus is needed. Knowledge alone would not initiate the attitude, but with stimulus, such as experiencing that knowledge, this attitude will come out. To change one's attitude based on this function, one should feel that his / her attitude is not adequate to deal with the new or changing situations. The examples related to consumer studies is when a consumer is in a doubt about a new product, an information about the logos on the products will enhance her attitude towards that product.

This goes along with the work of Grunert and van Trijp (2014). The attitude is built by the combination of consumer's want and consumer's inference about a product. Consumer's want is the benefit which a consumer expects from a product and it is related to the strength of the importance that the consumer has. Consumer's inference is the benefit which consumer infer the product to have which is restated as a perception in this study. To conclude, attitude is formed by the importance or strength of the beliefs and our perceptions about the objects. The attitude serves several functions, such as to reward, to express value, to defence the ego, and to add knowledge.

In this study, there are two objects which build the attitude. They are packaging types and product types. The packaging type has three levels while the product type has two levels.

2.2. Packaging types

2.2.1. Plastic packaging

Packaging has three main functions, which are containment, protection, and communication (van Herpen et al., 2016). Plastic is one the most common packaging materials which are used for food and beverages, including fresh fruit and vegetables. The advantage of plastic packaging is that it can serve all those three functions. It can contain the fruits conveniently. Fruits are considered fragile, so the plastic is usually used with the combination with carton to increase the protection function. Moreover, it is also easy to put information on the plastic (Fellows, 2017).

2.2.2. No packaging

On the other hand, according to Williams et al. (2012), consumers are concerned about packaging waste which is produced by the plastic and other types of packaging. Thus, they demand that the use of packaging should be decreased, or even at some point, eliminated (van Herpen et al., 2016). Some retailers sell organic fruits without any packaging. The other reasons behind it were that consumers like to touch the product, it is easier for them to check the quality of the food, consumers can determine how many they want and do not need to purchase a default / pre-set number of food, and consumers may perceive less environmental impact (van Herpen et al., 2016). The retailers place the organic and the conventional products in different sections. However, this has weaknesses such as it cannot cover the three functions of the packaging, namely containment, protection, and communication. Moreover, according to Schleenbecker and Hamm (2013), consumers demand to

distinguish the organic product from the conventional one and to the supermarket as the 'naughty' consumers might mix the organic with the conventional and pay with the conventional food price. To conclude, van Herpen et al. (2016) has proven that consumers increase their choice for fruits and vegetables which are without packaging.

2.2.3. Laser packaging technology

The marketers then gave some alternatives to the consumers by providing one or two functions of the packaging but leaving less waste. The examples of this are the use of label, big packaging, paper packaging, and the latest one is the laser technology. The technology was invented to give alternative on the use of label and plastic, especially on their functions to give product information, such as brand, traceability, and certification (Marx et al., 2013). One example of a retailer who has implemented this technology is EOSTA (EOSTA, 2016).

The technology uses carbon dioxide laser to mark fresh fruits with some information. The laser creates a depigmentation on the fruit's surface that leaves a distinguishable mark. However, this does not apply to all fruits, which is why some extra compounds such as iron oxides and hydroxides are needed for contrast enhancer. Those compounds are going to be used in minimum quantity and expected to not leave any significant traces on the fruit's internal part. Therefore, the use of those compounds is only allowed for fruits whose outer parts are not normally edible, such as citrus fruits, melons, and pomegranates (EU, 2013). In EU, the technology has been legalised since 2013 while in USA it has been legal since 2012 (eCFR, 2017).

Table 1. Packaging types and their functions

Packaging types	Containment and handling	Protection and preservation	Information and communication
Unpacked	No	No	No
Plastic	Yes	Yes	Yes
Laser marked	No	No	Yes

2.3. Product types

2.3.1. Conventional product

In this study, conventional product is defined as every product which is not an organic product. That means that it is a product which is not organic certified based on EU Regulation 834/2007. Conventional product is still the mainstream consumed product compared to organic product. Conventional farming has more than 90% of all farms area in Europe (IFOAM, 2016).

2.3.2. Organic product

Organic product is defined as an organic product which is certified according to EU Regulation 834/2007 (Schleebecker and Hamm, 2013). The certification is comprised based on a farming system which sustains the health of soils, ecosystem, and people. It is based on ecological processes, biodiversity, and cycles adapted to local environment rather than the use of unnatural input (European Commission, 2012). Furthermore, Kristiansen (2006) added that organic agriculture is not only related to the farming system, but also, where possible, to the whole supply chain process as well as the cultural and social impacts of the movements.

According to Teng and Wang (2003), organic food is perceived as healthier, safer, more environmental friendly, and having more nutritious value than its conventional counterpart. Consumers also want to pay more money for organic product (Teng and Wang, 2003). There are a lot of food types which are sold in organic version, such as bread, meat, dairy product, egg, fruit, vegetable, wine, and many more.

However, according to IFOAM (2016), in Europe, the most sold organic products are vegetables and fruits, followed by animal products.

Considering the combination of the packaging and product type, we hypothesise that:

- H1: The attitude towards the combination of packaging and product type is a function of packaging and product type and their combinations.
    - H1.1 (Interaction effect): The **usage** of **packaging** types (laser and plastic) will **increase** the **attitude** for conventional fruit but it will **decrease** the **attitude** for organic fruits.
        - H1.1a (Simple effect): The usage of packaging types (laser and plastic) will increase the attitude for conventional fruits.
        - H1.1b (Simple effect): The usage of packaging types (laser and plastic) will decrease the attitude for organic fruits.
    - H1.2 (Interaction effect): The **change** of **product** type from conventional to organic will decrease the attitude of **plastic** and **laser marked** fruit but will increase the attitude of **unpacked** fruit.
        - H1.2a (Simple effect): The change of product type from conventional to organic will decrease the attitude of plastic and laser marked fruit.
        - H1.2b (Simple effect): The change of product type from conventional to organic will increase the attitude of unpacked fruit.

2.4. Perception

According to Grunert and van Trijp (2014), consumer's inference is the process of inference making and benefit perception. Based on the product features, description, and positioning, consumers create an inference about what the product will give to them. An inference usually carries a lot of uncertainty. However, in some cases, the degree of uncertainty is less than in other cases. That happens with the products which have benefits that can be experienced by the consumers. This is called experience qualities (Grunert and van Trijp, 2014). Consumers may learn from previous consumption about the products and they can relate it to the future purchase. However, not all the product benefits can be experienced. Thus, consumers make informational and inferential beliefs formation about the credence quality of the product. For example, it is never clear how much a product can contribute to the animal welfare, sustainability, or health and it is not possible to experience it. Therefore, consumers can create an informational belief about the product from its credence qualities, such as label, quality logo, and so on (Steenis et al., 2017; Grunert and van Trijp, 2014). Grunert and van Trijp (2014) also proposed another factor which can form the belief in the absence of information, which is inferential belief formation. With this, consumers use any available cues, such as packaging material and packaging colour, to form a belief. Obviously with this method, the uncertainty is higher than the informational belief formation. Ultimately, consumer's inferences contain a lot of uncertainty. In addition, even though the quality cues are available, that does not mean that the consumers will make the right inference or the right prediction about the quality of the product. Their ability to make inferences depends on how much knowledge and competence they have about the product. For example, the information about the quality of meat is available, such as the breed, age, and slaughtering date. But consumers with less knowledge and competence about meat do not care about those. They will just rely on visible cues such as colour and visible fat content, although they know that this information might not always lead them to the good quality meat. To conclude, knowledge and competence influence consumers' perception.

As described above, there are a lot of factors of the product which influence perception. To choose the suitable factors, it is important to consider what factors also influence the attitude, since according to Fishbein model (Solomon, 2014), attitude is the function of belief or importance and perception. Steptoe et al. (1995) has developed a method which assesses perceived influences on food selection at the individual level, or in other words, the method evaluates consumers' importance. It is called Food Choice Questionnaire (FCQ). According to the model, consumers' importance is formed by 9 factors, which are health, mood, convenience, sensory appeal / taste, natural content, price, weight control, familiarity and ethical concern. However, we made several adjustments to the factors such as leaving mood out of the equation as it is irrelevant in this study, emphasising familiarity to the familiarity of the laser technology, separating convenience into 4 types, naturalness which is strongly related to organic agriculture, and focusing ethical concern to sustainability.

2.4.1. Taste

For food, taste is the most important thing that consumers consider. They unlikely are willing to compromise that for any other factors (Aggarwal et al., 2016; Đorđević and Žeželj, 2013; Januszweska et al., 2011). Markovina et al. (2015) stated that in his study, people who consider taste as the most important determinant in buying food are coming from countries with strong economic power and those can be related. The same result was also published by Steptoe et al. in 1995. Why taste is so important? In terms of consumer's want, Raghunathan et al. (2006) described that taste leads to enjoyment and many researches (Dhar and Simonson, 1999; Shiv and Fedorikhin, 1999; Tepper and Trail, 1998) have proven that enjoyment is important for human being. For example, Dhar and Simonson in 1999 found out that people tend to have more enjoyment and to sacrifice cost and waiting time. In terms of consumer's inference, Schleenbecker and Hamm (2013) and Teng and Wang (2015) stated that consumers infer organic food has superior taste compared to conventional food. However, in contrary, Kourouniotis et al. (2016) stated that people who consider taste as the most important factor tended to have some certain behaviours such as a poorer diet quality, too little fruits and vegetables consumptions, and too many fat, sugar, and salt intake. To conclude, people who do not do these behaviours tended to not consider taste as the most considerable factor in consuming food.

Although taste is the most considered factor in choosing food, it is actually affected by several factors. Unlike a machine, although they are of different brands, they will still measure the same. For example, a scale from brand A and B will weight a same object as the same weight. In contrary, it is not the case with taste. A same food can be tasted differently by different people (Shepherd, 1999). The factors which influence that are the origin of the fruit (Sijtsema et al., 2013), gender, age (Steptoe et al., 1995), like and dislike, and culture or lifetime exposure to certain tastes (Kourouniotis et al., 2016; Shepherd, 1999).

2.4.2. Health

It is no longer a secret that food contributes a lot to human health. According to Kaczorowski et al. (2016) and WHO (2009), unhealthy diet has been one of leading causes of illness, death, and disability. Therefore, health is an important factor in deciding the food. A study by Januszweska et al. (2011) found that health is always in the 5 highest rank of the Food Choice Questionnaire in 3 European countries. In summary, health is related to the prevention of chronic disease, to general nutritional concerns, and to well-being (Steptoe et al., 1995).

In terms of consumer's want, there are some contradicting opinions about health. One argument said that social strata impacts the healthy food choice. The higher the social strata, the healthier food they choose (Beydoun and Wang, 2008; Le et al., 2013; Turrell and Kavanagh, 2006; Konttinen et al., 2012; Miura and Turrell, 2014). In contrary, research done by Aggarwal et al. (2016) in United States posited

that the strata do not influence the healthy food choice as they found that low social strata people also choose healthy food. The authors said that less-healthier food choice is affected by higher food price, limited availability and access, lack of cooking skills, and cooking time constraints. In terms of consumer's inference, Schleenbecker and Hamm (2013) and Teng and Wang (2015) stated that organic foods are healthier than the conventional ones. To conclude, health is one of the most important factor people consider when buying organic food.

2.4.3. Convenience

According to Steptoe et al. (1995), convenience is related to how easy or how convenient to buy and to use the product. The examples of questions which are used to measure this factor are whether the food is easy to prepare or whether it is easily available in the nearest supermarket. Glanz et al. (1998) found out that in the United States, demographic factors influence convenience. The authors expressed that age and income level are negatively related to convenience, which means that younger and lower income people would consider convenience as more important while the older and higher income people would consider convenience as less important. Besides that, convenience also determined the consumption of cereal as breakfast and of fruits and vegetables. People consume more of them when they feel more convenient about them.

Convenience can also be related to packaging as one of the function of packaging is about convenience (van Herpen et al., 2016). Packaging can be grouped into three parts, which are primary, secondary, and tertiary packaging. Primary packaging is the one which comes in contact with the end customer. A secondary packaging contains several packs of primary packaging, such as a corrugated carton. A tertiary packaging carries a set of secondary packaging, such as wooden pallet (Wikström et al., 2014). For consumers, convenience is related to the primary packaging.

According to Marsh and Bugusu (2007), convenience features several components such as handling, disposal, and resealability / storage. Koutsimanis et al. (2012) researched what drives consumers in buying fresh produces. Handling the produces in terms of carrying and opening has a high overall score, although it is slightly higher for younger consumers. Lindh et al. (2016) gave an example which said that easy-to-open is related to handling. Although there are differences in hand's strength according to age and gender, there were no significant differences found among them in terms of packaging handling preferences. That means that both people with less and more strength in hand prefer an easy-to-open packaging, because it is convenient. Disposal was considered important as well, although the participants showed no preference of how to dispose the waste. That indicated the lack of knowledge of the right disposal method. Container size is considered important by participants between 40 and 60 years old and by female (Koutsimanis et al., 2012). Lindh et al. (2016) stated that in terms of container size, consumers like that it should fit in the refrigerator or other storage place in house and it should be easy to transport home. In the conclusion of the study, Koutsimanis et al. (2012) reported that for fresh fruits and vegetables, consumers prefer to handle a container bigger than 237 mL and to store them for 6-9 days. There is no preference for disposal method.

Figure 2. 237 mL container
Source: (Sam's Club, 2015)

Convenience is regarded as high when less time and effort are needed to perform those components (Loose et al., 2013). According to Berry et al. (2002), time is a limited and scarce resource. Time is finite and cannot be expanded, unlike money. In terms of product consumption, time is most common regarded as a cost. The cost of time is reputed as an opportunity cost of forgone income and participation in other activities. Consumers sell it in the labour market and buy it with time-saving items. The term time-saving itself means reallocating time across activities to obtain better efficiency. Time allocation influences consumption behaviour through the value and goals. People value time differently, some of them are willing to do things more slowly while some others do not. Thus, since the consumers view time differently, they also view convenience differently.

According to Berry et al. (2002), effort is a nonmonetary cost which has similar feature with time; it affects perceived conveniences. It also influences satisfaction. To achieve convenience, consumers tend to look for a way to do a task in the shortest time with the least effort needed. If the effort is more, consumers expect more outcome in return. Effort could be distinguished into three types, which are physical effort, emotional effort, and cognitive / mental effort. The latter is the most researched topic, while the others two receive less attention from the researchers.

2.4.4. Naturalness

Humans have an instinctive attachment to natural things. This has caused an unsurprising phenomenon that people have a strong preference for natural products. Besides health and taste, the other most wanted preference is naturalness (Román et al., 2017). According to Steptoe et al. (1995), naturalness is related to the use of additives and the selection of natural ingredients. Consumers want the food to have less additives. What consumer's want about naturalness is influenced by age, gender, education, income, values, personality traits, health interests, and some other relevant factors (Román et al., 2017).

Naturalness is much related to organic food. In principle, according to IFOAM (n.d.), organic food is made based on natural ecological process, biodiversity, and cycles which are adapted to local situations. Thus, it can be said that organic food has the highest level in this factor. Renko et al. (2013) stated that Balkan consumers are natural products oriented because they prefer to purchase traditional, local, and organic products.

A little different from Steptoe et al. (1995), Román et al., (2017) defined that judgements about naturalness is heavily dependent on the process in making the food, not on the content of the food. Consumers' acceptance of new processing technology is an important variable in perceived naturalness. For example, a genetically modified product will have a very low score on naturalness. Chemical modification is also considered as less natural than physical modification. The authors used three categories to review naturalness. They are (1) how the food is grown, (2) how the post-harvest processing is, and (3) how the end-product is. The first category gives positive score to organic and local farming. The second category requires the food to be processed with the absence of perceived negative technology, such as preservatives, artificial colours and flavours, and so on. A positive review is given to the traditional food production. The last category attributes naturalness to health, taste, and eco-friendly.

