CONSUMER PREFERENCE ON INTRINSIC QUALITY ATTRIBUTES OF DRIED MANGO AMONG CHINESE CONSUMERS

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Consumer preference on Intrinsic quality attributes of dried mango among Chinese consumers

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Wageningen, February 2017

Dangyiqi Wu
**Additional Search Terms**

Dried Mango, intrinsic attributes, cross national, China, Chinese, DM, flavour, colour, texture, sweet, sour, sweetener, extra ingredients, consumer preference, health consciousness, health sacrifice, health preoccupation

**Terminology List**

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<th>Term</th>
<th>Definition</th>
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<tr>
<td>DM</td>
<td>Dried Mango</td>
</tr>
<tr>
<td>Attributes</td>
<td>A quality or feature regarded as a characteristic or inherent part of someone or something.</td>
</tr>
<tr>
<td>Perception</td>
<td>The way in which something is regarded, understood, or interpreted.</td>
</tr>
<tr>
<td>Preference</td>
<td>Favour shown to one person or thing over another or others.</td>
</tr>
<tr>
<td>Motives</td>
<td>Something that causes a person to act in a certain way, do a certain thing, etc.; incentive.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Anything that restrains or obstructs progress, access</td>
</tr>
</tbody>
</table>
Summary

World demand and production of processed fruit and vegetable has been increasing for this past decade (IBISworld, 2016). China, the country has the world largest population, as the matter of course, it is one of the major contributors for the fruit and vegetable market in Asia-pacific. Tropical fruits and processed tropical fruits were mainly imported to China. Association of South-East Asian Nations (ASEAN) pointed out that tropical fruits in any firm imported to China has increased dramatically in the past decades (Tan, Guan, & Chen, 2011). Mango accounts 39% of the world tropical fruit production (FAO, 2011), in which China is one of the main market (CHEN & CHEN, 2010). Therefore, mango is chosen to be the representative study objective in this research.

The food market was in a saturated situation for more than a decade already (Linnemann, 2006). If a new food product want to be outstanding in the supermarket, it has to be consumer-oriented designed to catch customers’ attention. The first stage of consumer-driven product development is to understanding the consumer needs and wishes (Van Kleef, 2006). Commonly qualitative and quantitative consumer study are carried out to get a clear view of consumer needs. Previously the focus group (qualitative) study had been done and in this study, a quantitative study will be carried out.

Based on the literature study and focus group results, the quantitative research is designed. A conjoint survey is needed with focus on intrinsic quality attributes of dried mango and sorting by conjoint analysis method. The aim of this study is to know “what is the consumer preference to intrinsic quality attributes of dried mango?”. In order to answer this key research question, three sub-question was developed:

- What is the profile of intrinsic quality attributes of dried mango?
- What is the preference of intrinsic quality attributes of dried mango?
- How does the profile and preference of intrinsic quality attributes between consumers with different health orientation?

An online survey with 6 intrinsic quality attributes was designed by Sawtooth Lighthouse studio (Sawtooth software inc.,2017) and distributed to mainland China (appendix 1). By more than hundred complete survey results, it was found out no extra ingredients is the most important factor compare to other five quality attributes to Chinese consumers. And
look at the overall importance, the consumers nowadays prefer the product natural and healthy.

As a combination results with qualitative study, an approximate dried mango product profile was decided, as a milestone for the consumer-driven product development of dried mango products.
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1. INTRODUCTION

An explanation of reason and necessity of this research project is stated in this chapter. Research objective and research questions are brought up to form a clear research path of this project. In order to have a clear overview of this study, the structural purpose will be stated at the end of this chapter.

1.1 RESEARCH BACKGROUND

The global fruit and vegetable processing industry has seen demand increased over the last five years, reported a growth of 2% on a year to year basis (IBISworld, 2016). It is predicted that the market will be worth $240 billion by 2019. China is one of the major contributors for the fruit and vegetable market in Asia-Pacific due to its vast population. Zhang and Yang (2006) indicated that fruit consumption in Chinese market has rapidly increased in past decades. Also, the total familiarity towards tropical fruits has increased incredibly due to the fast development in China’s economy. However, the enormous size of the country results in different familiarities and knowledge on dried tropical fruit. A given fact indicates that mango accounts for 39% of the world tropical fruit production with an output of 31.7million tons (FAO, 2011) and China is one of those main markets of mango consumption (Chen & Chen, 2010). Therefore, mango is selected to be the representative one for a tropical fruit consumer study. Dried tropical fruits were the study objective mentioned in previous focus group study, as a conclusion, Dried Mango is narrowed down to be the representative study objective in this study.

Previously, a qualitative result was done by using focus group discussion. As for a new product development, both qualitative and quantitative research is needed for a better understanding of the consumers’ perception towards the product. A quantitative research provides a better understanding of consumer wishes and brings them into actual product development (Van Kleef, Van Trijp, & Luning, Consumer research in the early stages of new product development: a critical review of methods and techniques., 2005). It is essentially important to know the quality attributes that consumers use to judge and interpret the product’s quality, which is directly related to the consumers’ preference. As mentioned in a
previous study, intrinsic quality attributes are worth to be considered for conducting this quantitative study.

This study is also a part of a parallel cross-national study among three countries. Those are Indonesia as the tropical country, China as the sub-tropical country and the Netherlands as the non-tropical country. The cross-national study was conducted due to the reason that consumers from different nationalities have different demands that varies upon demographic and cultural background impacts (Kenneth, 2006). By carrying out this study, it can give a comprehensive view of consumers’ preferences towards dried mango.

