

4. DISCUSSION

4.1. Consumer Acceptance

Consumer satisfaction is one of the factors that is determining product success on the market. Consumer satisfaction can be influenced by consumer liking of product' sensory attributes (Hawkins and Mothersbaugh, 2009; Stolzenbach *et al.*, 2013; Henseleit *et al.*, 2009). A nine-point hedonic scale is the most common method that used to test the consumer acceptance of a product. Nine point hedonic scale has four positive categories, one neutral category, and four negative categories. The categories are labeled with numbers to indicate degree of liking. The advantage of nine point hedonic scale compared to other scaling methods is the limitation option (limited choice). The limited choice helps the panelists to rate the product. Nine point hedonic scale is suitable for the wide range of population with untrained panelists (Lim, 2011). The technique are easy, simple, and effective to be used as a measurement tool. In hedonic test, consumers will rate sensory attributes of samples. Sensory attribute that need to be considered in new product development can be determined by the test result.

4.1.1. Hedonic Score and Preference in Commercial Aloe Vera Drink Products

Table 2. shows that all the sensory attributes provide significant difference between both products. About 64 panelists preferred AV-2 product (Table 5). Panelists preferred AV-2 based on color, aroma, amount of aloe gel, flavor, and overall liking (Table 2). Overall liking of a product has close association with flavor acceptability compared with color acceptability (Acree and Kurtz, 2015). Overall liking and flavor on aloe vera drink are affected by sweetness level and viscosity. The highest sweetness level was found in AV-1 sample (11.70 brix). However, high sweetness level was not preferred by consumers. High viscosity level also was not preferred by panelists. The AV-1 sample is the highest in viscosity level.

About thirty four panelists preferred AV-1 sample. Panelists preferred AV-1 based on appearance. Even though color of both samples are transparent but AV-1 sample color more yellowish than AV-2 sample. It was supported by color measurement using a chromameter. Consumer acceptance on appearance attribute can be influenced by product color and clarity. The appearance of AV-2 was unacceptable because aloe vera gel color had different color with the liquid. Aloe gel color of AV-1 had same color with the liquid. The AV-2 product appears more turbid than AV-1 products. Therefore panelists preferred AV-1 based on appearance.

Based on consumer liking and consumer preference, it can be concluded that on the aloe vera products, the colorless and transparent liquid were preferred by panelists. Aloe vera gel color that match with the liquid color was preferred. Slightly viscous aloe vera drink was preferred. In addition, moderate level of sweetness was preferred.

Food color is consumer first impression of food itself. Consumer perception of food product attributes, such as flavor, tastes, and quality is affected from visual perception (DuBose *et al.*, 1980). According DuBose *et al.*, 1980, color is important because it affects consumers assessment on food product and determine the overall acceptability of a product. The color also provides sensory information that interact with gustatory, olfactory, and textural. In some studies, flavor detection in colored drink product is much better than the colorless drink product (DuBose *et al.*, 1980). The color of a product is often associated with the flavor of the product. A beverages product with orange color perceived to have apricot or orange flavor. Male and female consumers have different color assessment. Longer wavelengths of hue (warm colors) are more favorable in female perception. Young adult consumers have greater emphasis on product color compared with older consumer group. Product color is more important for female than male consumers (Westland and Shin, 2015). The product color need to be considered when the product market segment are young adults and females.

4.1.2. Hedonic Score and Preference in Commercial Ginger Drink Product

Ginger is the rhizome of the *Zingiber officinale* plant. The characteristics of ginger are warm, sweet, strong aroma, and pungent flavor. The main characteristic of ginger drink is pungency. Essential oils such as gingerols, and oleoresin are compounds in ginger which gives pungent taste (Sutarno *et al.*, 1999; Herold, 2007). Gingerol compound is not stable at high temperature, it will be dehydrated into shogaol compound. Shogaol compound also provide pungent characteristic. Level of pungency level on ginger product is caused by the concentration of essential oils in product. The high content of essential oils increases pungency level on ginger drink product.

Table 3 shows that appearance, color, taste, pungency, and overall liking provide significant difference between both samples. However, aroma and flavor did not provide a significant difference in both samples. GD-2 was preferred by 67 panelists (Table 5). GD-2 was preferred based on appearance, overall liking, color, aroma, pungency, taste, and flavor. Firmansyah (2003) in Herold (2007) states that ginger drink product that contain one hundred percent of ginger extract will have bright reddish color. Panelists preferred GD-2 color because the color measurement data shows that GD-2 has darker color and more reddish than GD-1 sample. GD-1 sample has bright yellowish color. Panelists preferred GD-2 color because it indicates the color of ginger extract. Panelists actually preferred the taste of GD-2 even though the GD-1 was the highest in sweetness level.

Low viscosity was found in GD-2 sample which is actually was preferred by consumers. Thirty one panelists preferred GD-1. It can be concluded that ginger drink with moderate level of sweetness and moderate level of viscosity were preferred. The product viscosity is affected by temperature, concentration and molecular weight of the liquid materials. High temperature will reduce the viscosity of a solution (Hadiwiyoto, 1996; Nugraheni 2008; Santoso *et al.*, 2013). Therefore, ginger drink products have the lowest viscosity level compared with other products types (Figure 10). In addition, sweetener addition in beverage products has an impact on viscosity and mouth feel. The sweetener addition also

gives mouth coating effect (Redondo *et al.*, 2001). However, high concentration of sweeteners was not preferred because it causes tongue heaviness.