2.4.5. Price

Price clearly is an important determinant of food choice. Consumers set a standard in their mind as reference point. This point is used to judge the other prices. They want the products to be below or equal to the standards (Thomas and Menon, 2007). Furthermore, it is much more important for people

with low income and for women. In the United Kingdom, women are usually responsible for purchasing the food for her family and thus, they are more aware of financial expenditure of their family compared to men (Steptoe et al., 1995). In a research done by Januszewska et al. (2011), consumers in Belgium, Romania, and Hungary consider price as one of the top five factors of food choice. Often, price acts as a barrier. Consumers cannot afford the price of organic products; thus, they do not buy them (Aggarwal et al., 2016). However, placing a lower price does not always work well. Barjolle and Pohar (2013) expressed that 'premium prices' are sometimes necessary to cover the reputation costs which are important to gain trust from the consumers. In other words, consumers infer that product with premium price is trustworthy. Therefore, price is indeed an important factor in determining food choice.

2.4.6. Familiarity

Familiarity in food choices represents on how eager people want to stick to their eating behaviour rather than trying something new. There is a positive relation between familiarity and mood, which means that for people who need food to regulate stress, they tend to eat familiar food. It is also related to age. Older people tend to stick to the food that they already know. Moreover, familiarity is associated with income. People with less income tend to choose familiar food while people with higher income are more willing to try something new. When people have limited budget, the risk are higher when they try to eat something new. Thus, they tend to choose the familiar foods. In addition, familiarity is one of few factors which is not influenced by gender (Steptoe et al., 1995).

Familiarity can also be related to brand and certification. According to Margaret and Keller (2003), brand familiarity is an important factor which can influence consumers' perception. It is built by the direct and indirect experiences that the consumers have with the brand so that consumers can have a memory about the brand and its associations in their minds. The examples of the direct experience is the consumers who have tried the products and the examples of indirect experiences are the families talk about it, they have seen it in some ads, and so on. Brand familiarity can influence consumers' perception in a unique way. Hoyer et al. (2016) in their book gave an example of people who did a blind taste test and cannot differ their favourite beer from the other beers. But when the beers' brands were identified, they gave higher scores for their favourite brands. It emphasises that consumers infer high quality when familiarity is high. In addition, there are several international awards which are given to the most familiar brands, emphasising the importance of brand familiarity (Interbrand, 2016; Forbes, 2017).

Stanton and Guion (2015) expressed that certification, particularly organic certification can also be used as a brand. This means that other promoting the brands, companies can also promote the logo. However, the logo is not used only by one company, so consumers might look for other brands. The key about using certification logo as a brand is consumers' knowledge about it. How much consumers know about will determine their perception towards it. The authors also stated that too many different certification logos would make consumers confused and thus they would have more negative perception towards it.

2.4.7. Ethical concern

According to Steptoe et al. (1995), ethical concern is an independent factor, which is not correlated with the other eight factors, influencing perception. It can be influenced by age and gender. Women concern more about ethical concern than men and younger people concern less than older people. In their study, young male students were not affected by this factor. In the study done by Markovina et al. (2015), ethical concern is always in the two least important factors of FCQ done in nine European countries.

The questions which can be asked regarding this factor are whether the product comes from countries that you approved politically and whether the product is packaged in an environmentally friendly way (Steptoe et al., 1995). Balabanis and Adamantios (2008) researched that there were differences in brand evaluations when the consumers know the countries of origin of the products. However, that does not necessarily apply to all brands within the same product. That means that brand familiarity might cover the negativity caused by information of countries of origin. As for whether the packaging is environmentally friendly (sustainability) is discussed in the packaging part of this paper.

According to Seo et al. (2016), the market shares for sustainable products is gradually increasing because consumers have become more aware about environmental sustainability and pollution. Out of moral or ethics and health concerns, they started to change their consumption towards sustainable products. The examples of sustainable products are organic product, local product, and Fair-Trade product. The product sustainability can be communicated via certification, in which familiarity factor plays a role. The authors also suggested that sustainability is not only for product, but also for packaging. The eco-friendliness of a packaging is an external attribute of the product, since packaging is an external part of the product. In recent years, packaging is seen as a big contributor for environmental pollution. Thus, consumers have started to prefer eco-friendly packaging. To conclude, in this study, the ethical concern is narrowed down to sustainability.

Considering these ten perceptual beliefs and the combination of product and packaging types, we hypothesise one main effect and three interaction effects which are:

- H2: **Packaging and product** combinations generate different perceptions depending of the interaction of packaging and product type.

Organic products are considered tastier, healthier, and more natural than conventional products (Schleenbecker and Hamm, 2013) but consumers prefer that conventional and organic products are without packaging (van Herpen et al., 2016). Thus, the adding of any packaging could affect the perception of organic fruit. On the other hand, the laser technology is reviewed as a new technology (Samoggia and Nicolodi, 2017). Therefore, for conventional fruits, the laser marking technology could give lower scores in taste, health, and naturalness perception than plastic packed fruits. Considering those references, we hypothesise that:

    - H2.1 (Main effect): The perception of **laser marked fruit** will be **lower** in terms **of taste, health**, **naturalness** compared to unpacked **conventional** and **organic** fruit.
        - H2.1a (Simple effect): The perception of conventional with laser marked fruit will be lower in terms of taste, health, naturalness compared to unpacked **conventional** fruits.
        - H2.1b (Simple effect): The perception of organic with laser marked fruit be lower in terms of taste, health, naturalness compared to unpacked **organic** fruits.
    - H2.2 (Interaction effect): The perception of **laser marked fruit** will be different in terms **of taste, health**, **naturalness** compared to plastic packed **conventional**, but they will not be different for **organic** fruit.
        - H2.2a (Simple effect): The perception of conventional laser marked fruit will be different in terms of taste, health, naturalness compared to **conventional** plastic packed fruit.
        - H2.2b (Simple effect): The perception of organic laser marked fruit will not be different in terms of taste, health, naturalness compared to **organic** plastic packed fruit.

- H2.3 (Main effect): The perception of **laser marked fruit** will be **lower** in terms **familiarity** compared to other combinations for both **conventional** and **organic** fruit.
  - H2.3a (Simple effect): The perception of conventional with laser marked fruit will be lower in terms of familiarity compared to other combinations of **conventional** fruits.
  - H2.3b (Simple effect): The perception of organic with laser marked fruit will be lower in terms of familiarity compared to other combinations of **organic** fruits.

Considering that laser marked packaging does not have packaging such as plastic, and that plastic is the most common packaging type because its conveniences (Fellows, 2017), we hypothesise that:

- H2.4 (Main effect): The perception of **laser marked fruit** will not be significantly different in terms of **convenience in purchasing** than unpacked fruits for both **conventional** and **organic** fruit.
  - H2.4a (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in purchasing than **conventional** unpacked fruits.
  - H2.4b (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in purchasing than **organic** unpacked fruits.
- H2.5 (Main effect): The perception of **laser marked fruit** will not be significantly different in terms of **convenience in consuming** than unpacked fruits for both **conventional** and **organic** fruit.
  - H2.5a (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in consuming than **conventional** unpacked fruits.
  - H2.5b (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in consuming than **organic** unpacked fruits.
- H2.6 (Main effect): The perception of **laser marked fruit** will not be significantly different in terms of **convenience in storing** than unpacked fruits for both **conventional** and **organic** fruit.
  - H2.6a (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in storing than **conventional** unpacked fruits.
  - H2.6b (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in storing than **organic** unpacked fruits.
- H2.7 (Main effect): The perception of **laser marked fruit** will not be significantly different in terms of **convenience in disposing** than unpacked fruits for both **conventional** and **organic** fruit.
  - H2.7a (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in disposing than **conventional** unpacked fruits.
  - H2.7b (Simple effect): The perception of laser marked fruit will not be significantly different in terms of convenience in disposing than **organic** unpacked fruits.

- H2.8 (Main effect): **Plastic** packaging will lead to more **positive perception** in **convenience in purchasing** than no packaging and laser marked fruit for **conventional** and **organic** fruit.
  - H2.8a (Simple effect): Plastic packaging will lead to more positive perception in convenience in purchasing than no packaging and laser marked fruit for **conventional** fruit.
  - H2.8b (Simple effect**): Plastic packaging will lead to more positive perception in convenience in purchasing** than no packaging and laser marked fruit for **organic** fruit.
- H2.9 (Main effect): **Plastic** packaging will lead to more **positive perception** in **convenience in consuming** than no packaging and laser marked fruit for **conventional** and **organic** fruit.
  - H2.9a (Simple effect): Plastic packaging will lead to more positive perception in convenience in consuming than no packaging and laser marked fruit for **conventional** fruit.
  - H2.9b (Simple effect): Plastic packaging will lead to more positive perception in convenience in consuming than no packaging and laser marked fruit for **organic** fruit.
- H2.10 (Main effect): **Plastic** packaging will lead to more **positive perception** in **convenience** in storing than no packaging and laser marked fruit for **conventional** and **organic** fruit.
  - H2.10a (Simple effect): Plastic packaging will lead to more positive perception in convenience in storing than no packaging and laser marked fruit for **conventional** fruit.
  - H2.10b (Simple effect): Plastic packaging will lead to more positive perception in convenience in storing than no packaging and laser marked fruit for **organic** fruit.
- H2.11 (Main effect): **Plastic** packaging will lead to more **positive perception** in **convenience in disposing** than no packaging and laser marked fruit for **conventional** and **organic** fruit.
  - H2.11a (Simple effect): Plastic packaging will lead to more positive perception in convenience in disposing than no packaging and laser marked fruit for **conventional** fruit.
  - H2.11b (Simple effect): Plastic packaging will lead to more positive perception in convenience in disposing than no packaging and laser marked fruit for **organic** fruit.

Considering that there is no literature yet about price perception, thus we hypothesise that:

- H2.12 (Main effect): The perception of **laser marked fruit** will not be significantly different in terms of **price** than **unpacked** and **plastic** packed fruits for both **conventional** and **organic** type.
  - H2.12a (Simple effect): The perception of laser marked fruit will not be significantly different in terms of price than unpacked and plastic packed fruits for **conventional** type.
  - H2.12b (Simple effect): The perception of laser marked fruit will not be significantly different in terms of price than unpacked and plastic packed fruits for **organic** type.

Considering that consumers believe that the usage of packaging gives negative environmental impact (Seo et al., 2016), we hypothesise that:

- H2.13 (Interaction effect): In terms of **sustainability**, the usage of packaging technology will decrease the perception for **organic** fruit, but for **conventional** fruit, the **laser marked** fruit will **not have significantly different** score as the **unpacked** fruit.
  - H2.13a (Simple effect): In terms of sustainability, the usage of packaging technology will decrease the perception for **organic** fruit, but
  - H2.13b (Simple effect) for **conventional** fruit, the laser marked fruit will not have significantly different score as the unpacked fruit.

Furthermore, considering the ten perceptual beliefs and attitude, we hypothesise one main effect, which are:

- H3: The attitude towards the combination of packaging and product type is a function of the ten perceptual beliefs.

2.5. Importance

According to Grunert and van Trijp (2014), consumer's want is formed by the value held by the subject. The value is a concept of the desired outcome or a behaviour which forms the basis for an evaluation or selection to be made. Value represents the ultimate human motivators, even in relation with purchase intention. However, value alone is not enough to define consumer's choice. It needs to be supported by situational components, such as time and place. To define consumer's choice, a goal is more relevant. A goal is a concentrated value added with situational components. It points at a desired outcome of the product people intent to purchase. An example of goal and a situational component is that a person wants to please his family by buying delicious food but at that time he does not have enough money.

The combination of packaging and product type forms the perception. However, before forming the attitude, the consumers could be faced with contradicting perceptions on one cue. For example, an organic product combined with no packaging might have high preferences in terms of naturalness, but it has low score in convenience. Thus, consumers must do a trade-off, which means how the consumers perceive the combination of the product and packaging type where there is contradicting perceptions. This kind of trade-off has been researched several times in the past, for example Shiv and Fedorikhin (1999) experimented how mood affects the trade-off between the enjoyment and the health benefits of food offerings. Klaiman et al. (2016) cited that consumers might trade many product attributes, except for taste and price. Steenis et al. (2017) stated that trade-off can be unintended and undesirable. For example, changing a metal can to glass will make the product more sustainable but at the same time it might increase the price of the product. According to Luchs et al. (2012), trade-off might be true, but it also can be wrong. In their experiment (Luchs et al., 2010), consumers perceived that sustainable product has less functional performance compared to its conventional counterpart. In 2012, Luchs et al. continued the research to find out how consumers would react to that trade-off. They found out that consumers prefer functional performance compared to sustainability performance. To conclude, such trade-off might impact consumers' attitude towards the combination of product and packaging type.

The trade-off is influenced by consumers' view on the importance of the perceptions (Steenis et al., 2017). For example, consumer A considers price as the most important, so he would not buy organic fruit and sacrifice health as expensive price and healthy product are the perceptions of organic product

while consumer B believes that health is the most important for her, so she would buy that organic fruit.

The trade-off might not be necessary if there are no contradicting perceptions. For example, Schleenbecker and Hamm (2013) stated that organic food is inferred as tasty food. It is considered to be tastier than its conventional counterpart. Moreover, naturalness is also related to the other determinant, which is health. Consumers likely infer that a healthy food is a food with high naturalness (Steptoe et al. 1995). Renko et al. (2013) wrote that European consumers relate the definition of traditional food with naturalness. Thus, that means that a traditional food is inferred to have a high naturalness. They also stated that unnatural ingredients might be a barrier for consumers to purchase food.

However, this perception is not the same for everyone. Raghunathan et al. (2006) argued that people in the United States infer unhealthy food as tasty food. The less healthy the food is, the tastier people infer about the food. Their inferences are made from experience and somewhat unconscious as they did not believe about their food choices in the experiments. In one experiment, they prefer the tasty food knowing that it is also unhealthy but in the other experiment they disagreed that taste and health are inversely correlated. One of several reasons behind this occurrence is enjoyment. When people want to enjoy the food, they tend to choose unhealthier food (Raghunathan et al., 2006). Shepherd in 1999 described the two other things which influence this are optimistic bias and ambivalence. Some people have an optimistic bias that they infer that a food contains a particular nutritional value while actually it does not or that they are less likely to suffer an illness compared to other people. Ambivalence is about mixed feeling that comes when people confront a contradicting consideration. For example, people might perceive a food as healthy, but s/he will not choose it because it is not delicious. To conclude, on individual level there might be differences on how important a factor is which can be resulted in the difference attitude towards the cue.

The research done by Janssen et al. (2009) shows that buyers' type can have influence in the consumer's attitude. In their research, organic buyers had great interest in health, nutrition, and organic food, while conventional buyers did not show much interest on those factors and they put much attention to price. In conclusion, they traded the belief of other factors for the belief of price. Considering this, we hypothesise that buyers' type through trade-off will moderate the model by several interaction effects such as:

- H4: The extent to which perception contributes to attitude depends on the importance of the 10 perceptual beliefs which differs between buyers' type.

Considering that organic product is heavily related to naturalness (Román et al., 2017), laser technology to sustainability (EOSTA, 2016), and plastic packaging to conveniences (Fellows, 2017), we hypothesise that:

  - H4.1 (Interaction effect): The **conventional** fruit consumers will prioritise **sustainability** over **naturalness,** but the **organic** fruit consumers will **not** prioritise **those**.
    - H4.1a (Simple effect): The **conventional** fruit consumers will prioritise sustainability over naturalness**,** but
    - H4.1b (Simple effect): the **organic** fruit consumers will **not** prioritise sustainability over naturalness.
  - H4.2 (Interaction effect): The **organic** fruit consumers will prioritise **sustainability** over **4 kinds of conveniences,** but the **conventional** fruit consumers will **not**.

        - H4.2a (Simple effect): The **organic** fruit consumers will prioritise sustainability over 4 kinds of conveniences, but
        - H4.2b (Simple effect): the **conventional** fruit consumers will not prioritise sustainability over 4 kinds of conveniences.