1.2 RESEARCH OBJECTIVES

The ultimate research objective of this study is to identify the key intrinsic quality attributes that influence Chinese consumers’ preference towards dried mango and by knowing the intrinsic quality attributes to develop a consumer driven dried mango product. Therefore, in order to achieve the main objective, the progressed objectives are listed as below:

1.2.1 Determine the intrinsic quality attributes and their levels that needed for create the fundamental base of the conjoint survey
1.2.2 Determine the correct method needed to analyse the survey data

1.3 RESEARCH QUESTIONS

To reach the main research objective, it is necessary to answer the main research question:” What is the consumer preference to intrinsic quality attributes of dried mango?”. In order to answer this research question, the following sub research questions were brought up:

1.3.1 What is the profile of intrinsic quality attributes of dried mango?
1.3.2 What is the preference of intrinsic quality attributes of dried mango?
1.3.3 How does the profile and preference of intrinsic quality attributes between consumers with different health orientation?
1.4 RESEARCH METHOD

Several methods can be used to conduct consumer studies (Van Kleef, 2006). The most common quantitative methods are conjoint analysis and factor analysis. A comparison between these two methods has been carried out to select the most appropriate method for this project to apply.

*Table 1 Comparison of research methods*

<table>
<thead>
<tr>
<th></th>
<th>Conjoint Analysis</th>
<th>Factor Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can the method answer the research questions?</td>
<td>Can provide both indicative intensity &amp; preference (importance) level of measured variables (Lacobucci, 2013)</td>
<td>Can only screen preference (relative importance) variables; cannot provide intensity of the variables (Van Kleef, Van Trijp, &amp; Luning, Consumer research in the early stages of new product development: a critical review of methods and techniques., 2005)</td>
</tr>
<tr>
<td>Scope of the study: sensory and health related motives: only intrinsic quality attributes</td>
<td>Can provide information on the variables of interest</td>
<td>With the demarcation, it is not suitable to apply screening in this stage</td>
</tr>
<tr>
<td>Can the method provide degree of freedom in subsequent NPD stages of DM?</td>
<td>If the description of DM can be made rather general and should not restrict the imagination of respondent, it can provide profiles of variables of interest by certain classification, such as orientation, demographic data.</td>
<td>Can provide comparison (preference, importance, context, orientation etc.) among more than one DM product (e.g. three different types of DM)</td>
</tr>
<tr>
<td>Duration of fill in the survey (max. 15 mins)</td>
<td>The limitation of this method is repetitive; it generates longer thinking time. If selected attributes</td>
<td>Time constraint will less likely occur.</td>
</tr>
</tbody>
</table>
As a conclusion, for this confirmatory quantitative consumer study, Conjoint analysis method will be applied due to the match of requirements. As a conclusion from this comparison, the intrinsic quality attributes analysis of dried mango will be using the conjoint analysis.

1.5 STRUCTURE OF THE STUDY

Six phases were established in order to reach the objective for this study. Figure 1 (see next page) gives clear indication of the study steps. Before conducting the study, analysis of the FGD results are necessary to get a clear view of important factors that will possibly influence consumers’ preference. Then followed by the identification step, which generates all the information needed for designing the quantitative study. Then the survey for conjoint analysis is designed. After finish the survey is completed, the applying step takes place. After gathering all the data from quantitative study, analysing step of conjoint analysis is carried out for detailed examination of data. At the end, by analysing all data and results, research finding will be established.

1.6 STRUCTURE OF THE REPORT

After this introduction chapter, a literature review chapter will follow by providing much clear and deeper information of this project environment. Then Chapter 3 - material and method will describe in detail how the quantitative study was carried out. After all
information, result and discussion, conclusion of the study will be stated and at the end a recommendation for further study will be given.

**Figure 1 Research design**
2. LITERATURE REVIEW

In this chapter, literature underpinning will explain the current situation towards fruits and its dried as well as the consumer and consumer driven product development that varies due to the different demand.

2.1 TROPICAL FRUITS

There are two thousand species documented in the tropics as food and only 40% to 50% are well known internationally (Blancke, 2016). However, the species of tropical fruit that are in the market are very limited. Gepts indicates most common tropical fruits in trade come from three major areas, including Central and South America, Asia and South-east Asia (Gepts, 2008). The most popular tropical fruits worldwide are pineapple, mango, avocado and papaya (FAOSTAT, 2014), while the most popular imported tropical fruits in China is mango, longan, durian, coconut and banana (Zhang X. , 2004)

2.1.2 TROPICAL FRUIT IN ASIA

Tropical fruits can grow in Asia, more specifically in Association of South-east Asian Nations (ASEAN) countries due to the suitable tropical climate and fertile grounds. Major producers of tropical fruits in this region are Indonesia, Thailand and the Philippines (Ahmad & Chua, 2008). Till 2006, the production volume of tropical fruits has reached 28.7 million tons, an 45.5% increase over 10 years. This accounted for approximately ten percent of the world total production of tropical fruit (Ahmad & Chua, 2008). The primarily tropical fruits produced were mango, pineapple and banana and these three varieties of fruit represented a 22% share of the world’s total production (Ahmad & Chua, 2008). The countries mainly responsible for producing these three varieties are Thailand, the Philippines, and Indonesia.

The export of tropical fruit from ASEAN countries has significantly grown from 1996 to 2005 and in 2008 the market already worth value of 674.9 million dollars. In the following years, there has been a clear increase in export volumes of tropical fruit from ASEAN countries to China specifically (ITC, 2011). This is mainly due to China’s close proximity to the ASEAN region and its middle class growing appetite for tropical fruit (ITC, 2011).
2.1.3 TROPICAL FRUIT IN CHINA

World demand and production of processed fruit and vegetable has been increasing for these past decades (IBISworld, 2016). In those past decades, tropical fruits and processed tropical fruit products were mainly imported in China. The import of tropical fruits in any form from the Association of South-east Asian Nations (ASEAN) to China has increased dramatically in the past decades (Tan, Guan, & Chen, 2011). Chinese consumers consume dried fruits as daily snacks (Zhang & Yang, 2006), therefore a considerable market is provided.