4.1.3. Hedonic Score and Preference in Commercial Mixed Fruit and Vegetable Juice Products

Table 4 shows that appearance and aroma attributes provide a significant difference between the both samples (Table 4). Overall liking, color, taste, and flavor did not provide significant difference in both samples. The result was supported by consumer preference towards both samples (Table 5). MJ-1 samples was preferred by 47 peoples and MJ-2 was preferred by 50 peoples. MJ-1 was preferred based on sensory attributes: appearance, overall liking, color, and taste. Color, flavor, and taste of both products are slightly different. Color test result shows that both samples have almost similar color, i.e. orange color. However, MJ-1 sample color is more brightly than MJ-2 sample. On the sweetness level test, sweetness level of both products have slightly difference. MJ-1 sample is sweeter than MJ-2 sample (Figure 9). However, MJ-2 was preferred based on aroma and flavor. MJ-2 product has strong fruit aroma and flavor. It can be concluded that mixed fruit and vegetable juice with bright color and have strong fruit aroma and flavor were preferred by panelists.

4.2. Consumer Preference

A food product has chemical and physical aspects that influence consumer acceptance based on sensory aspect. But it does not guarantee the consumer will choose the product. Consumer preference is consumer choice on a product toward other products. Consumer preference of food products is a complex consumer behavior which is influenced by many factors. Social demographics such as gender, age, education level, occupation, and income are factors that influences consumer purchasing of a food product and affects individual response of product characteristics (Bisogni *et al.*, 2002; Tung *et al.*, 2015).

The strong relationship between social demographic factors with consumer preference on ginger drink products did not exist. The smallest p value was found

on gender (Table 7). Gender differences have an impact on food preference. Female consumers are very concern with their daily food intake. Females have more healthy consumption pattern than males. Females are more concerned with body weight and nutrients intake than male consumers. Female consumers would avoid fatty foods, consume a lot of fiber and fruits and reduce the consumption of salt in foodstuffs (Wardle *et al.*, 2004). While the male consumers consumes food as habitual activity. Male consumers are aware with healthy diet rules, but they are skeptical and antipathy because it is considered to unsatisfactory (Sobal, 2005). Male consumers are more concerned with taste and convenience in their preference (Steptoe *et al.*, 2002; Wardle and Griffith, 2001).

The strong relationship between social demographic factors with consumer preference on the aloe vera drink products, was exist (Table 6). Age is affecting factor of consumer preference on aloe vera products. Age influence consumer to choose aloe vera product or not at all. The age related with physical changes such as sensitivity to perceive taste or smell. The sensitivity ability to taste and smell will decrease in older people (Westenhoefer, 2005). Therefore, if the product market segment is elderly consumers, higher concentrations of flavor and aroma are required. Age also be a factor in the food choice decision. Older consumers will consumes healthy foods and reduce the consumption of fatty foods. In other hand, young consumers are more explorative to try food products even though it is unhealthy foods.

The strong relationship between social factors demographic choice with consumer preference on the product on mixed fruit and vegetable juice products, did not exist. (Table 8). The smallest p value was found on income factor. Income level be the one of main factors on product purchasing (Henseleit *et al.*, 2009). It is related to the ability to buy a product and food consumption budget. Consumer with low income level will reduce consuming various type of products. It is also makes consumer prefer the price before the quality.

In addition, the level of education also can affects the consumer preference. The

education level impact on consumer knowledge on nutrition and healthy lifestyle. The high education level related to high concern for health and the nutrients needed. For examples, consumer with high level of education will choose organic food products compared with non-organic food products (Batte *et al.*, 2007).

4.3. Association between Consumer Acceptance and Consumer Preference

Consumer acceptance of sensory attribute has an interaction with consumer preference. The sensory attribute that has strong association with the consumer preference is key sensory attribute for food product development. The association was determined by chi-square statistic analysis. The p value less than 0.05 indicates strong association between consumer liking of sensory attribute with the consumer preference to choose the product or not at all.

The strong association between sensory attributes and consumer preference on aloe vera, ginger drink, and mixed fruit and vegetable juice did not exist. The smallest p value was found in appearance sensory attribute (0.604) on aloe vera drink products. On ginger drink products, the smallest p value was found in appearance. On mixed fruit and vegetable juice products, the smallest p value was found in aroma. Appearance on aloe vera drink products and ginger drink products have weak association with consumer preference. Appearance becomes contributing factor in consumer preference. Appearance is the first perception or the first impression of consumer towards a food product. Appearance is closely related to the visual aspect. In commercial beverage products, appearance will be assessed first before taste aspect. If the appearance not acceptable, consumer will not consume the product. Appearance is also associated with quality changes in product. On fruit juice products, product discoloration indicates enzymatic browning reaction. The reaction is not preferred by consumers. Therefore, the company added a chemical compounds to prevent browning reaction on product.

On mixed fruit and vegetables juice product, appearance of products was favored by consumers. Therefore, consumer start to assess products based on aroma aspect. According to de Mann, 1989; Mayasari, 2010; Santoso *et al.*, 2013, The

product is accepted or rejected can be determined by the aroma. The aroma reflects the taste of beverage product before consumers consume it. The aroma comes from volatile compounds in food product. The high concentration of volatile compound will cause nausea, whereas low concentration of volatile compound is not preferred by consumers. Consumer liking on aroma attribute affect consumer choice to repurchases.