And those trade-offs will influence the attitude as such:

- H4.3 (Main effect): The usage of **technology** will give an **increase** in **attitude** of **conventional fruit buyers** to both **conventional** and **organic** fruit.
    - H4.3a (Simple effect): The usage of technology will give an increase in attitude of conventional fruit buyers to **conventional** fruit.
    - H4.3b (Simple effect): The usage **of technology will give an increase in attitude of conventional fruit buyers** to **organic** fruit.
- H4.4 (Interaction effect): The usage of technology will give a decrease in attitude of organic fruit buyers to both conventional (H4.4a) and organic fruit (H4.4b), but the difference for laser marked and plastic packaging will not be significant for conventional (H4.4c) and organic fruits (H4.4d)
    - H4.4a (Simple effect): The usage of technology will give a decrease in attitude of organic fruit buyers to **conventional fruits**
    - H4.4b (Simple effect): The usage of technology will give a decrease in attitude of **organic** fruit buyers to organic fruits
    - H4.4c (Simple effect): The attitude difference of **conventional laser marked** and **plastic** packaging will not be significant for **organic** fruit buyers.
    - H4.4d (Simple effect): The attitude difference of **organic laser marked** and **plastic** packaging will not be significant for **organic** fruit buyers.

3. Methodology

3.1. Participants

Respondents are people from 17 to 65 years old. Samples were collected via online questionnaire. 250 people is aimed to be the respondents. They were invited through social media network, including Facebook groups, Whatsapp group, and Twitter.

3.2. Stimuli

A 2x3 mixed design experiment was conducted (Table 2). One participant was asked to score on 2 combinations, which are combination 1 (control) and combination 2-6 (randomly chosen). Product types consisted of organic and conventional product. Packaging types consisted of no packaging, plastic packaging, and laser marked (no packaging). Apple fruit was chosen because it is a common fruit in the Netherlands and even in the world. One set of samples consisted of four apples.

Table 2. List of combinations

Name	Packaging type	Product type
Combination 1 (control)	No packaging	Conventional product
Combination 2	Plastic packaging	Conventional product
Combination 3	Laser marked	Conventional product
Combination 4	No packaging	Organic product
Combination 5	Plastic packaging	Organic product
Combination 6	Laser marked	Organic product

3.3. Procedure

Once the respondent clicked the link to Qualtrics, a short explanation about the questionnaire was given. The respondent was also asked to electronically sign the informed consent. A questionnaire began with asking demographic data. The respondent was asked about the buying frequency to split them into the conventional or organic fruit buyers. Then, the participants were shown 2 pictures in randomised order. One of those was the picture of the Control (combination 1) and the other one was a picture of randomised one from combination 2-6. After each picture, s/he then was asked to answer the questionnaire about the perception and attitude towards the picture while s/he was still being able to look at the picture. Finishing that, the respondent was asked about the importance and determinance of themselves in choosing a fruit. Thus, the questionnaire was finished. The plot can be seen in the Appendix 8.

The quota function in Qualtrics was used. The quota were 125 respondents for each conventional and organic fruit buyers. Then, the quota function was used again to make sure that combination 2-6 obtained 25 respondents each.

3.4. Measurements

In total, there were 65 questions in the questionnaire, excluding the demographic questions. Measurement of those questions are described in this section.

3.4.1. Perception

Perception is measured using modified questions from Sabbe (2009) and modified perceptual beliefs from Steptoe et al. (1995) (Appendix 2). The questions are answered on 7-point scales with end poles labelled as very much important and very much unimportant. The respondents were asked whether the product combined with the packaging type is healthy, convenient (to purchase, to consume, to

store, to dispose), delicious, natural, expensive, familiar, and sustainable. The questions were designed to ask about the combination of packaging and product type, and not each of them individually.

3.4.2. Importance

To measure the importance, we used 3 different methods. They are regression, modified Food Choice Questionnaire (FCQ), and determinance method. For the regression, we used attitude as the dependent variable and the perceptions of all combinations as the independent variables. It is used only to answer hypothesis 3. For the modified FCQ method, we used the Food Choice Questionnaire (Steptoe et al., 1995) as the base and combined some questions from Sautron et al. (2015) and Lockie et al. (2004) (Appendix 3). The measurement used 7-point scale with the poles labelled as "very much unimportant" and "very much important". Some factors had multiple questions while some others only have 1 question. The factors that were scored by the respondents with their respective Cronbach alpha values were health (0.747), convenience in purchasing (NA), in consuming (NA), in storing (NA), and in disposing (NA), taste (0.625), naturalness (0.762), price (0.594), familiarity (0.521), and sustainability (0.744). Furthermore, for factors which had Cronbach's α below 0.70 (Duhachek et al., 2005), we selected carefully one question to represent each factor. The respected questions can be seen in the Appendix 3. For the determinance method, a modified method from van Dam and van Trijp (2013) was used (Appendix 4). There were 10 attributes from the perception measurement, each attribute appeared 6 times and every possible attribute pair appeared twice. Totally, the respondent was asked the same question 15 times in which each question contains only 4 out of 10 attributes. The attributes are the same with the factors in importance measurement, which are 6 perceptual beliefs from Steptoe et al. (1995) and 4 separated convenience attributes: convenience in purchasing, consuming, storing, and disposing. The respondents chose from each quartet of attributes, which attribute is the most important for them in choosing apples. It then was measured what attribute was most frequently chosen. According to van Dam and van Trijp (2013), the method is one of zero-sum methods. By choosing one attribute, the other three attributes do not get scores. This forces the respondents to focus on one most important attribute. Therefore, this method is the primary method to test hypothesis 4. The data from importance method is used as a support for the determinance method.

3.4.3. Attitude

To measure the attitude, modified question from Steenis et al. (2017) was used. The respondent rated the statements using 7-point Likert scale with the poles labelled as "very much disagree" and "very much agree" based on this question: "What do you think of these statements?" The statements were "(1) The combination of the packaging and product types is generally good? (2) I have no problem to eat the product. (3) I feel satisfied about the combination of this packaging and product type" (Appendix 5). The obtained Cronbach α is 0.867.

3.4.4. Buyers' type

To measure the buyers' type, a modified question from Dumortier et al. (2017) was used (Appendix 6). The respondent rated his / her answer to the question "How many times do you buy organic fruits?' with response categories: never, rarely, once or more in 1 month, more than once in 2 weeks, and almost daily. Never and rarely are categorised as conventional fruit buyers and once or more in 1 month, more than once in 2 weeks, and almost daily are categorised as organic fruit buyers.

3.5. Data analysis

The data analysis was carried out with IBM SPSS version 23.0.0.2 (IBM 2015). Significance was assessed at $\alpha=0.05$.

The value for each attitude and perception was subtracted with the control scores in individual level. The result is named corrected data / value, while the original ones are called absolute data / value. The purpose of using corrected data is to eliminate the subjectivities or bias from each participant. The research design allowed us to do within subject analysis with absolute value for conventional fruit and between subject design with corrected value for organic fruits. Thus, for conventional fruits, single t-test with corrected value (compare to 0) were used to compare the control (unpacked) with either the plastic and laser marked fruit. The independent t-test was used to compare the plastic and laser marked conventional fruits, as those data were originated from between subject designs. For organic fruits, one-way ANOVA was used to carry the analysis as the design is completely between subject. Bonferroni correction was used to analyse the data of perception and attitude, as the analyses were conducted with the same dataset. The critical p-value for attitude and perception after applying the Bonferroni correction is 0.05/(17 one sample t-test + 16 independent t-test + 10 F-test) = 0.001.

To analyse the data of perception, according to Sabbe (2009), the mean of every perceptual belief was measured. From this data, the overall perception about the combination of the packaging and the product could be seen. To compare whether one combination has superior perceptions over all the other combinations, the one-way ANOVA and Tukey post hoc tests were used.

To analyse the importance using the stepwise regression, we used attitude as the dependent variable and the perceptions of all combinations as the independent variables. To analyse the data of the modified FCQ measurement, one-way ANOVA and Tukey post hoc tests were used to determine which factors are significantly different and the most important among the others. The data was analysed in compilation with the buyers' types to see whether buyers' types influence the importance. To analyse the data of the determinance, a zero-sum method (van Dam and van Trijp, 2013) is used. It was observed how many times an attribute was chosen, and the total values were analysed using 1-way ANOVA and Tukey post hoc tests.

To analyse the data of attitude, paired sample *t*-tests, one-way and two-way ANOVA, Tukey post hoc, and linear regression analysis tests were conducted (Steenis et al., 2017). To measure whether it is the product types, packaging types, or the interactions between them which contributed to the attitude, two-way ANOVA test was used for plastic and laser marked combinations. The test could not be used to analyse the unpacked combinations as it could not fulfil the requirement of two-way ANOVA test. The test was carried out using the corrected value. To measure which combination has the highest attitude above the others, the one-way ANOVA and Tukey post hoc tests were used. Cronbach's alpha was measured, and the result was 0.867.

The data of buying frequency measurement was used to test whether there were significant differences of attitudes, perceptions, fitness, importance, and determinance between the two groups (conventional and organic fruit buyers).

4. Result

4.1. Participants data

The participants consisted of 174 students, 54 employees, and 22 others. They are 160 females, 89 males, and 1 other. Around 40% of them stay longest in Indonesia, 20% in Netherlands, and the rest are in the other countries. In total there are 292 respondents, but due to the Quota function of Qualtrics, only the first 250 data which were used.

Table 3. Number of respondents and their buying frequencies

Buying frequency	Never	Rarely	Once or more in 1 month	More than once in 2 weeks	Almost daily
Respondent	Conventional-fruit buyers		Organic-fruit buyers		
	14	111	57	53	15
Total	125		125		
	250				

4.2. Attitude

4.2.1. Hypothesis 1.1

Hypothesis 1.1a states that "the usage of packaging types (laser marking and plastic) will increase the attitude for conventional fruits". The usage of packaging has given less scores on attitude of all respondents for conventional fruits. Both of the plastic packaging and laser marking have given significant decreases to the attitude (respectively $t_{(49)}$ are -4.979 and -7.048 and both with a one-sided p-value > .999). Thus, hypothesis 1.1a is not supported.

The counterparts of hypothesis 1.1a, which is hypothesis 1.1b, also shows similar result. "The usage of packaging types (laser and plastic) will decrease the attitude for organic fruits" is appeared to be true for all respondents ($F_{(2)}$ 8.279, p-value < .001). The usage of packaging fell into the different cluster of unpacked apples. However, when the respondents are classified, the conventional fruit buyers had a slightly higher attitude for plastic packed apples rather than laser marked apples ($F_{(2)}$ 3.938, p-value .02), while the organic fruit buyers, in contrary considered laser marked apples slightly better than plastic packed apples ($F_{(2)}$ 5.119, p-value .01). Nevertheless, hypothesis 1.1b is supported as the unpacked apples were still considered higher compared to the plastic and laser packaging.

Thus, based on the negative results of hypothesis 1.1a and positive results of hypothesis 1.1b, it can be concluded that hypothesis 1.1 is not supported. The summary can be seen in Table 4.

Table 4. Summary of hypothesis 1.1

Hypotheses	Expect	Result (critical p-value = 0.001)	Post-hoc	Evaluation	Tested by	See
1.1a Conventional	$Att_{Pla} > Att_{Unp}$	$t_{(49)} = -4.979$; p > .999	NA	Rejected	One sample t-test	Appendix 10 & Appendix 12
	$Att_{Las} > Att_{Unp}$	$t_{(49)} = -7.048$; p > .999	NA	Rejected	One sample t-test	
1.1b Organic	$Att_{Pla} < Att_{Unp}$	$F_{(2,147)}= 8.279$; p < .001	≠	Supported	F-test	Appendix 11 & Appendix 12
	$Att_{Las} < Att_{Unp}$		≠	Supported		

4.2.2. Hypothesis 1.2

Hypothesis 1.2 states that "the change of product type from conventional to organic will decrease the attitude of plastic and laser marked fruit (1.2a) but will increase the attitude of unpacked fruit (1.2b)". The data from 2-way ANOVA (Appendix 14) showed that when comparing only the plastic and laser packaging types, there is no significant interaction between product and packaging type ($F_{(3)}$ 1.452, p-value .23). The packaging type alone also did not show any significances ($F_{(3)}$ 0.168 p-value .68). And the product type also did not show any significance ($F_{(3)}$ 1.585, p-value .21). It signifies the indication that the consumers will not have any preferences between the two packaging types and even between the two product types. However, that might be caused because the unpacked value cannot be inputted into the 2-way ANOVA.

To look deeper, H1.2a which stated that "the change of product type from conventional to organic will decrease the attitude of plastic and laser marked fruit" and H1.2b which stated that "the change of product type from conventional to organic will increase the attitude of unpacked fruit" were reviewed. There is no significant p-value observed. Tested against a critical p-value of .001 both hypothesis 1.2a ($t_{(98)}$ = 0.035; p = .49 and $t_{(49)}$ = 1.995; p = .02) and H1.2b ($t_{(49)}$ = 0.970; p = .17) were rejected. The summary can be seen in Appendix 13.

4.3. Perception

4.3.1. Hypothesis 2

Hypothesis 2 stated that packaging and product combinations generate different perceptions. This hypothesis is answered by several sub-hypotheses. For ease of exposure, the results of sub-hypotheses are grouped together and summarised in 3 tables, but that details of the analysis and statistical tests are reported in the Appendix 15 - 24.

4.3.2. Hypothesis 2.1

Hypothesis 2.1 stated that "the perception of laser marked fruit will be lower in terms of taste, health, naturalness, and familiarity compared to unpacked for both organic and conventional fruit". Focusing on the conventional product type, the hypothesis 2.1a "the perception of conventional with laser marked fruit will be lower in terms of taste, health, naturalness compared to unpacked conventional fruits" is supported. The $t_{(49)}$ values respectively are -3.740, -4.773, -9.022 and p-values are all < .001. Hypothesis 2.1b "the perception of organic with laser marked fruit is lower in terms of taste, health, naturalness compared to unpacked organic fruits" is also supported. The scores for organic laser marked fruit are always significantly lower than the unpacked organic fruits. Thus, hypothesis 2.1 is supported.

4.3.3. Hypothesis 2.2

Hypothesis 2.2 stated that "the perception of laser marked fruit will be different in terms of taste, health, naturalness compared to plastic packed conventional, but they will not be different for organic fruit". Focusing on the conventional product type, the hypothesis 2.2a "the perception of conventional laser marked fruit will be different in terms of taste, health, naturalness compared to conventional plastic packed fruit" is supported. The perception scores of the 3 factors of laser marked apples were significantly lower than those of the plastic packed apples. Therefore, hypothesis 2.2a is supported. Hypothesis 2.2b which stated that "the perception of organic laser marked fruit will not be different in terms of taste, health, naturalness compared to organic plastic packed fruit" is also supported. All respondents did not perceive any differences in taste and naturalness for plastic packed (respectively μ= -0.44, -1.06) and laser marked organic apples (respectively μ= -0.48, -0.98), although based on the

post hoc analysis, the score of health perception of plastic packed organic fruit was categorised as both higher and lower group. In summary, hypothesis 2.2 is supported.

4.3.4. Hypothesis 2.3

Hypothesis 2.3 stated that "the perception of laser marked fruit will be lower in terms familiarity compared to other combinations for both conventional and organic fruit". For both the conventional and organic fruits, laser marking technology has given the lowest scores in term of familiarity. Thus, hypothesis 2.3a "the perception of laser marked fruit will be lower in terms familiarity compared to other combinations for conventional fruit" and hypothesis 2.3b "the perception of laser marked fruit will be lower in terms familiarity compared to other combinations for organic fruit" are supported.

The summary of hypothesis 2.12 and 2.13 can be seen in Table 5.