China’s tropical fruit production in 2009 exceeded 20 million tons (ITC, 2011). Tropical fruit is generally grown in the southern provinces in China due to the climate; these include Fujian, Hainan and Guangdong (ITC, 2011). The land surface area for planting tropical fruits was approximately 2.5 million hectares which represents a quarter of China’s total land area used in fruit planting (ITC, 2011). It has been observed by agricultural specialists that China has a further 17.5 million hectares suitable for the planting of tropical fruits (ITC, 2011). Furthermore, it is estimated by the China Marketing Fruit Association that approximately 10% of China’s total fruit consumption is tropical fruit (ITC, 2011).

The import of tropical fruit to China has seen significant increases in terms volume over the last few year as seen in the table below, which summarizes the imports of major tropical fruit in China in the years 2004, 2006 and 2009. It can be observed that Banana, Longan, Durian and Dragon Fruit represented the 4-principal imported tropical fruit and with banana’s leading and accounting for 491.3 thousand metric tons.

<table>
<thead>
<tr>
<th>Year</th>
<th>Banana</th>
<th>Longan</th>
<th>Durian</th>
<th>Dragon Fruit</th>
<th>Coconut</th>
<th>Mangosteen</th>
<th>Lychee</th>
<th>Pineapple</th>
<th>Mango</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>380.9</td>
<td>109.4</td>
<td>85.5</td>
<td>9.9</td>
<td>83.6</td>
<td>30.8</td>
<td>5.5</td>
<td>0.1</td>
<td>12.7</td>
</tr>
<tr>
<td>2006</td>
<td>387.8</td>
<td>168.5</td>
<td>85.2</td>
<td>35.4</td>
<td>112.7</td>
<td>172</td>
<td>5.7</td>
<td>4.0</td>
<td>6.5</td>
</tr>
<tr>
<td>2009</td>
<td>491.3</td>
<td>256.0</td>
<td>196.1</td>
<td>195.4</td>
<td>129.9</td>
<td>91.7</td>
<td>37.1</td>
<td>12.1</td>
<td>33.1</td>
</tr>
</tbody>
</table>

All the values are in “thousand MT” Sources of data: China Customs Statistics Yearbook, 2005-2007; www.chinacustomsstat.com

As to where the imports originate from it can be observed from the table 3, which representing the imports of major tropical fruits and their country of origin in the year 2009. China for the vast majority of its tropical fruit imported it from ASEAN, with 6 varieties being exclusively imported to China from ASEAN.
China’s export volumes of tropical fruit from the year 2001 to 2009 volumes actually decreased significantly when looked at the four-major fresh tropical fruits banana, lychee, longan and pineapple (Tan, Guan, & Chen, 2011).

Due to China’s population, better standard of living and higher income consumers can now afford a wider range of imported fresh tropical fruit. It is expected according to industry specialists that consumption will grow the fastest in the coming years from the middle class (ITC, 2011).

### 2.2 DRIED FRUITS

There are varies challenges for export tropical fruit to sub-tropical or non-tropical countries. Perishability of the products, uncontrollable supplies and strict import regulations of each country affect the tropical fruits quality goes to those markets (Alphonce, Temu, Almli, & Griffith, 2015). Dried fruit reduces the difficulty of export. Processed tropical fruit has longer shelf life and less preservation conditions, in this case dried tropical fruits are exported to non-tropical countries.

#### 2.2.2 DRIED FRUIT IN ASIA

The consumption of dried fruit in Asia pacific has seen volume growth per capita between 2009 and 2014 (Kocheri, 2015). This is aligned with the trend of consumers nowadays looking for convenience, a healthier alternative for fresh fruits and an increase in income.
An industry expert predicts the Asia-Pacific region will grow the fastest in the years to come (GIA, 2016).

2.2.3 DRIED FRUIT IN CHINA

An analysis on the consumption of dried fruit in China has been difficult to research, due to a lack of available data. Looking at processed tropical fruits in general, there has been a significant increase in the import volumes for the observed period of 2004 to 2009 (Tan, Guan, & Chen, 2011). For example, dried longan has seen a significant increase, in 2004 the figure accounted for 55,461 thousand tons and in 2009 it had increased to 133,616 thousand tons (Tan, Guan, & Chen, 2011). This significant increase in import of this particular example of dried fruit possibly conveys China’s demand for similar products (such as dried mango) as the middle class has more disposable income.

2.3 CONSUMER-DRIVEN PRODUCT DEVELOPMENT

The food market was identified in a saturation state for a while (Linnemann, 2006). In order to stand out from all goods, the products need to be consumer-oriented to satisfy consumer wishes. A consumer-driven product development starts with understanding consumer needs to complete the first stages of opportunity identification of a product (Van Kleef, 2006).

![Figure 4 overview of stages of new product development process](VanKleef, Consumer research in the early stages of new product development, 2006)

A deep understanding helps raising the ratio of success (Van Kleef, 2006). As can be seen in figure 4, in able to launch a consumer driven product, it is started with understanding consumer needs, which including qualitative method and quantitative methods.
2.3.1 CHINESE CONSUMERS

Chinese consumers perceive fruit as snack, no matter fresh or dried (Zhang & Yang, 2006). Due to the mistrust in Chinese food industry, an exploratory study found out that Chinese consumers perceive imported goods of better quality, including higher fresh level, lower chemical residues etc. (Liu, Zhang, & Zhang, 2007). Since the Chinese economy condition has increased rapidly, the willingness to purchase imported goods is averagely increased.