Table 5. Summary of hypothesis 2.1 to 2.3

Hypotheses	Expectation	Result (critical p-value = .001)	Post-hoc	Evaluation	Tested by	See
2.1a: Conventional	$Hea_{Las} < Hea_{Unp}$	$t_{(49)} = -3.740$; $p < .001$	NA	Supported	One sample t-test	Appendix 15 & Appendix 17
	$Tas_{Las} < Tas_{Unp}$	$t_{(49)} = -4.773$; $p < .001$	NA	Supported	One sample t-test	
	$Nat_{Las} < Nat_{Unp}$	$t_{(49)} = -9.022$; $p < .001$	NA	Supported	One sample t-test	
2.1b: Organic	$Hea_{Las} < Hea_{Unp}$	$F_{(2,147)} = 8.327$; $p < .001$	≠	Supported	F-test	Appendix 16 & Appendix 17
	$Tas_{Las} < Tas_{Unp}$	$F_{(2,147)} = 10.620$; $p < .001$	≠	Supported	F-test	
	$Nat_{Las} < Nat_{Unp}$	$F_{(2,147)} = 22.309$; $p < .001$	≠	Supported	F-test	
2.2a: Conventional	$Hea_{Las} \neq Hea_{Pla}$	$t_{(73.8)} = -3.231$; $p = .002$	NA	Rejected	Independent t-test	Appendix 15 & Appendix 17
	$Tas_{Las} \neq Tas_{Pla}$	$t_{(93.2)} = -2.186$; $p = .03$	NA	Rejected	Independent t-test	
	$Nat_{Las} \neq Nat_{Pla}$	$t_{(98)} = -2.978$; $p = .004$	NA	Rejected	Independent t-test	
2.2b: Organic	$Hea_{Las} \approx Hea_{Pla}$	$F_{(2,147)} = 8.327$; $p < .001$	=	Supported	F-test	Appendix 16 & Appendix 17
	$Tas_{Las} \approx Tas_{Pla}$	$F_{(2,147)} = 10.620$; $p < .001$	=	Supported	F-test	
	$Nat_{Las} \approx Nat_{Pla}$	$F_{(2,147)} = 22.309$; $p < .001$	=	Supported	F-test	
2.3a: Conventional	$Fam_{Las} < Fam_{Unp}$	$t_{(49)} = -13.101$; $p < .001$	NA	Supported	One sample t-test	Appendix 15 & Appendix 17
	$Fam_{Las} < Fam_{Pla}$	$t_{(98)} = -8.532$; $p < .001$	NA	Supported	Independent t-test	
2.3b: Organic	$Fam_{Las} < Fam_{Unp}$	$F_{(2,147)} = 8.327$; $p < .001$	≠	Supported	F-test	Appendix 16 & Appendix 17
	$Fam_{Las} < Fam_{Pla}$		≠	Supported		

4.3.5. Hypothesis 2.4

Hypothesis 2.4 states that "the perception of laser marked fruit will not be significantly different in terms of convenience in purchasing than unpacked fruits for both conventional and organic fruit". Observing it with more detail, hypothesis 2.4a "the perception of laser marked fruit will not be significantly different in terms of convenience in purchasing than conventional unpacked fruits" is not supported ($t_{(49)}$ -2.385, p-value .02). Its organic fruit counterpart showed similar result but with a lower strength ($t_{(72.9)}$ -2.127, p-value .04). To summarise, hypothesis 2.4b "the perception of laser marked fruit will not be significantly different in terms of convenience in purchasing than organic unpacked fruits" is also not supported because the data from all respondents is used to answer this hypothesis. To summarise, hypothesis 2.4 is not supported.

4.3.6. Hypothesis 2.5

Hypothesis 2.5 states that "the perception of laser marked fruit will not be significantly different in terms of convenience in consuming than unpacked fruits for both conventional and organic fruit". The hypothesis is not supported as the data for conventional ($t_{(49)}$ -4.339, p-value < .001) and organic fruits ($t_{(73.1)}$ -4.040, p-value < .001) show significant differences. Thus, hypothesis 2.3a "the perception of laser marked fruit will not be significantly different in terms of convenience in consuming than

unpacked fruits for both conventional fruits" and its organic fruits counterpart, hypothesis 2.5b, are not supported. It is to be noticed that the organic fruit buyers, nonetheless, perceived no differences between the unpacked and laser marked apples in terms of convenience in consuming.

4.3.7. Hypothesis 2.6

Hypothesis 2.6 states that "the perception of laser marked fruit will not be significantly different in terms of convenience in storing than unpacked fruits for both conventional and organic fruit". The sub-hypotheses 2.6a ($t_{(49)}$ -1.444, p-value .16) and 2.b ($t_{(98)}$ -0.228, p-value .82) are supported. The only significant value is shown by the conventional fruit buyers towards conventional fruits ($t_{(24)}$ --2.347, p-value .03). They perceived that the laser marked apples are less convenient to store than the unpacked apples.

4.3.8. Hypothesis 2.7

Hypothesis 2.7 states that "the perception of laser marked fruit will not be significantly different in terms of convenience in disposing than unpacked fruits for both conventional and organic fruit". Looking at the conventional and organic fruits, hypothesis 2.7a "the perception of laser marked fruit will not be significantly different in terms of convenience in disposing than unpacked fruits for conventional fruit" with $t_{(49)}$ -0.315, -value .75 and 2.7b "the perception of laser marked fruit will not be significantly different in terms of convenience in disposing than unpacked fruits for both organic fruit" with $t_{(98)}$ 1.040 and p-value .30, are proven.

The summary for hypothesis 2.4 to 2.7 can be observed in Table 6.

Table 6. Summary of hypothesis 2.4 to 2.7

Hypotheses	Expectation	Result (critical p-value = 0.001)	Evaluation	Tested by	See
2.4a: Conventional	$ConvPur_{Las} \approx ConvPur_{Unp}$	$t_{(49)} = -2.385$; $p = .02$	Supported	One sample t-test	
2.4b: Organic	$ConvPur_{Las} \approx ConvPur_{Unp}$	$t_{(72.9)} = -2.127$; $p = .04$	Supported	Independent t-test	
2.5a: Conventional	$ConvCon_{Las} \approx ConvCon_{Unp}$	$t_{(49)} = -4.339$; $p < .001$	Rejected	One sample t-test	Appendix 18 & Appendix 19
2.5b: Organic	$ConvCon_{Las} \approx ConvCon_{Unp}$	$t_{(73.1)} = -4.040$; $p < .001$	Rejected	Independent t-test	
2.6a: Conventional	$ConvSto_{Las} \approx ConvSto_{Unp}$	$t_{(49)} = -1.444$; $p = .16$	Supported	One sample t-test	
2.6b: Organic	$ConvSto_{Las} \approx ConvSto_{Unp}$	$t_{(98)} = -0.228$; $p = .82$	Supported	Independent t-test	
2.7a: Conventional	$ConvDis_{Las} \approx ConvDis_{Unp}$	$t_{(49)} = -0.315$; $p = .75$	Supported	One sample t-test	
2.7b: Organic	$ConvDis_{Las} \approx ConvDis_{Unp}$	$t_{(98)} = 1.040$; $p = .30$	Supported	Independent t-test	

4.3.9. Hypothesis 2.8

Plastic packaging was expected to give more convenience compared to other packaging types as hypothesis 2.8 states (plastic packaging will lead to more positive perception in convenience in purchasing than no packaging and laser marked fruit for conventional (H2.8a) and organic (H2.8b) fruit). For the conventional fruits, it is not supported. Comparing plastic and unpacked, the statistic test gave the result of $t_{(49)}$ -1.411 with p-value .92. Comparing plastic and laser marked, it is obtained $t_{(98)}$ 0.404 with p-value .34. The same result is seen for the organic fruit ($F_{(2,147)}$ 1.683 with p-value .81). Thus, hypothesis 2.8a "plastic packaging will lead to more positive perception in convenience in purchasing than no packaging and laser marked fruit for conventional fruit" and hypothesis 2.8b "plastic packaging will lead to more positive perception in convenience in purchasing than no packaging and laser marked fruit for organic fruit" then are not supported. However, that is not the case in this research.

4.3.10. Hypothesis 2.9

Plastic packaging was also expected to give more convenience in consuming compared to other packaging types as hypothesis 2.9 states (plastic packaging will lead to more positive perception in convenience in consuming than no packaging and laser marked fruit for conventional (H2.9a) and organic fruit (H2.9b)). For the conventional fruit, hypothesis 2.9a is not supported. Plastic packed apples has given a lower score compared to the unpacked apples ($t_{(49)}$ -3.456, p-value > .999). Moreover, plastic packaging is not perceived differently with laser marking technology ($t_{(98)}$ 0.923 with p-value .18). For the organic fruit, the plastic packed apple fell into the middle category. Thus, hypothesis 2.9b is also not supported. To conclude, hypothesis 2.9 is not supported.

4.3.11. Hypothesis 2.10

Hypothesis 2.10 stated that "plastic packaging will lead to more positive perception in convenience in storing than no packaging and laser marked fruit for conventional (H2.10a) and organic (H2.10b) fruit". The 2 sub-hypotheses are not supported as for the conventional fruit, comparing plastic and unpacked, $t_{(49)}$ -0.170 with p-value 0.57 is obtained, and comparing plastic and laser, $t_{(98)}$ 0.787 with p-value 0.22 is acquired. The statistic test for organic fruit gave the result of $F_{(2,147)}$ 1.281 with p-value 0.72. Therefore, hypothesis 2.10 is not supported.

4.3.12. Hypothesis 2.11

Hypothesis 2.11 stated that "plastic packaging will lead to more positive perception in convenience in disposing than no packaging and laser marked fruit for conventional (H2.11a) and organic (H2.11b) fruit". Despite giving a convenience, the plastic packaging has given inconvenience in disposing the waste. Both the hypothesis 2.10a (plastic vs unpacked: $t_{(49)}$ -6.244 with p-value > .999, plastic vs laser $t_{(81.3)}$ -5.143 with p-value > .999) and 2.10b ($F_{(2,147)}$ 11.941 with p-value > .999) are not supported.

The summary of hypothesis 2.8 to 2.11 can be seen in Table 7.

Table 7. Summary of hypothesis 2.8 to 2.11

Hypothesis	Expectation	Result (critical p-value = 0.001)	Post hoc	Evaluation	Tested by	See
2.8a: Conventional	$ConvPur_{Pla} > ConvPur_{Unp}$	$t_{(49)} = -1.411$; p = .92	NA	Rejected	One sample t-test	Appendix 20 & Appendix 21
	$ConvPur_{Pla} > ConvPur_{Las}$	$t_{(98)} = 0.404$; p = .34	NA	Rejected	Independent t-test	
2.8b: Organic	$ConvPur_{Pla} > ConvPur_{Unp}$ $ConvPur_{Pla} > ConvPur_{Las}$	$F_{(2,147)} = 1.683$; p = .81	NA NA	Rejected Rejected	F-test	
2.9a: Conventional	$ConvCon_{Pla} > ConvCon_{Unp}$	$t_{(49)} = -3.456$; p > .999	NA	Rejected	Independent t-test	
	$ConvCon_{Pla} > ConvCon_{Las}$	$t_{(98)} = 0.923$; p = .18	NA	Rejected	Independent t-test	
2.9a: Organic	$ConvCon_{Pla} > ConvCon_{Unp}$ $ConvCon_{Pla} > ConvCon_{Las}$	$F_{(2,147)} = 7.246$; p = .999	= =	Rejected Rejected	F-test	
2.10a: Conventional	$ConvSto_{Pla} > ConvSto_{Uno}$	$t_{(49)} = -0.170$; p = .57	NA	Rejected	One sample t-test	
	$ConvSto_{Pla} > ConvSto_{Las}$	$t_{(98)} = 0.787$; p = .22	NA	Rejected	Independent t-test	
2.10b: Organic	$ConvSto_{Pla} > ConvSto_{Las}$ $ConvSto_{Pla} > ConvSto_{Las}$	$F_{(2,147)} = 1.281$; p = .72	NA NA	Rejected Rejected	F-test	
2.11a: Conventional	$ConvDis_{Pla} > ConvDis_{Las}$	$t_{(49)} = 6.244$; p > .999	NA	Rejected	One sample t-test	
	$ConvDis_{Pla} > ConvDis_{Las}$	$t_{(81.3)} = -5.143$; p > .999	NA	Rejected	Independent t-test	
2.11b: Organic	$ConvDis_{Pla} > ConvDis_{Las}$ $ConvDis_{Pla} > ConvDis_{Unp}$	$F_{(2,147)} = 11.941$; p > .999	≠ ≠	Rejected Rejected	F-test	

4.3.13. Hypothesis 2.12

Hypothesis 2.12 stated that "the perception of **laser marked fruit** will not be significantly different in terms of **price** than **unpacked** and **plastic** packed fruits for both **conventional** (H2.12a) and **organic**

type (H2.12b)". Hypothesis 2.12a is partially supported as the perceived price of laser marked apples were significantly higher than the unpacked apples ($t_{(49)}$ = -3.740; p <.001). But the plastic packed apples were perceived as expensive as the laser marked apples ($t_{(98)}$ = 0.207; p = .84). For the organic fruits, hypothesis 2.12b is also partially supported. Laser marked apples were significantly perceived to be more expensive than unpacked apples, but the plastic packed apples fell into the middle category, which means that It could be perceived as the same expensive with laser marked apples and also with unpacked apples. Therefore, hypothesis 2.12 is not supported.

4.3.14. Hypothesis 2.13

Hypothesis 2.13 states that "in terms of sustainability, the usage of packaging technology will decrease the perception for organic fruit (H2.13a), but for conventional fruit, although the plastic packing apple will have a lower attitude than the unpacked apples (H2.13b) the laser marked fruit will not have significantly different score as the unpacked fruit (H2.13c)". The first sub-hypothesis, hypothesis 2.13a does not seem to be true. According to the post hoc analysis, plastic packed apple fell into the least sustainable group while the unpacked and the laser marked apples were categorised into the same group. Thus, the first sub-hypothesis is not supported. Its conventional counterparts, hypothesis 2.13b is supported. The plastic packaging has had significant lower sustainability perception scores toward the conventional unpacked apples ($t_{(49)}$ -8.122 p-value < .001), and hypothesis 2.13c is also supported but the laser marked is perceived to be insignificantly different to the unpacked apples ($t_{(49)}$ -2.477, p-value .99. Thus, hypothesis 2.13 is not supported.

The summary of hypothesis 2.12 and 2.13 can be seen in Table 8.

Table 8. Summary of hypothesis 2.12 and 2.13

Hypotheses	Expectation	p-value (critical p-value = 0.001)	Post hoc	Evaluation	Tested by	See
2.12a: Conventional	$Pri_{Las} \approx Pri_{Unp}$	$t_{(49)} = 4.094$; p < .001	NA	Rejected	One sample t-test	Appendix 22 & Appendix 23
	$Pri_{Las} \approx Pri_{Pla}$	$t_{(98)} = 0.207$; p = .84	NA	Supported	Independent t-test	
2.12b: Organic	$Pri_{Las} \approx Pri_{Unp}$	$F_{(2,147)}$= 5.990; p = .003	≠	Supported	F-test	
	$Pri_{Las} \approx Pri_{Pla}$		=	Supported		
2.13a: Organic	$Sus_{Pla} < Sus_{Unp}$	$F_{(2,147)}$= 16.313; p < .001	≠	Supported	F-test	Appendix 24 & Appendix 23
	$Sus_{Las} < Sus_{Unp}$	$F_{(2,147)}$= 16.313; p > .999	=	Rejected		
2.13b: Conventional	$Sus_{Pla} < Sus_{Unp}$	$t_{(49)} = -8.122$; p < .001	NA	Supported	One sample t-test	
2.13c: Conventional	$Sus_{Las} \approx Sus_{Unp}$	$t_{(49)} = -2.477$; p = .99	NA	Supported	One sample t-test	

4.4. Importance

4.4.1. Hypothesis 3

Hypothesis 3 said that the attitude towards the combination of product and packaging types is a function of the ten perceptual beliefs. Based on the stepwise regression analysis, totally there are only 5 significant value for conventional fruit buyers. They have different concerns in each combination they were evaluating. For organic fruit buyers, totally there are 8 significant values. Therefore, hypothesis 3 is not supported. The summary of the stepwise regression can be seen in Table 9.