China has an enormous land area, mostly the research done represents the result of Eastern China, which has more than half of the population and has a well-developed economy conditions. A well-constructed consumer study that represents China, needs to consider the regional factor and other influencing aspects (Atsmon & Magni, 2016).

2.3.2 THE TOTAL FOOD QUALITY MODEL

![Total food quality model](Grunert, 2005)

Total food quality model (figure 5) illustrated the formation process of consumer perception. Consumer perception covers both intrinsic and extrinsic quality cues. These cues from the perception of a products, which include motives and barriers. This result will influence the final decision of consumption. After consumption, if the experience fulfilled the expectation it will result in future purchases (Mai & Ness, 2006).
2.3.3 PREFERENCE

The term preference can be defined as a set of characteristics a consumer wants to see in a product in order to make it more desirable (Economic time, 2016). The set of characteristics could range from the usefulness of the good to the level of satisfaction and happiness it provides the buyer (Economic time, 2016). The consumer has an underlying preference, which in itself is affected by many factors such as popular trends, level of received education and personal taste for instance (USI, 2016). It has to be emphasized that preference is not affected by money, the income of the consumer or price of the product (USI, 2016). The capability of a consumer to buy a product does not affect the individual taste in terms of likes and dislikes (USI, 2016).

2.3.4 MOTIVES & BARRIERS

Motives and barriers are directly related to purchase, while the consumption experience decides the future purchases. Motives encourage consumption and barriers do the opposite. As stated in the previous study, motives and barriers are defined as a cognitive process of thinking and reasoning for consumption behaviour. A list of possible motives and barriers was documented in the previous qualitative study. Mostly the motives and barriers factors are related with health, sensory and some extrinsic elements (Bengs, 2012), such as healthiness and convenience, play an important role in driven fruit consumption (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012).

2.3.5 HEALTH ORIENTATION

Healthiness is a key motive that drives fruit consumption (Rozin, 2006). Sijtsema indicated that personal health orientations also influence the choice for dried fruit. The consumer groups with high level of health conscious might be prone to consumer dried fruit than the less health orientated consumers (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012). Therefore, in this consumer research, health orientation will be used as an important factor.
3. MATERIALS AND METHODS

3.1 QUANTITATIVE CONSUMER STUDY – CONJOINT ANALYSIS

A previous focus group provides the qualitative study, which is an exploration of consumers’ way of thinking (Sheldon, 2016), a quantitative research is needed to provide a statistical analysis of consumers’ preference to determine the desired quality of dried mango.

In this study, conjoint survey was carried out to identify the preference of key intrinsic quality attributes towards dried mango among Chinese consumers and their ‘optimum profile’.

3.2 CONJOINT ANALYSIS SECTION

Conjoint analysis is one of the most widely-used quantitative marketing research technique to determine what features that should have contain in the upcoming new products. It can measure the preference of products’ attributes and forecast the acceptance of the product in the market (Curry, 1996).

The conjoint survey was designed by Sawtooth Lighthouse Studio Version 9.2.0 (Sawtooth software inc., 2017) with using ACBC method. This survey including 5 essential sections. The complete survey can be find in appendix 1.

3.2.1 INTRODUCTION

At the beginning of the survey, a brief introduction was stated to give a clear overview to the respondents about the purpose of this survey. The structure of the survey and possible time needed to complete it was also mentioned.

In addition, in order to motivate the respondents to complete the survey with their valuable opinion, a reward page was designed. Respondents could choose to fill in their contact information (the contact information was their email address) in case they were selected for the voucher reward. The chance of winning a reward is approximately 10%.
3.2.2 DEMOGRAPHIC AND CONDITIONAL QUESTIONS

This section includes demographic and conditional questions. Some of the questions were conditional in order to filter out the disqualified respondents, who is not concerned as in the target group. There are totally 8 questions in this section and three questions (i, vi, vii) were to filter out the disqualified respondents. The questions in this section are listed below.

i. What is your nationality? **(Conditional question)**
   - Chinese
   - Others

The respondents selected others were disqualified, the survey will redirect to the terminated page.

ii. Which city do you live?
   - This is an open-ended question.

Due to the drastic number of cities in China, it is not possible to make a choice question therefore respondents have to fill in the location themselves. This question can provide an overview of respondents’ locations in China and when it is necessary, the cities are categorised by the city tiers (Official commercialized category of Chinese cities).

iii. What is your gender?
   - Male
   - Female

iv. How old are you?
   - Age 18 – 25
   - Age 26 – 40
   - Age 41 – 60
   - Above age 60

Generally different age groups have different eating behaviours. Age group division were suggested by Sijtsema etc. (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012).
The statistical analysis for this question determine whether there is difference in dried mango preference in age groups.

v. What is your education level?
   - Primary or lower
   - Middle school
   - High school
   - Bachelor
   - Master or higher

vi. Have you ever tried fresh mango? (Conditional question)
   - Yes
   - No
   - Allergy to mango

The respondents who have an allergy to mango were disqualified; the survey will redirect to the terminated page.

vii. Have you ever eaten Dried Mango? (Conditional question)
    - Yes
    - No
    - Allergy to mango

The respondents who have an allergy to mango were disqualified; the survey will redirect to the terminated page.

viii. How often do you consume dried mango?
     - Daily
     - Weekly
     - Monthly
- Few times a year
- Never

### 3.2.3 THE CORE SECTION

The core section of the conjoint survey includes 3 major tasks: list of attributes and levels, screening tasks and choice task tournament. By going through these tasks a final optimum profiled product can be create for each respondent. Table 4 is the design of survey that used for Chinese consumers.

**Table 4 Design for conjoint analysis for Chinese market**

<table>
<thead>
<tr>
<th>Sections of the conjoint analysis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of attributes</td>
<td>6</td>
</tr>
<tr>
<td>Build your own tasks (BYO)</td>
<td>included</td>
</tr>
<tr>
<td><strong>Screening Tasks</strong></td>
<td></td>
</tr>
<tr>
<td>Number of Screening tasks</td>
<td>5</td>
</tr>
<tr>
<td>Number of concepts per Screening task</td>
<td>4</td>
</tr>
<tr>
<td>Minimum number of attributes to vary from BYO selections</td>
<td>2</td>
</tr>
<tr>
<td>Maximum number of attributes to vary from BYO selections</td>
<td>3</td>
</tr>
<tr>
<td>Number of unacceptable questions</td>
<td>2</td>
</tr>
<tr>
<td>Number of must have questions</td>
<td>1</td>
</tr>
<tr>
<td>BYO Product Modification Strategy</td>
<td>Mixed</td>
</tr>
<tr>
<td><strong>Choice Tasks Tournament</strong></td>
<td></td>
</tr>
<tr>
<td>Maximum number of concepts included in choice tournament</td>
<td>14</td>
</tr>
<tr>
<td>Number of concepts per choice task</td>
<td>3</td>
</tr>
<tr>
<td>Calibration concept</td>
<td>0</td>
</tr>
<tr>
<td>- Avoiding Dominated Concept is not used</td>
<td></td>
</tr>
<tr>
<td>- Include BYO in tournament is not used</td>
<td></td>
</tr>
</tbody>
</table>
F. Build Your Own (BYO) section

In this section, respondents were asked to select the product attributes they prefer the most out of the choice that provided. The requirement state in this section is: “In this part, you are offered with several characteristics of dried mango. Within each characteristic, there will be a list of several options. Now, you are given the free choice to create the dried mango you want. How do you prefer your dried mango? Indicate your preference by clicking one option for each characteristic of dried mango below. If some characteristics do not fit to your preference, then at least choose the closest option to your preference from the list. The software will automatically consider your options for the next part of this survey”.

F. List of attributes

Proper defined conjoint attributes and its levels is the most essential part for conjoint survey (Orme, 2002). Based on the chosen attributes and levels, it will determine the optimum profile for the final product. The attributes and levels that used for this conjoint survey (table 5) were selected based upon the information gathered from focus group discussions. These attributes create the fundamental information for the conjoint survey.

Table 5 Attributes and its level used for the conjoint survey

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Level of Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango Flavour</td>
<td>Weaker flavour than fresh mango</td>
</tr>
<tr>
<td></td>
<td>Similar flavour than fresh mango</td>
</tr>
<tr>
<td></td>
<td>Stronger flavour than fresh mango</td>
</tr>
<tr>
<td>Dominant Taste</td>
<td>More sweet than sour</td>
</tr>
<tr>
<td></td>
<td>Balanced sweet and sour</td>
</tr>
<tr>
<td></td>
<td>More sour than sweet</td>
</tr>
<tr>
<td>Colour</td>
<td>Pale yellow</td>
</tr>
<tr>
<td><strong>Dominant Texture</strong></td>
<td>Chewy</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>Soft</td>
</tr>
<tr>
<td></td>
<td>Crispy</td>
</tr>
<tr>
<td><strong>Sweetener</strong></td>
<td>High calorie sweetener (i.e. sugar/honey)</td>
</tr>
<tr>
<td></td>
<td>Low calorie sweetener (i.e. fruit sugar)</td>
</tr>
<tr>
<td></td>
<td>No calorie sweetener (i.e. aspartame)</td>
</tr>
<tr>
<td><strong>Extra Ingredients</strong></td>
<td>Salt (i.e. sea salt)</td>
</tr>
<tr>
<td></td>
<td>Spices (i.e. chilli, ginger)</td>
</tr>
<tr>
<td></td>
<td>Salt and spices combination</td>
</tr>
<tr>
<td></td>
<td>No extra ingredients</td>
</tr>
</tbody>
</table>

**Screening Tasks Section**

Sawtooth Lighthouse Studio Version 9.2.0 (Sawtooth software inc., 2017) will develop a set of questions that is based on the respondents’ choice of BYO section, the questions will differ each other. These series of questions are used to identify the required level of intrinsic quality attributes as well as the avoiding level of attributes that provided. Within
In this section, there are 3 type of screening questions provided – screening tasks, unacceptable items and must-have items.

- **Screening tasks** – “We have considered your selection in the previous part. Now, in this part, we have generated six sets of combinations. Every combination we present may vary slightly from your own concept. *Please carefully examine and decide whether each combination is acceptable to you or not*”.

- **Unacceptable items** – “Before continuing, we've noticed that you've avoided dried mango with certain characteristics shown below. Would any of these features be totally unacceptable to you? If so, *choose the one feature that is most unacceptable to you*, so we can just focus on the characteristics of dried mango that meet your needs”.

- **Must have items** – “We don’t want to jump to conclusions, but we've also noticed that you've selected dried mangoes with certain characteristics shown below. If any of these is an absolute requirement for you, it would be helpful to know. If so, *please choose the one most important characteristic*, so we can just focus on dried mangoes that meet your needs”.