Table 9. Regression of attitude towards 10 perceptual beliefs

Rank	Conventional fruit buyers					See
	Conventional fruits		Organic fruits			
	Plastic	Laser marked	Unpacked	Plastic	Laser marked	
1	Convenience in purchasing	Health	No significant variables.	Sustainability	Taste	Appendix 25
2	Naturalness	Sustainability		Taste	Naturalness	
3				Convenience in purchasing		
	Organic fruit buyers					
Rank	Conventional fruits		Organic fruits			
	Plastic	Laser marked	Unpacked	Plastic	Laser marked	
1	Convenience in purchasing	Taste	Naturalness	Convenience in consuming	Health	Appendix 26
2	Sustainability	Sustainability		Convenience in disposing	Sustainability	
3	Convenience in disposing	Familiarity				

4.4.2. Hypothesis 4

Hypothesis 4 states that "the extent to which perception contributes to attitude depends on the importance which differs between buyers' type". When seen from the importance measurement, the most important factors for all respondents are health and taste, while the least important ones are the four kinds of convenience and familiarity. The conventional and organic fruit buyers' results showed the similar patterns. There are some differences indeed, that the conventional fruit buyers consider sustainability and naturalness as the least important factors, while the organic fruit buyers consider those as the most important factors. The results from determinance measurement showed a quite same motive. Nevertheless, the conclusion of hypothesis 4 would be observed from its 4 sub-hypotheses (which also have each own sub-hypotheses).

Table 10. Importance and determinance results

Rank	Determinance		Importance	
Factors	Conventional-fruit buyers (n=125)	Organic-fruit buyers (n=125)	Conventional-fruit buyers (n=125)	Organic-fruit buyers (n=125)
Health	2	1	1,2	1
Conv. in purchasing	5	4	3,4	3
Conv. in consuming	3	3	4	2,3
Conv. in storing	4,5	3,4	4	3
Conv. in disposing	5	4	4	3
Taste	1	1	4	1
Naturalness	3	2	3,4	1
Price	2	2	2,3	2
Familiarity	3,4	3,4	4	3
Sustainability	4,5	2	4	1

To test the hypothesis 4.1 which states that "the conventional fruit consumers will prioritise sustainability over naturalness, but the organic fruit consumers will not prioritise those" and 4.2 which states that "the organic fruit consumers will prioritise sustainability over convenience, but the conventional fruit consumers will not", the post hoc data from the determinance analysis is used and the importance analysis is used as a supporting consideration.

4.4.3. Hypothesis 4.1

Hypothesis 4.1a stated that "the conventional fruit consumers will prioritise sustainability over naturalness". Surprisingly, they tend to prioritise naturalness (μ= 1.4) over sustainability (μ= 0.472). Thus, hypothesis 4.1a is not supported. The importance analysis also shows the same result. On the other hand, the organic fruit buyers valued those factors equally. Therefore, hypothesis 4.1b which stated that "the organic fruit consumers will not prioritise sustainability over naturalness" is also not supported. This result is supported by the importance measurement which shows that sustainability (μ= 5.912) and naturalness (μ= 5.87) fell into the same post-hoc group. Concluding these 2 sub-hypotheses, hypothesis 4.1 is not supported.

4.4.4. Hypothesis 4.2

Hypothesis 4.2 stated that 'the organic fruit consumers will prioritise sustainability over 4 kinds of conveniences (H4.2a), but the conventional fruit consumers will not (H4.2b)" The first sub-hypothesis is supported as the organic fruit buyers prioritised sustainability over all kinds of convenience. The conclusion is also supported by the importance measurement. On the other hand, the second sub-hypothesis is only partially supported. Convenience in consuming is more important than sustainability and the other 3 conveniences. To conclude, hypothesis 4.2 is also not supported as the sub-hypothesis 4.2b is only partially proven. It is also good to notice that when using the importance measurement as a second consideration, conventional fruit buyers did not prioritise any kind of convenience over sustainability. Thus, hypothesis 4.2 is only partially supported.

4.4.5. Hypothesis 4.3

Hypothesis 4.3 states that "the usage of technology will give an increase in attitude of conventional fruit buyers to both conventional (H4.3a) and organic fruit (4.3b)". Hypothesis 4.3a is not supported because the usages of plastic packaging is not significantly different than the unpacked apples ($t_{(24)}$ -2.745, p-value .994) and laser marking technology have given lower scores compared to the unpacked conventional apples ($t_{(24)}$ -6.259, p-value > .999). Hypothesis 4.3b is also not supported as the organic plastic packed and laser marked apples do not have significant different scores compared to unpacked organic ($F_{(2)}$ 3.938, p-value .98). To conclude, hypothesis 4.3 is not supported.

4.4.6. Hypothesis 4.4

Hypothesis 4.4 states that "the usage of technology will give a decrease in attitude of organic fruit buyers to both conventional (H4.4a) and organic fruit (H4.4b), but the difference for laser marked and plastic packaging will not be significant for conventional (H4.4c) and organic fruits (H4.4d)". The sub-hypothesis 4.4a which states that "the usage of technology will give a decrease in attitude of organic fruit buyers to conventional fruit" is supported. They gave significant lower scores for conventional plastic packed ($t_{(24)}$ 4.599, p-value < .001) and laser marked apples ($t_{(24)}$ 3.926, p-value .001) compared to conventional unpacked apples. The second sub-hypothesis 4.4b which states that "the usage of technology will give a decrease in attitude of organic fruit buyers to organic fruit" is rejected. The p-value (.01) is not significant enough. Hypothesis 4.4c is supported as the p-value is insignificant (.38). Hypothesis 4.4d which states that "the attitude difference of laser marked and plastic packaging will not be significant" is also supported because the p-value (.01) is above the significance critical value. To conclude, hypothesis 4.4 is not supported.

Table 11. Summary of hypothesis 4.3 and 4.4

Hypothesis	Expectation	Results (critical p-value = 0.001)	Post hoc	Evaluation	Tested by	See
4.3a: conventional	$Att_{Pla} > Att_{Unp}$	$t_{(24)} = -2.745$; $p = .99$	NA	Rejected	1 sample t-test	Appendix 30
	$Att_{Las} > Att_{Unp}$	$t_{(24)} = -6.259$; $p < .999$	NA	Rejected	1 sample t-test	
4.3b: organic	$Att_{Pla} > Att_{Unp}$	$F_{(2,147)} = 3.938$; $p = .98$	=	Rejected	F-test	
	$Att_{Las} > Att_{Unp}$		≠	Rejected		
4.4a: conventional	$Att_{Pla} < Att_{Unp}$	$t_{(24)} = -4.599$; $p < .001$	NA	Supported	1 sample t-test	Appendix 31
	$Att_{Las} < Att_{Unp}$	$t_{(24)} = -3.926$; $p = .001$	NA	Supported	1 sample t-test	
4.4b: organic	$Att_{Pla} < Att_{Unp}$	$F_{(2,72)} = 5.119$; $p = .01$	≠	Rejected	F-test	
	$Att_{Las} < Att_{Unp}$		=	Rejected		
4.4c: conventional	$Att_{Las} \approx Att_{Pla}$	$t_{(48)} = -0.885$; $p = .38$	NA	Supported	Independent t-test	
4.4d: organic	$Att_{Las} \approx Att_{Pla}$	$F_{(2,72)} = 5.119$; $p = .01$	=	Supported	F-test	

5. Discussion

5.1. Theoretical contribution

The attitude towards the combinations of the product and packaging types in this study is mostly related to the utilitarian and value-expressive functions. Organic fruit buyers prefer organic fruits because that they want to be healthy (Williams and Hammitt, 2000). They also feel self-righteous because they feel that they have contributed something good to the environment due to the sustainability attribute of the organic fruits (Pino et al., 2012). On the other hand, it is also related to value-expressive function because the organic fruit buyers want to express their belief that they are people who cares about the environment (Williams and Hammitt, 2000). The usage of plastic is already seen as unsustainable behaviour by the organic buyers, but whether laser marking technology is seen as such unsustainable will be discussed in this part.

Hypothesis 1.1 stating that "the usage of packaging types (laser and plastic) will increase the attitude for conventional fruit (H1.1a), but it will decrease the attitude for organic fruits (H1.1b)" is not supported, because hypothesis 1.1a is rejected even though hypothesis 1.1b is proven. That means that neither for conventional nor organic fruits that the usage of packaging will increase the attitude. The result was aligned with van Herpen et al., (2016) have found. This can be caused by the trends which was stated in the theoretical background that consumers like to touch the product, to check the quality of the product more easily, and to pick whatever pieces of fruits that they want to buy. Nevertheless, the importance data might give some insights about this as this will be discussed in hypothesis 4.3.

Hypothesis 1.2 stating that "the change of product type from conventional to organic will decrease the attitude of plastic and laser marked fruit but will increase the attitude of unpacked fruit" is also not supported. The unsupported sub-hypothesis 1.2a which states that "the change of product type from conventional to organic will decrease the attitude of plastic and laser marked fruit" and sub-hypothesis 1.2b which states that "the change of product type from conventional to organic will increase the attitude of unpacked fruit" can be explained by the argument in the previous hypothesis. van Herpen et al. (2016) found that the value of organic fruit could not improve consumers' preference from conventional fruit. Whether it is unpacked fruit or packed fruit, the deciding factor of attitude improvement is not the product type, but the packaging type.

Hypothesis 2 stated that "packaging and product combinations generate different perceptions". To test that, several sub-hypotheses were tested.

Hypothesis 2.1 stating that "the perception of laser marked fruit will be lower in terms of taste, health, naturalness, and familiarity compared to other combinations for both organic and conventional" is supported. Despite that it was already written in the questionnaire that the laser marking technology was completely safe, the respondents did not seem to be convinced about it. The lack of knowledge about this technology might be the reason behind this result. Moreau et al. (2001) stated that consumers' knowledge about the new innovations influences their perceptions on them. In their research, consumers were unlikely to accept the technology of electric car because they lacked knowledge about how electricity can run a car despite gasoline. The reason can also explain the acceptance of hypothesis 2.2 and 2.3. Hypothesis 2.2 stated that "the perception of laser marked fruit will be different in terms of taste, health, naturalness compared to plastic packed conventional (H2.2a), but they will not be different for the organic fruits (H2.2b)". The acceptance of hypothesis 2.2b also means that the organic laser marked apples were perceived to have the same scores with the plastic packed apples. This cannot be explained with the novelty of laser marking technology. Plastic is considered unnatural (Labbe et al., 2013). That is why for organic fruits, which naturalness is one of its characteristics, adding plastic packaging also decrease the naturalness score significantly. Ferqvist et al. (2015) also stated that some consumers perceived plastic as unhealthy because it might do some harms to the food it covers. Hypothesis 2.3 which stated that "the perception of laser marked fruit will be lower in terms familiarity compared to other combinations for both conventional and organic fruit" most likely also be caused by the newness of the laser marking technology. Despite the technology has been approved by EU since 2013 (eCFR, 2017), apparently the consumer is not familiar with it yet. It is simply because that the products are not marketed yet in the market.

Hypothesis 2.4 stating that "the perception of laser marked fruit will not be significantly different in terms of convenience in purchasing than unpacked fruits for both conventional (H2.4a) and organic (H2.4b) fruit" is supported. It is logical because laser marked apples do not have packaging, just as unpacked apples.

Hypothesis 2.5 which stated that "the perception of laser marked fruit will not be significantly different in terms of convenience in consuming than unpacked fruits for both conventional (H2.5a) and organic (H2.5b) fruit" is not supported. It might be caused by the consumers who do not feel that it is safe to consume the laser marked apples. They do not know that the mark comes from laser and it uses no additional components. The lack of knowledge could be the reason of this.

Hypothesis 2.6 and 2.7 which stated that "the perception of laser marked fruit will not be significantly different in terms of convenience in storing than unpacked fruits for both conventional (H2.6a) and organic fruit (H2.6b)" and "the perception of laser marked fruit will not be significantly different in terms of convenience in disposing than unpacked fruits for both conventional (H2.7a) and organic (H2.7b) fruit" are supported. It is logical because laser marked apples do not have any packaging, just like the unpacked fruits. Thus, storing and disposing them are not going to be different.

Hypothesis 2.8, 2.9, 2.10, and 2.11 stating that "plastic packaging will lead to more positive perception in convenience in purchasing (H2.8), consuming (H2.9), storing (H2.10), and disposing (H2.11) than no packaging and laser marked fruit for conventional (H2.[8-11]a) and organic (H2.[8-11]b) fruit" are all rejected, and this is antagonistic to the theory which stated that plastic is usually used for fruit as it increases the convenience, especially in purchasing and in storing (Fellows, 2017). This might be caused by the convenience that they could get from paper bag. Although it was not written in the questionnaire instruction about that, some of the participants might have experience to be offered paper bag by supermarket to pack the fruits. It is also possible that the participants could bring their own bag to carry the fruits. Thus, they did not perceive any differences between unpacked and plastic packed apples.

The hypothesis 2.12 stating that "the perception of laser marked fruit will not be significantly different in terms of price than unpacked and plastic packed fruits for both organic and conventional fruit" is not supported. Laser marked apples were perceived to be the most expensive compared to unpacked apples, for conventional types. The technology might be perceived to add the production cost, which resulted in the increase of the retail price. A more thorough measurement is needed, for example measuring willingness to pay (WTP) is more common method of measuring how much the laser marked apples must cost (Wertenbroch and Skiera, 2002).

Hypothesis 2.13 which states that "in terms of sustainability, the usage of packaging technology will decrease the perception for organic fruit (H2.13a), but for conventional fruit, although the plastic packing apple will have lower attitude than the unpacked apples (H2.13b) the laser marked fruit will not have significantly different score as the unpacked fruit (H2.13c)" is rejected. The respondents considered that organic laser marked apples are as sustainable as the organic unpacked one for both conventional and organic apples. The respondents seemed to have understood that the laser technology does not give any plastic waste. Plastic waste is correlated negatively to sustainability (van Herpen et al., 2016).

Hypothesis 3 said that "the attitude towards the combination of product and packaging types is a function of the ten perceptual beliefs". It is not supported as the conventional fruit buyers only showed significant interest in health, convenience in purchasing, taste, naturalness, and sustainability. Moreover, those perceptual beliefs were triggered by different combinations. For organic fruit buyers, totally there are 8 significant factors, which are health, convenience in purchasing, convenience in consuming, convenience in disposing, taste, naturalness, familiarity and sustainability. Price is not there because the products are the same. It is apple. When the products are different, for example apple vs banana, then price might come as a significant contributor. Convenience in storing is not significant probably because the pictures in the questionnaire only contained 4 apples, when it shows more than that, the response might be different. The result also shows that conventional fruit buyers do not have as many criteria as the organic fruit buyers when choosing for fruits.

Hypothesis 4.1 stating that "the conventional fruit consumers will prioritise sustainability over naturalness (H4.1a), but the organic fruit consumers will not prioritise those (H4.1b)" is not supported. The reason is because hypothesis 4.1a and 4.1b are rejected. It is interesting to see that conventional fruit buyers prioritised naturalness over sustainability, but they do not become organic fruit buyers. Janssen et al. (2009) stated that conventional buyers did not turn into organic buyers because of price difference. Seeing the determinance and importance data (Table 10), it is true. Price is the second most important determining factor (μ= 2.912). The other explanation why conventional fruit buyers would not turn into organic fruit buyer is just because that the conventional fruit buyers did not have the trust in organic certification. According to Kamau et al. (2018), there are natural products which is not certified as organic products because the certification itself is unaffordable for the farmers or because the product is just organic by default, such as wild fruit and farms which have less access to technology. Thus, they believed that not all conventional fruits are not natural. On the other hand, organic fruit buyers had equal concern for naturalness and sustainability and that might be caused by the lack of knowledge that they have. They might perceive naturalness and sustainability are always related, while in fact, they not always are. For example, Janssen et al. (2009) has researched that there is an alternative sustainable product which is not organic. Several big companies such as Grodan and Monsanto claimed that their products are sustainable (Monsanto, 2018; Grodan, 2017) while they are far from organic.

Hypothesis 4.2 which states that "the organic fruit consumers will prioritise sustainability over convenience (H4.2a), but the conventional fruit consumers will not (H4.2b)" is partially supported. The

acceptance of hypothesis 4.2a is in line with the theory (Seo et al., 2016) that organic buyers aim for good sustainability impact from the products. This is also almost true for conventional fruit buyers, if it is not because of that they prioritise convenience in consuming over sustainability. Conventional buyers prioritise taste over all the other things (Table 10). It might be true that they related the taste with convenience in consuming.

Hypothesis 4.3 which states that "the usage of technology will give an increase in attitude of conventional fruit buyers to both conventional (H4.3a) and organic fruit (4.3b)" is not supported. Conventional fruit buyers, apparently, did not give higher scores to plastic packed and gave even lower scores to laser marked apples compared to the unpacked ones. The relation between determinance and perception data explained why they did not gave higher scores to plastic packed apples. For the most important factors for them in determining fruits (taste and health), they scored conventional plastic packed apples to be not different with the unpacked ones (taste: $t_{(24)}$ -1.477, p-value 0.08; health: $t_{(24)}$ 0.811, p-value 0.43), and also for the organic fruits (taste: μ= -1.04, $F_{(2,72)}$ 7.372, p-value .001; health μ= 0.08, $F_{(2,72)}$ 5.279, p-value .01). They gave lower scores to laser marked apples by showing that naturalness and familiarity are quite important matters in choosing fruit for them and they also perceived that conventional (naturalness: $t_{(24)}$ -7.034, p-value < .001; familiarity $t_{(24)}$ -12.339, p-value 0.000) and organic laser marked apples (naturalness: μ=-1.88, $F_{(2,72)}$ 15.183, p-value < .001; familiarity μ= -3.12, $F_{(2,72)}$ 24.938, p-value <.001) to have significant lower scores compared to the unpacked apples.

Hypothesis 4.4 stated that "the usage of technology will give a decrease in attitude of organic fruit buyers to both conventional (H4.4a) and organic fruit (H4.4b), but the difference for laser marked and plastic packaging will not be significant for conventional (H4.4c) and organic fruits (H4.4d)". Hypothesis 4.4a is supported. Organic fruit buyers consider highly naturalness and sustainability and they gave low scores in perception of the 2 factors for plastic packed apples (vs. unpacked: naturalness: $t_{(24)}$ -4.226, p-value < .001; sustainability: $t_{(24)}$ -5.892, p-value < .001) and of 1 factor to the laser marked apples (naturalness: $t_{(24)}$ -5.699, p-value < .001). Hypothesis 4.4b is rejected. There is no logical explanation for this other than the critical p-value which is too low (.001) because the p-value of the result is .008. If the normal p-value is used, then the hypothesis would be accepted. Hypothesis 4.4c is supported. Health and taste perception scores show insignificant differences for conventional plastic and laser packed apples. Organic fruit buyers prioritised health and taste as the most important determinants in choosing fruits and their perception scores towards the plastic packed and laser marked conventional apples are not significantly different (health: $t_{(41.4)}$ -1.808, p-value .08; taste: $t_{(48)}$ -1.945, p-value .06). Hypothesis 4.4d is also supported. The perception for health and taste also showed insignificance (health: $F_{(2,72)}$ 3.272, p-value .04; taste: $F_{(2,72)}$ 3.845, p-value .03). To conclude, hypothesis 4.4 is only partially supported.

Hypothesis 4 which stated that "the extent to which perception contributes to attitude depends on the importance of the 10 perceptual beliefs which differs between buyers' type" is only partially accepted because not all the sub-hypotheses are supported.

5.2. Managerial implications

Laser marking technology might be a good alternative for plastic packaging. Even though, consumers still prefer unpacked fruits rather than it. They have shown a more positive attitude towards the technology rather than the plastic packaging. Despite the current idea that the laser technology is implemented in organic fruits, it is also advisable to implement it to the conventional fruits and to keep the organic fruits unpacked. Since the attitude is categorised into the utilitarian and value expressive functions, the way to solve this should be related to the attitude theories by Katz (1960). The

companies could plant a cue in the consumer minds that by choosing the plastic packaging, they contribute badly to the environment. Then, the laser marking technology could serve as one of the alternatives. On the other hand, based on the value expressive function, the industries could make a cue that the laser marking technology is sustainable. Thus, everyone who has a high interest in sustainable will choose the laser marked fruit or will talk about it because it cues to sustainability.

From the perception data, it is visible that the consumers perceived the laser marked apples lower than the unpacked apples in the 2 most important factors in choosing fruits, which are health and taste. It is contradictory to the facts that the technology does not affect those. Therefore, it is advisable to increase consumers' knowledge about the technology. Several ways could be done to do it, such as making a big promotion, igniting word of mouth, etc. It is also seen that plastic packaging did not increase any convenience as hypothesised. Therefore, it is recommended to end the usage of plastic packaging. Regarding the price, the consumers might perceive that the laser marking technology would add extra costs to the fruit, as it was perceived so with the conventional apples. Thus, the retail industries could anticipate that by making sure that the technology does not add any extra cost to the consumers. It can, for some periods, display both the unpacked and laser marked fruit and put on the same price for both. Then, the unpacked fruit is removed from the supermarket.

5.3. Limitations and suggestions for future research

The first limitation is that most of the respondents were students (69%). Thus, the result might just be valid for students. The second one is that the object of the study was picture. The real products might give different results in the research as it was argued by Bushong et al. (2010). Furthermore, the object of the study could be extended to the other kinds of fruits. The study design excluded conventional unpacked apple from most of the analysis because of its function as the control. The future research could include this combination as one of the factors which are compared among each other factors. For example, by finding each 25 conventional and organic fruit buyers who just score for this combination. The study design also included a lot of factors to be analysed within the same dataset, thus the Bonferroni correction made the critical p-value very low. It is good to limit the analysis on 1 dataset, so the critical p-value would not be very low. It is also visible that organic fruit buyers dislike plastic so much and conventional fruit buyers dislike the laser marked a lot. It will be interesting to do a future research about this as the industrial application might use the result and they can market their products to the right consumers with the right method.

Appendix

Appendix 1. Aimed participants

Combination	Organic fruit buyers	Conventional fruit buyers
Combination 1 & 2	25	25
Combination 1 & 3	25	25
Combination 1 & 4	25	25
Combination 1 & 5	25	25
Combination 1 & 6	25	25

Appendix 2. Perception measurement

How do you perceive the combination of packaging and product type above?

Category		No	Question
Health		1	The apple when combined with this packaging type is healthy.
Convenience	in purchasing	6	The apple when combined with this packaging type is convenient to purchase.
	in consuming	3	The apple when combined with this packaging type is convenient to consume.
	in storing	8	The apple when combined with this packaging type is convenient to store.
	in disposing	7	The apple when combined with this packaging type is convenient to dispose.
Taste		9	The apple when combined with this packaging type seems delicious.
Naturalness		10	The apple when combined with this packaging type looks natural.
Price		4	The apple when combined with this packaging type seems expensive.
Familiarity		5	I recognize both of the product and packaging.
Sustainability		2	I consider that the combination of this product and packaging is sustainable.

Appendix 3. Importance measurement

In choosing the fruit, to what extent do you think that this statement is important for you?
*: the chosen ones if the Cronbach α < 0.50

Category		No	Question	Reference
Health		4	Contains a lot of vitamins and minerals	Lockie et al. (2004)
		3	Keeps you healthy *	
		18	Is nutritious	
Convenience	in purchasing	12	Is easy to handle when buying it	NA
	in consuming	5	Is easy to handle when transporting it	NA
	in storing	1	Is easy to handle when storing it in the refrigerator or other storage places	NA
	in disposing	21	Is easy to handle when disposing it	NA
Taste		19	Smells nice	Steptoe et al. (1995)
		14	Looks nice	
		8	Has a pleasant texture	
		20	Tastes good *	
Naturalness		10	Contains natural ingredients	Lockie et al. (2004)
		13	Contains no artificial ingredients	
		17	is prepared in a way that preserves its natural goodness *	
		9	is as unprocessed as possible	
Price		7	Is not expensive *	Steptoe et al. (1995)
		2	Is good value for money	
Familiarity		16	Is familiar *	Steptoe et al. (1995)
		6	Is what you usually eat	
Sustainability		11	Is packaged in an environmentally friendly way	Sautron et al. (2015)
		15	Does not impact the environments negatively *	

Appendix 4. Determinance measurement

No	Per number, select 1 most important factor in choosing a fruit!			
1	Price	Health	Naturalness	Convenience in consuming
2	Familiarity	Taste	Health	Convenience in disposing
3	Convenience in disposing	Sustainability	Convenience in storing	Price
4	Convenience in storing	Naturalness	Convenience in purchasing	Familiarity
5	Convenience in consuming	Taste	Sustainability	Convenience in purchasing
6	Convenience in purchasing	Convenience in disposing	Price	Health
7	Convenience in disposing	Convenience in consuming	Familiarity	Convenience in storing
8	Sustainability	Convenience in purchasing	Health	Convenience in storing
9	Naturalness	Convenience in disposing	Convenience in consuming	Convenience in purchasing
10	Health	Convenience in storing	Taste	Convenience in consuming
11	Naturalness	Health	Sustainability	Familiarity
12	Convenience in disposing	Naturalness	Taste	Sustainability
13	Price	Taste	Convenience in storing	Naturalness
14	Convenience in purchasing	Familiarity	Taste	Price
15	Convenience in consuming	Sustainability	Familiarity	Price

Appendix 5. Attitude measurement

How agree are you to this statement?

Factor	No	Questions	Reference
Attitude	1	The combination of the packaging and product types is generally good.	Dumortier et al. (2017)
	3	I have no problem to eat the product.	
	2	I feel satisfied about the combination of this packaging and product type.	

Appendix 6. Buyers' type measurement

How often do you purchase organic fruits?

Buying frequency				
Never	Rarely	Once or more in 1 month	More than once in 2 weeks	Almost daily

Appendix 7. Picture of the study object

Conventional apple without packaging (Combination 1)

Organic apple without packaging (Combination 4)

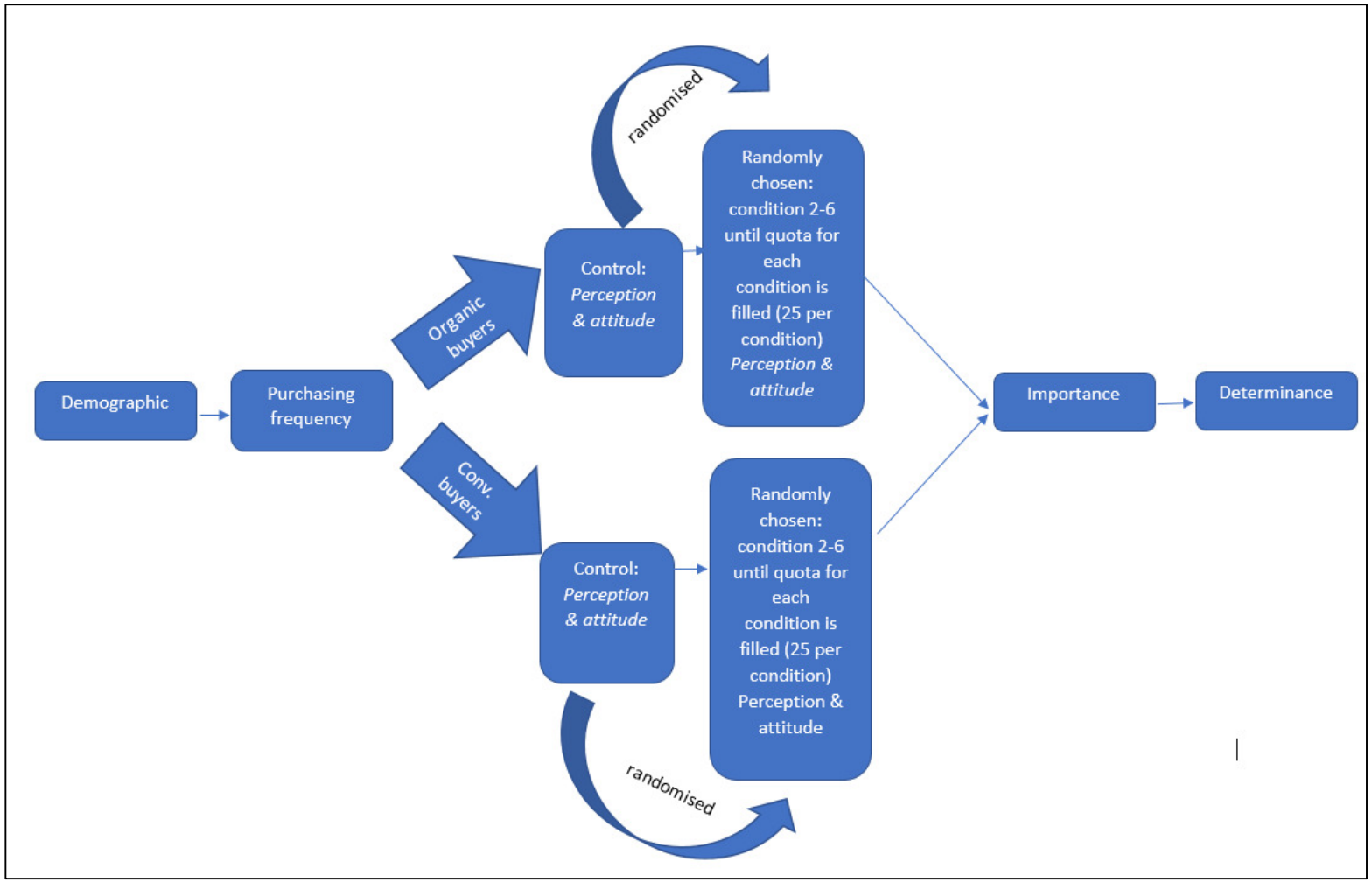
Conventional apple in plastic (Combination 2)

Organic apple in plastic (Combination 5)

Conventional laser marked apple (Combination 3)

Organic laser marked apple (Combination 6)

Appendix 8. Questionnaire plot



Appendix 9. Program plan and timeline

No	Activity	Timeline
1	First draft research proposal	Week 44
2	Final research proposal	Week 45
3	Data gathering	Week 46-50
4	Midterm review	Week 48
5	Data analysing	Week 50-52
6	Report writing	Week 1-4
7	Final assessment	Week 5
8	Submission of thesis	Week 6
9	Evaluation	Week 7