**Choice Tasks**

In this section, the respondents were asked to select their most favourite dried mango intrinsic quality set option out of the three comparison sets. The instruction of this part stated as “You almost come to the final part for the survey. We have considered all your answers for each combination in the previous part. Now, in this part, we have chosen several sets of combinations for you. *Please carefully examine and decide which one among these possible combinations do you prefer?*”

The requirement of the maximum number of concepts included in choice tournament as suggested from sawtooth lighthouse studio (Sawtooth software inc.,2017) is 14, which is calculated from the equation – “maximum number of concepts included in choice tournament = [(number of screening tasks ×number of concepts per task)/ 2] + 4”.
3.2.3 HEALTH ORIENTATION SECTION

Healthiness is also an essential element that determines the consumer consumption and preference towards food product (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012). Therefore, at the end of this conjoint survey, a health orientation section is set to understand the research group’s health consciousness. Respondents kindly asked to “indicate to which extent you agree with each of these statements!” to rate 11 statements about health in daily life (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012) in a 5-point likert scale (totally disagree, disagree, neutral, agree and totally agree). The 11 statement are listed below:

1) I have the impression that I sacrifice a lot for my health
2) I consider myself to be very health conscious
3) I am prepared to leave a lot, to eat as healthy as possible
4) I think I take health into account a lot in my life
5) I think it is more important to know how to eat in a healthier way
6) My health is so valuable to me that I am prepared to sacrifice many things for it
7) I have the impression that the other people pay more attention to health than I do
8) I do not continually ask myself whether something is good for me
9) I do not often think about whether everything I do is healthy
10) I do not want to ask myself all the time whether the things I eat are good for me
11) I often dwell on my health

3.2.4 CLOSING

At the end of the survey, there is a closing section for respondents devoting their precious time to help us on the new dried mango product development. For those who were disqualified from the conditional questions also have a special termination page, which is to show we are grateful for their participation.
3.3 DISTRIBUTION

In order to have a good view of the Chinese market, the Chinese consumer group were selected as random Chinese consumers in mainland China. This survey was initially designed in English and secondly translate into Chinese. A back-translate was conduct afterwards to verify the quality of Chinese survey. Before the final distribution, a pilot survey test was carried out to check the content of the survey as well as the length of the survey. The conjoint survey was uploaded to the Web server manager of Sawtooth lighthouse studio (Sawtooth software inc., 2017) and distributed via email and electrical devices (such as mobile phone, tablets etc.) to mainland China.

3.4 ANALYSIS

3.4.1 CLASSIFICATION OF RESPONDENTS

There are three type of the responses when sorting the data – complete, incomplete and disqualified.

- Complete – the respondents have finished all parts of the survey without being disqualified through the conditional questions.
- Incomplete – the respondents have opened/started survey, but somehow closed the survey before finishing it.
- Disqualified – the respondents have answered the survey, but are filtered out by the conditional questions.

The conjoint analysis will only take into account the respondents who completed the survey. Therefore, it is necessary to examine the completed results, to filter out the respondents who did not take the survey seriously and filled in random and irresponsible answers (i.e. patterned answers, answered in unreasonable time duration etc.). With the academic Sawtooth lighthouse studio license (Sawtooth software inc., 2017), the maximum respondents can be analysed is 250, which includes all types of respondents.

For the Chinese survey, 225 respondents opened survey, and 138 out of the population completed the survey with one respondent disqualified due to the conditional questions.
The rest 87 respondents did not complete the survey. There is no respondent eliminated from the completed group due to their regular time duration and there are no patterned answers. Therefore, the complete 138 respondents’ results are used for the conjoint analysis.

3.4.2 CALCULATING RELATIVE IMPORTANCE AND AVERAGE UTILITIES OF ATTRIBUTES

Relative importance of attributes is used to identify the level of importance of attributes that in different consumer group. As well this can reflect the importance when later evaluating the product in the market. The relative importance level can help product developer to have a focus point towards consumer preference. The raw data of individual importance of each respondent on each attribute can be downloaded from the Sawtooth lighthouse studio (Sawtooth software inc., 2017). By grouping the respondents upon requirements, using SPSS statistics 24 (IBM Corp., 2016), One-way ANOVA with Tukey post hoc. Tukey’s HSD post hoc can control the overall significant different level, which is the most useful option in this case to identify the significance different of attributes within the groups, in order to understand the importance of attributes.

The utility scores of the results can be calculated by Hierarchical Bayesian (HB) estimation by using Sawtooth lighthouse studio (Sawtooth software inc., 2017). Through this software the individual utility scores can be analysed, which is used to examine the relative preference towards other attributes.

3.4.3 UNDERSTANDING THE CONSUMER HEALTH ORIENTATION

SPSS statistics 24 (IBM Corp., 2016) can be used to calculated the health consciousness level of respondents. Health sacrifice and health preoccupation are used based on the 11 statement and reference from Sijtsema etc. (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012). Firstly, a Cronbach alpha value is going to be calculated to identify the number of factors and eliminated the less relative result. Based upon the results, categories the respondents into groups to calculate the relative importance within each health orientation group to understand their preference difference.
4. RESULTS AND DISCUSSION

4.1 SAMPLE

4.1.1 GENDER, AGE AND EDUCATION LEVEL

All the respondents, who filled in the survey were randomly chosen. Therefore, it varies from gender, age and education level. There are 137 Chinese respondents who completed the survey and in counting the completed surveys, the majority of the respondents are female (75%). The survey was distributed via Internet; however, it is still not yet common for Chinese older people (above 60 years of age) to use the internet. As a result, for both male and female respondents their age varies between 18 to 60 years. The education level might influence the health perception towards food, therefore it is regarded as a factor in this case.

Table 5 indicates the overall demographic information of all respondents who completed the survey. 129 respondents out of 137 are highly educated and within the counts, there is an equal ratio between the bachelors and master or higher.