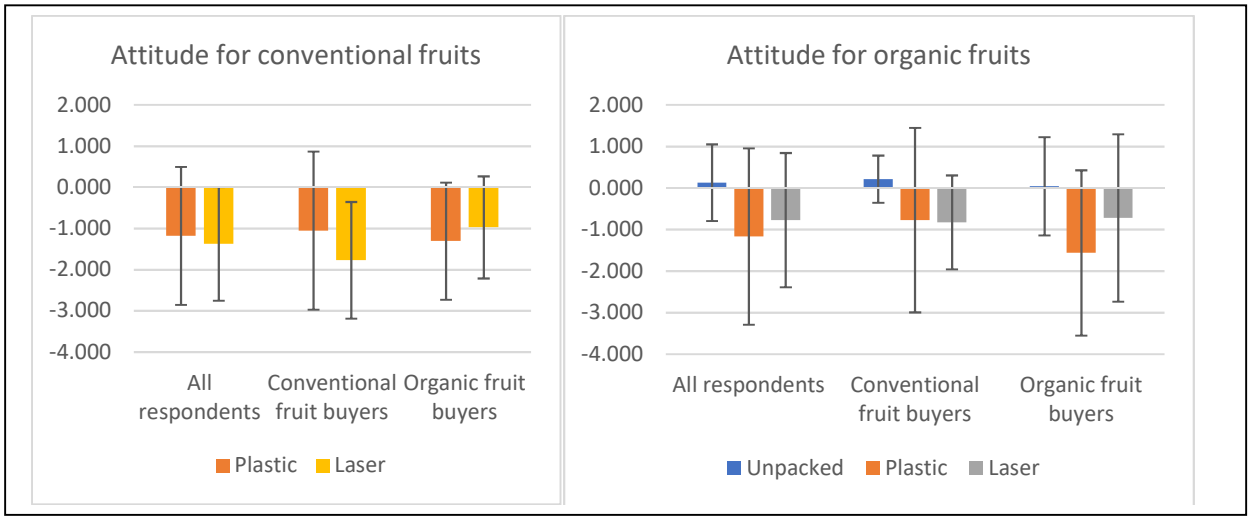
Appendix 10. Attitude scores comparison among combinations of conventional fruits

Buyers' types	Value	Conventional					
		Plastic (n=50)	$t_{(49)}$	p-value	Laser (n=50)	$t_{(49)}$	p-value
All respondents	mean std. dev.	-1.180 1.676	-4.979	> .999	-1.373 1.378	-7.048	> .999

Appendix 11. Attitude scores comparison among combinations of organic fruits

Buyers' types	Value	Organic			$F_{(2,147)}$	p-value
		Unpacked (n=50)	Plastic (n=50)	Laser (n=50)		
All respondents	mean std. dev.	0.127^{b} 0.923	-1.167^{a} 2.124	-0.774^{a} 1.617	8.279	< .001

Appendix 12. Attitude values for hypothesis 1.1



Appendix 13. Hypothesis 1.2

Buyers' types	Value	Unpacked			Plastic				Laser marked			
		Organic (n=50)	$t_{(49)}$	p. value	Conventional (n=50)	Organic (n=50)	$t_{(98)}$	p. value	Conventional (n=50)	Organic (n=50)	$t_{(49)}$	p. value
All respondents	mean	0.127	0.970	0.17	-1.180	-1.167	0.035	0.49	-1.373	-0.774	1.995	0.02
	std. dev.	0.923			1.676	2.124			1.377	1.617		

Appendix 14. Two-way ANOVA analysis of 4 combinations

Source	$F_{(3)}$	p-value
Corrected model (n=200)	1.069	0.36
Product type	1.585	0.21
Packaging type	0.170	0.68
Product type * packaging type	1.452	0.23

Mean

	Packaging type	
Product type	Plastic	Laser marked
Conventional	-1.180	-1.373
Organic	-1.167	-0.774

Appendix 15. Hypothesis 2.1a-2.3a

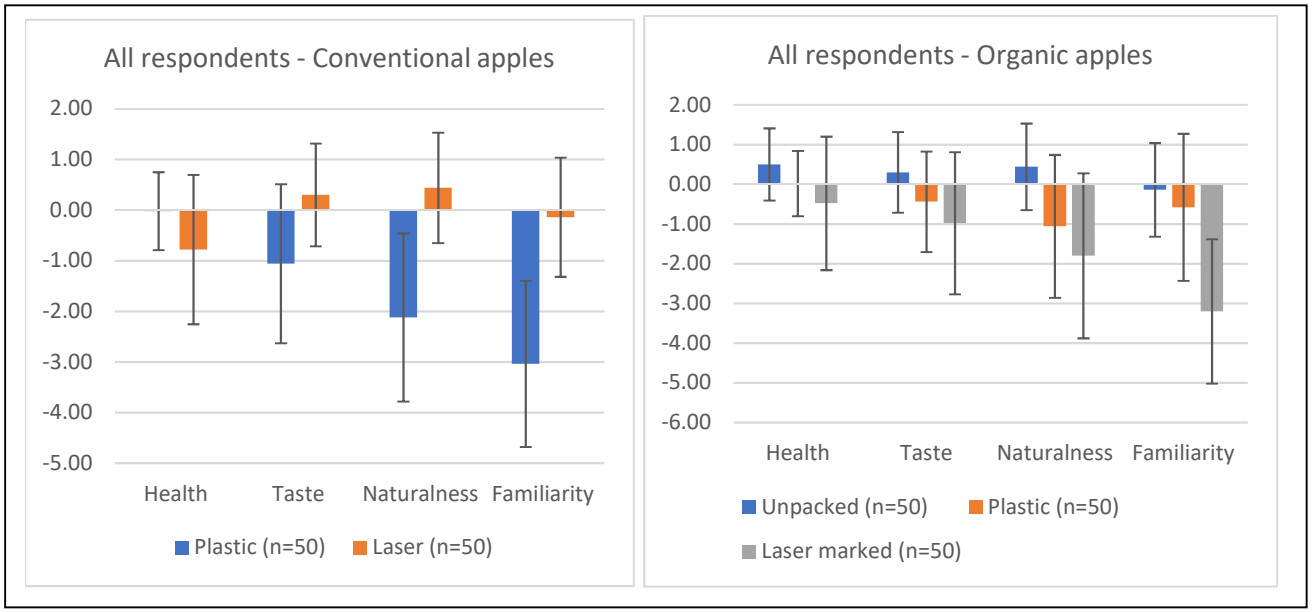
Buyers' types	Factors	Value	Conventional							
			Plastic (n=50)	Laser (n=50)	Laser vs Unpacked (H2.1a)		Laser vs Plastic (H2.2a)		Plastic vs Unpacked	
					$t_{(49)}$	p-value	$t_{(98)}$	p-value	$t_{(49)}$	p-value
All respondents	Health	mean	-0.02	-0.78	-3.740	< .001	-3.231*	.002	-3.740	< .001
		std. dev.	0.77	1.48						
	Taste	mean	-0.44	-1.06	-4.773	< .001	-2.186**	.03	-4.773	< .001
		std. dev.	1.25	1.57						
	Naturalness	mean	-1.14	-2.12	-9.022	< .001	-2.978	.004	-13.101	< .001
		std. dev.	1.63	1.66						
	Familiarity	mean	-0.54	-3.04	-13.101	< .001	-8.532	< .001	-3.740	< .001
		std. dev.	1.27	1.64						
			Plastic (n=25)	Laser (n=25)	Laser vs Unpacked		Laser vs Plastic		Plastic vs Unpacked	
					$t_{(24)}$	p-value	$t_{(48)}$	p-value	$t_{(24)}$	p-value
Conventional fruit buyers	Health	mean	0.08	-0.80	-2.667	.01	-2.787***	.01	0.811	.43
		std. dev.	0.49	1.50						
	Taste	mean	-0.40	-0.92	-2.697	.01	-1.194	.24	-1.477	.15
		std. dev.	1.35	1.71						
	Naturalness	mean	-1.00	-2.28	-7.034	< .001	-2.678	.01	-2.847	.01
		std. dev.	1.76	1.62						
	Familiarity	mean	-0.48	-3.32	-12.339	< .001	-7.605	< .001	-1.853	.08
		std. dev.	1.30	1.35						
Organic fruit buyers	Health	mean	-0.12	-0.76	-2.568	.02	-1.808****	.08	-0.618	.54
		std. dev.	0.97	1.48						
	Taste	mean	-0.48	-1.20	-4.157	< .001	-1.945	.06	-2.071	.05
		std. dev.	1.16	1.44						
	Naturalness	mean	-1.28	-1.96	-5.699	< .001	-1.484	.14	-4.226	< .001
		std. dev.	1.51	1.72						
	Familiarity	mean	-0.60	-2.76	-7.352	< .001	-4.779*****	< .001	-2.384	.03
		std. dev.	1.26	1.88						

* df = 73.8
** df = 93.2
*** df = 29.1
**** df = 41.4
***** df = 41.9

Appendix 16. Hypothesis 2.1b-2.3b

Buyers' types	Factors	Value	Organic			$F_{(2,147)}$	p-value
			Unpacked (n=50)	Plastic (n=50)	Laser (n=50)		
All respondents	Health	mean	0.50[b]	0.02[a,b]	-0.48[a]	8.327	< .001
		std. dev.	0.91	0.82	1.68		
	Taste	mean	0.30[b]	-0.44[a]	-0.98[a]	10.620	< .001
		std. dev.	1.02	1.26	1.79		
	Naturalness	mean	0.44[b]	-1.06[a]	-1.80[a]	22.309	< .001
		std. dev.	1.09	1.80	2.08		
	Familiarity	mean	-0.14[b]	-0.58[b]	-3.20[a]	50.518	< .001
		std. dev.	1.18	1.85	1.82		
			Organic				
			Unpacked (n=25)	Plastic (n=25)	Laser (n=25)	$F_{(2,72)}$	p-value
Conventional fruit buyers	Health	mean	0.48[b]	0.08[a,b]	-0.64[a]	5.279	.01
		std. dev.	0.96	0.70	1.78		
	Taste	mean	0.28[b]	-0.40[a,b]	-1.12[a]	7.372	.001
		std. dev.	0.98	1.19	1.62		
	Naturalness	mean	0.52[b]	-1.04[a]	-1.88[a]	15.183	< .001
		std. dev.	1.09	1.77	1.74		
	Familiarity	mean	0.16[b]	-0.44[b]	-3.12[a]	24.938	< .001
		std. dev.	1.34	2.12	1.69		
Organic fruit buyers	Health	mean	0.52[b]	-0.04[a,b]	-0.32[a]	3.272	.04
		std. dev.	0.87	0.94	1.60		
	Taste	mean	0.32[b]	-0.48[a,b]	-0.84[a]	3.845	.03
		std. dev.	1.07	1.36	1.97		
	Naturalness	mean	0.36[b]	-1.08[a]	-1.72[a]	8.086	.001
		std. dev.	1.11	1.87	2.41		
	Familiarity	mean	-0.44[b]	-0.72[b]	-3.28[a]	25.600	< .001
		std. dev.	0.92	1.57	1.97		

Appendix 17. Health, taste, naturalness, and familiarity perceptions comparison (conventional and organic fruits)



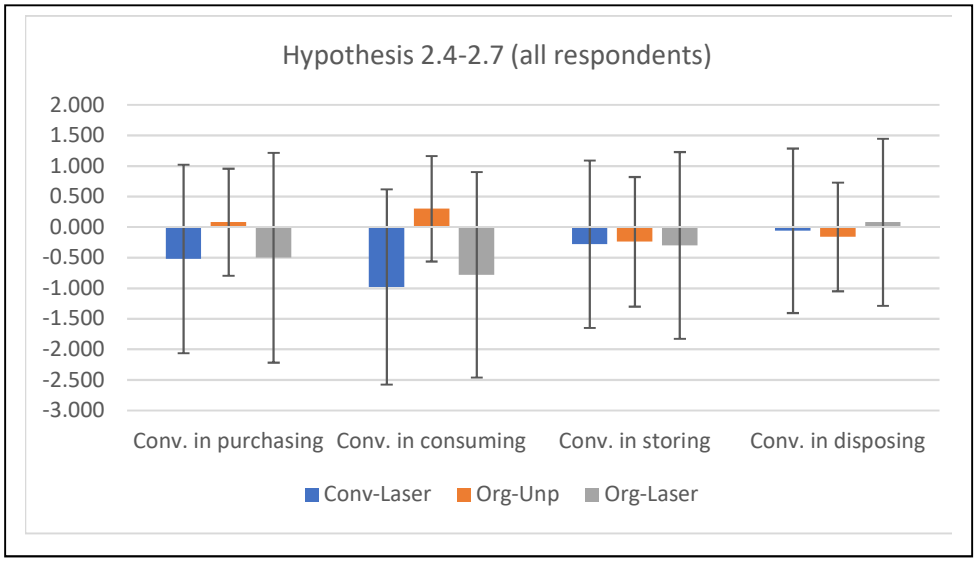
Appendix 18. Hypothesis 2.4-2.7

Buyers' types	Factors		Value	Conventional			Organic			
				Laser (n=50)	Laser vs Unpacked		Unpacked (n=50)	Laser (n=50)		
					$t_{(49)}$	p-value			$t_{(98)}$	p-value
All respondents	Convenience	in purchasing (H2.4)	mean	-0.52	-2.385	.02	0.08	-0.50	-2.127*	.04
			std. dev.	1.54			0.88	1.72		
		in consuming (H2.5)	mean	-0.98	-4.339	< .001	0.30	-0.78	-4.040**	< .001
			std. dev.	1.60			0.86	1.68		
		in storing (H2.6)	mean	-0.28	-1.444	.16	-0.24	-0.30	-0.228	.82
			std. dev.	1.37			1.06	1.53		
		in disposing (H2.7)	mean	-0.06	-0.315	.75	-0.16	0.08	1.040	.30
			std. dev.	1.35			0.89	1.37		

* df = 72.9

** df = 73.1

Appendix 19. Hypothesis 2.4 to 2.7

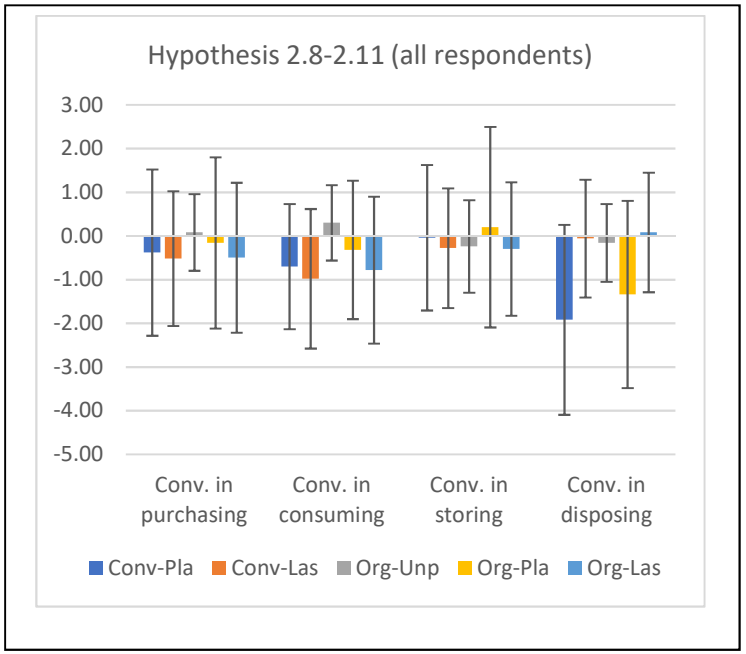


Appendix 20. Hypothesis 2.8-2.11

Buyers' types	Factors	Value	Conventional (H2.[8-11]a)						Organic (H2.[8-11]b)			$F_{(2,147)}$	p-value
			Plastic (n=50)	Laser (n=50)	Plastic vs Unpacked		Plastic vs Laser		Unpacked (n=50)	Plastic (n=50)	Laser (n=50)		
					$t_{(49)}$	p-value	$t_{(98)}$	p-value					
All respondents	Conv. in purchasing (H2.8)	mean	-0.38	-0.52	-1.411	.92	0.404	.34	0.08	-0.16	-0.50	1.683	.81
		std. dev.	1.91	1.54					0.88	1.96	1.72		
	Conv. in consuming (H2.9)	mean	-0.70	-0.98	-3.456	> .999	0.923	.18	0.30^{b}	$-0.32^{a,b}$	-0.78^{a}	7.246	.999
		std. dev.	1.43	1.60					0.86	1.58	1.68		
	Conv. in storing (H2.10)	mean	-0.04	-0.28	-0.170	.57	0.787	.22	-0.24	0.20	-0.30	1.281	.72
		std. dev.	1.67	1.37					1.06	2.30	1.53		
	Conv. in disposing (H2.11)	mean	-1.92	-0.06	-6.244	> .999	-5.143*	> .999	-0.16^{b}	-1.34^{a}	0.08^{b}	11.941	> .999
		std. dev.	2.17	1.35					0.89	2.14	1.37		

* df = 81.3

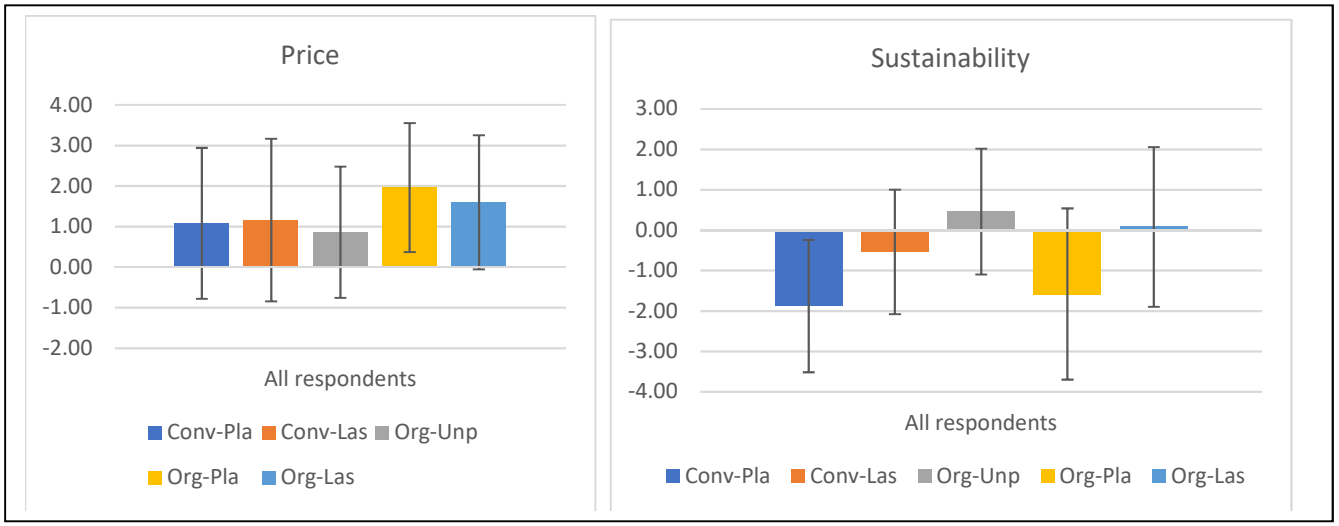
Appendix 21. Hypothesis 2.8-2.11



Appendix 22. Hypothesis 2.12

Factors	Buyers' types	Value	Conventional					Organic			$F_{(2,147)}$	p-value
			Plastic (n=50)	Laser (n=50)	Laser vs Unpacked $t_{(49)}$	Laser vs Unpacked p-value	Laser vs Plastic $t_{(98)}$	Laser vs Plastic p-value	Unpacked (n=50)	Plastic (n=50)	Laser (n=50)		
Price	All respondents	mean	1.08	1.16	4.094	< .001	0.207	.84	0.86[a]	1.96[a,b]	1.60[b]	5.990	.003
		std. dev.	1.86	2.00					1.62	1.59	1.65		

Appendix 23. Price and sustainability perceptions comparison



Appendix 24. Hypothesis 2.13

Factors	Buyers' types	Value	Conventional						Organic			$F_{(2,147)}$	p-value
			Plastic (n=50)	Laser (n=50)	Plastic vs Unpacked $t_{(49)}$	Plastic vs Unpacked p-value	Plastic vs Laser $t_{(98)}$	Plastic vs Laser p-value	Laser vs Unpacked $t_{(49)}$	Laser vs Unpacked p-value	Unpacked (n=50)	Plastic (n=50)	Laser (n=50)		
Sustainability	All respondents	mean	-1.88	-0.54	-8.122	< .001	-4.214	< .001	-2.477	.992	0.46[b]	-1.58[a]	0.08[b]	16.313	< .001 / > .999
		std. dev.	1.64	1.54							1.56	2.12	1.98		
			Plastic (n=25)	Laser (n=25)	$t_{(24)}$	p-value	$t_{(48)}$	p-value	$t_{(24)}$	p-value	Unpacked (n=25)	Plastic (n=25)	Laser (n=25)		
	Conventional fruit buyers	mean	-1.96	-0.76	-5.545	< .001	2.583	.01	-2.520	.02	0.68[b]	-1.72[a]	0.08[b]	11.493	< .001 / > .999
		std. dev.	1.77	1.51							1.35	2.19	1.89		
	Organic fruit buyers	mean	-1.80	-0.32	-5.892	< .001	3.374	.001	-1.017	.32	0.24[b]	-1.44[a]	0.08[b]	5.477	.01 / .99
		std. dev.	1.53	1.57							1.74	2.08	2.10		

Appendix 25. Stepwise regression with attitude as the dependent factor and 10 perceptions as the independent factors for conventional fruit buyers.

Factors	Conventional fruit buyers (n=125)									
	Conventional fruits									
	Plastic					Laser marked				
$F_{(2,2)}$ *respectively	12.808					7.089				
Model significance	.000					.004				
R^2	0.496					0.337				
Rank	Variables	Coefficient	t	p-value	VIF	Variables	Coefficient	t	p-value	VIF
	Constant	-0.542	-1.719	.100		Constant	-1.174	-4.190	.000	
1	Convenience in purchasing	0.592	3.978	.001	1.001	Health	0.392	2.458	.022	1.034
2	Naturalness	0.511	3.229	.004	1.001	Sustainability	0.375	2.361	.027	1.034

Factors	Organic fruits									
	Unpacked					Plastic				
$F_{(2,3,2)}$ *respectively						16.776				
Model significance						0.000				
R^2						0.664				
Rank	No significant variables.					Variables	Coefficient	t	p-value	VIF
						Constant	0.546	1.630	.118	
1						Sustainability	0.605	4.956	.000	1.031
2						Taste	0.475	2.101	.048	1.048
3						Convenience in purchasing	0.448	3.813	.001	1.016

Laser marked				
12.741				
0.000				
0.495				
Variables	Coefficient	t	p-value	VIF
Constant	0.023	0.094	.926	
Taste	0.336	3.001	.007	1.215
Naturalness	0.252	2.421	.024	1.215

Appendix 26. Stepwise regression with attitude as the dependent factor and 10 perceptions as the independent factors for organic fruit buyers.

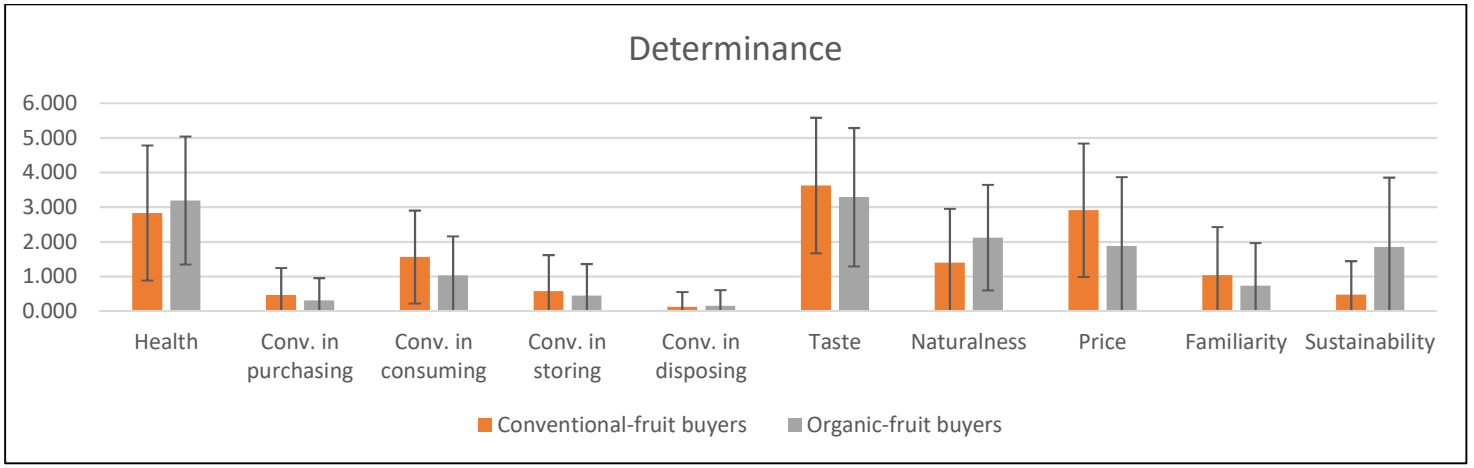
Factors	Organic fruit buyers (n=125)									
	Conventional fruits									
	Plastic					Laser marked				
$F_{(3,3)}$ *respectively	12.606					6.989				
Model significance	.000					.002				
R^2	0.492					0.428				
Rank	Variables	Coefficient	t	p-value	VIF	Variables	Coefficient	t	p-value	VIF
	Constant	0.065	0.190	.851		Constant	0.282	0.782	.443	
1	Convenience in purchasing	0.592	3.978	.001	1.001	Taste	0.391	2.784	.011	1.124
2	Sustainability	0.482	3.409	.003	1.093	Sustainability	0.336	2.695	.014	1.053
3	Convenience in disposing	0.257	2.531	.019	1.093	Familiarity	0.246	2.307	.031	1.091

	Organic fruits													
	Unpacked					Plastic					Laser marked			
$F_{(1,2,2)}$ *respectively	8.323					10.225					32.731			
Model significance	0.008					0.001					0.000			
R^2	0.234					0.435					0.726			
Rank	Variables	Coefficient	t	p-value	VIF	Variables	Coefficient	t	p-value	VIF	Variables	Coefficient	t	p-value	VIF
	Constant	-0.157	-0.721	.478		Constant	-0.838	-2.466	.022		Constant	-0.547	-2.521	.019	
1	Naturalness	0.548	2.885	.008	1.000	Convenience in consuming	0.463	2.105	.047	1.038	Health	0.665	4.569	.000	1.169
2						Convenience in disposing	0.448	3.522	.002	1.038	Sustainability	0.492	4.440	.000	1.169

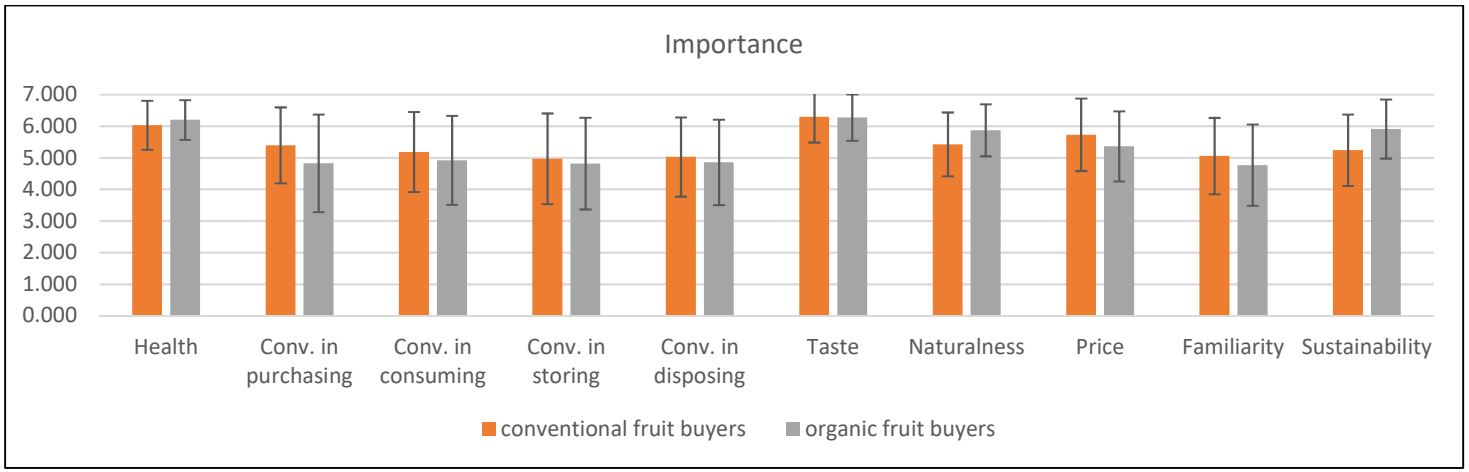
Appendix 27. Determinance and importance analysis with standard deviation

Factors		Value	Determinance		Importance	
			Conventional-fruit buyers (n=125)	Organic-fruit buyers (n=125)	Conventional-fruit buyers (n=125)	Organic-fruit buyers (n=125)
Health		mean	2.832[d]	3.192[d]	5.392[a,b]	6.198[c]
		std dev	1.950	1.848	1.204	0.63
Convenience	in purchasing	mean	0.464[a]	0.304[a]	5.184[a]	4.824[a]
		std dev	0.778	0.650	1.266	1.545
	in consuming	mean	1.560[c]	1.032[b]	4.968[a]	4.920[a,b]
		std dev	1.340	1.128	1.436	1.406
	in storing	mean	0.576[a,b]	0.448[a,b]	5.024[a]	4.816[a]
		std dev	1.042	0.911	1.254	1.45
	in disposing	mean	0.120[a]	0.152[a]	5.392[a,b]	4.856[a]
		std dev	0.433	0.459	1.204	1.354
Taste		mean	3.624[e]	3.288[d]	5.184[a]	6.272[c]
		std dev	1.954	1.995	1.266	0.734
Naturalness		mean	1.400[c]	2.120[c]	4.968[a]	5.870[c]
		std dev	1.555	1.522	1.436	0.823
Price		mean	2.912[d]	1.880[c]	5.024[a]	5.360[b]
		std dev	1.926	1.986	1.254	1.11
Familiarity		mean	1.040[b,c]	0.736[a,b]	5.392[a,b]	4.768[a]
		std dev	1.388	1.226	1.204	1.29
Sustainability		mean	0.472[a,b]	1.848[c]	5.184[a]	5.912[c]
		std dev	0.972	2.004	1.266	0.936
$F_{(9)}$			91.660	75.214	19.371	35.271
p-value			.000	.000	.000	.000

Appendix 28. Determinance analysis



Appendix 29. Importance measurement for all respondents



Appendix 30. Attitude comparison for conventional fruits buyers

Buyers' types	Value	Conventional fruit					
		Plastic (n=25)	$t_{(24)}$	p. value	Laser (n=25)	$t_{(24)}$	p. value
	mean	-1.053	-2.745	.994	-1.773	-6.259	> .999
	std. dev.	1.919			1.417		
Conventional fruit buyers		Organic fruit					
		Unpacked (n=25)	Plastic (n=25)	Laser (n=25)	$F_{(2,72)}$		p-value
	mean	0.213[b]	-0.773[a,b]	-0.827[a]	3.938		.98
	std. dev.	0.569	2.221	1.130			

Appendix 31. Attitude comparison for organic fruits buyers

Buyers' types	Value	Conventional fruits									
		Plastic vs Unpacked			Laser vs Unpacked			Plastic vs Laser			
		Plastic (n=25)	$t_{(24)}$	p. value	Laser (n=25)	$t_{(24)}$	p. value	Plastic (n=50)	Laser (n=50)	$t_{(48)}$	p. value
	mean	-1.307	-4.599	< .001	-0.973	-3.926	.001	-1.307	-0.973	-0.885	.38
	std. dev.	1.420			1.239			1.420	1.239		
Organic-fruit buyers		Organic									
		Unpacked (n=25)	Plastic (n=25)	Laser (n=25)	$F_{(2,72)}$		p-value				
	mean	0.041	-1.561	-0.721	5.119		.01				
	std. dev.	1.184[b]	1.989[a]	2.013[a,b]							

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