<table>
<thead>
<tr>
<th>Table 5 Gender, age and education level of Chinese respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
### 4.1.2 DISTRIBUTION OF REGIONS

China, known for its drastic population and landscape. It has the world’s second largest state by land area (NBSPRC, 2016), therefore the Chinese government established the City Tiers Matter to help understand the development of regional markets. The cities in China are categorized into 4 tiers mainly based upon population, income and competitiveness. Tier 1 is all the cities that are large densely populated urban areas with strong influence towards China’s economic, culture and politics. Tier 2 is made up with Provincial capitals, sub-provincial capitals and some developed cities that have quite some influence on the Chinese economies and culture. Tier 3 consists of cities has less influence towards economic aspect and mostly are open coastal cities. Tier 4 cities contain less urban areas with little or none influence towards the Chinese economy (Nexus, 2013). To sum up, different city tiers illustrate different economic development, income levels and business opportunities, which directly result in different consumer behaviors (Cheng, 2016). In this survey, the Chinese respondents were asked to filled in the city where they live in and use China city tiers system to categories them into city tiers during data analysis.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>45%</td>
</tr>
<tr>
<td>Tier 2</td>
<td>29%</td>
</tr>
<tr>
<td>Tier 3</td>
<td>15%</td>
</tr>
<tr>
<td>Tier 4</td>
<td>11%</td>
</tr>
</tbody>
</table>

**Figure 6 Distribution of Chinese respondents per city tiers.**

| Total | 137 | 0 | 0 | 8 | 69 | 60 |
As shown in figure 6, there are 45% of respondents from tier 1 cities and a total 74% of respondents from the highly developed cities (Second tier and above) this represent the population that are in good economic conditions and can select the food products as they desired.

4.1.3 FREQUENCY OF CONSUMPTION

Frequency of dried mango consumption had been asked in the survey. Except high frequency eaters (daily to weekly), the majority respondents had an experience with dried mango and ate it every year, which is related to the rapid internet development and widely internet shopping, food choice no longer is limited to the regional issues. The people who had no experience only occupied a relatively small percentage (5%).

Figure 7 Frequency of consumption of Dried Mango.
4.2 CONJOINT ANALYSIS

4.2.1 RELATIVE IMPORTANCE

As mentioned in previous chapter, the relative importance can be calculated within different groups. It is to check the relative importance of attributes as well the significant difference within groups. As a result, it can identify the optimum profile of dried mango.

- The 3 most important intrinsic quality attributes

To the Chinese respondents, as shown in figure 8, the most important three intrinsic quality attributes towards dried mango are extra ingredients, sweetener and texture (p<0.05).

![Relative importance of attributes among Chinese consumers (n=137). The Relative importance of attributes indicates how important is an attribute compare to the others. Different letter indicates significant difference between attributes (p-value < 0.05).](image)

1) Extra ingredients – this attributes has a relatively very high importance compared to other attributes. It is mainly due to most of the respondents selected the choice of ‘no extra ingredients’, which means that maintaining the natural flavour of mango in a dried mango product is essentially important to Chinese consumers.
2) **Dominant texture** – this attribute was rated as second important attributes towards Chinese consumers (*figure 8*). The relative importance value is high because the consumer has strong bias towards one option, in this case is chewy as dominant texture.

3) **Sweetener** – Sweetener as one of the most important ingredient of dried mango, has third highest relative importance. Sweeteners are always under argument due to it is a part of additive. But in this case, the consumers seem to all have very unique answer therefore result in relatively high importance.

- The relative importance of frequent eaters vs. non-frequent eaters

Among all the Chinese respondents, there is only small percentage (5%, 6 out of 137) of none dried mango eaters, it is not really representative to analyse between eaters and non-eaters. As a result, the Chinese consumers will be categorised into frequent eaters (weekly and monthly eater) and non-frequent eaters (only consume few times a year or never consume). Figure 9 shows the relative importance of attributes between these two different groups.

*Figure 9 Relative importance of attributes between frequent eaters (left, n=29) and non-frequent eaters (right, n=108). The Relative importance of attributes indicates how important is an attribute compare to the others. Different letter indicates significant difference between attributes (p-value < 0.05)*

It is very clear that extra ingredient is as important for both frequent eaters and non-frequent eaters. However, for the frequent eaters, there is not much significant different between the rest 5 attributes, opposite, for non-frequent eaters, the dominant texture and sweetener are relatively more important than colour, dominant taste and mango flavour.
With the majority population, the non-frequent eaters’ relative importance directly influence the overall difference, as similar to figure 8.

- The relative importance of male vs. female eaters

As Linnemann indicated, there is significant difference of eating preference between male and female (Linnemann, 2006). Therefore, in this case, the preference between the genders are worth to look at. Figure 10 illustrated the difference between male and female frequent eaters.

![Figure 10 Relative importance of attributes between frequent male eaters (left, n=3) and frequent female eaters (right, n=26). The Relative importance of attributes indicates how important is an attribute compare to the others. Different letter indicates significant difference between attributes (p-value < 0.05)](image)

As can be seen from figure 10, there is very significant difference between the male and female frequent eaters. Beside the representative of the number of respondents, the difference between attributes within different groups are very different. To both genders, extra ingredients are relatively important. For the male frequent eater, the dominant taste and mango flavour are the least important and has relatively significant difference with other attributes but for female frequent eaters, there is very little difference between the rest 5 attributes. However, as mentioned, the total number respondents are not so representative, therefore the gender difference between non-frequent eaters are worth to check.
A comparison is also done between the male and female of non-frequent eater group, which is relatively more representative due to the larger respondent number. As illustrated in figure 11, there still present significant difference between the genders.

Figure 10 Relative importance of attributes between frequent male eaters (left, n=32) and frequent female eaters (right, n=76). The Relative importance of attributes indicates how important is an attribute compare to the others. Different letter indicates significant difference between attributes (p-value < 0.05)

Extra ingredients as attribute still take the most relative important place for both gender. However, to the non-frequent female eaters, dominant texture and sweetener are relatively more importance than colour, dominant taste and mango flavour, and it shows significant difference between the two groups of attributes. For the non-frequent male eaters, beside the extra ingredients, the different of importance between the attributes are not so significantly distinguished. For them the dominant taste has the significant difference towards the all other attributes. Sweetener, colour and mango flavour have more or less similar important between the dominant taste and texture.

4.2.2 RELATIVE UTILITIES

Individual utilities can be calculated by Sawtooth lighthouse studio (Sawtooth software inc.,2017). Individual utilities (zero-centred diffs) illustrate the preference towards attributes of dried mango. Figure 11 shows a relative utilities report of overall Chinese consumers’ preference.
Figure 11 Relative utilities (Zero-centred Diffs) of attributes of Chinese consumers (n=137) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).
Relative utilities of attributes of Chinese consumers

From figure 11, it shows some significant differences between the attributes.

- **Extra ingredients** – the average utilities value of extra ingredients’ attributes value are most standout. There is very unique preference towards no extra ingredient among Chinese consumers. As well the options with spices have the least acceptance from Chinese consumers.

- **Sweetener** – there is as well significant difference among all attributes within the sweetener option. Low or no calories sweetener are preferred by Chinese consumers, and natural fruit sugar has significant preference compare to the no calorie aspartame. High calorie sweetener is not preferred in this case.

- **Dominant Texture** – The Chinese consumers are preferring mostly a chewy/soft texture of dried mango product than crispy products. There is significant preference towards chewy and soft products and within the options there is not much significant difference.

- **Colour** – (the actual colours provided in the survey are listed in table 5) to Chinese consumers it is very obvious that the dried mango colour should be similar to the fresh mango. The intensive colours provided in the option were not preferred at all. The preference level decreases with increase colour intensiveness.

- **Dominant taste** – average Chinese consumers prefer a sweet taste fruit product. When the product is more sour than sweet, it is mostly not appreciated. Therefore, there is a significance different of ‘more sour than sweet’ option towards ‘more sweet or balanced’ option.

- **Mango flavour** – Chinese consumers prefer a dried mango product similar to the fresh product as well the flavour of it. Neither stronger nor weaker are not preferred.

The relative utilities were also calculated by frequent eater (appendix 2) and non-frequent eaters (appendix 3). Both group has very similar preference as the overall utility stated above. There is not much significant difference shows in the cases, detail see appendix 2 and 3.
4.3 HEALTH ORIENTATION

The health orientation part in the survey consisted of 11 health related life statements, which was verified by Sijtsema et al. in 2012 (Sijtsema, Jesionkowska, Symoneaux, Konopacka, & Snoek, 2012). These statements are used for consumer studies to understand the consumer health consciousness level. By using SPSS to calculate the Cronbach alpha value and factor analysis to confirm it consist with two subscales: health sacrifice and health preoccupation. Question 9 ‘I do not often think about whether everything I do is healthy’ and question 10 ‘I do not want to ask myself all the time whether the things I eat are good for me’ were removed before further analysis due to low Cronbach alpha value, which represent low relativity to the overall analysis. After identify the factors, the rest nine questions were group into the two subscales. Within each subscale, the respondents also divided into high or low health orientation level.

❖ Relative importance of Health sacrifice group

![Figure 12 Relative importance of attributes between High Health Sacrifice (left, n=37) and Low Health Sacrifice (right, n=100). The Relative importance of attributes indicates how important is an attribute compare to the others. Different letter indicates significant difference between attributes (p-value < 0.05)]

By comparing the two figures in figure 12, there shows a significant difference between the two groups. As for the overall importance, no extra ingredients are uniquely for all groups, that makes the high difference between the attributes. Also, there is obvious different in
relative importance of attributes, which means the optimum profile of dried mango is different to these groups. For the high health sacrifice group, the sweetener is slightly more important than dominant texture, while for low health sacrifice group it is the opposite. By looking at the significant difference, for the high health sacrifice group, there is relative small significant difference within the groups (3 level differences) but opposite for the low health sacrifice group. For the low health sacrifice group, there is four level of significant difference.

☑ Relative importance of Health preoccupation group

![Graph showing relative importance of attributes between high and low health preoccupation groups.](image)

**Figure 13 Relative importance of attributes between High Health preoccupation (left, n=83) and Low Health preoccupation (right, n=54).** The Relative importance of attributes indicates how important is an attribute compare to the others. Different letter indicates significant difference between attributes (p-value < 0.05)

Figure 13 illustrated the relative importance of attributes between high and low health preoccupation groups. Comparing the relative importance of attributes’ value there are very similar between the groups, however, the significant difference between the groups has large difference. For the high health preoccupation group, there is significant difference between attributes (extra ingredients vs. sweetener and dominant textures vs. colour, dominant taste and mango flavour). Nevertheless, for the low health preoccupation group, except the very unique option towards extra ingredients, the significant different within other attributes are not so big.
Relative utilities of all health orientation groups

As mentioned previously, the relative utilities illustrated the preference towards the attributes. In this case, all four health orientation groups’ relative utilities were calculated.

Figure 14 and 15 shows the relative utility between high and low health sacrifice consumer groups. Same for all the consumer groups, the choice towards extra ingredients are very uniquely same. Very high preference towards no extra ingredients and very adverse attitude towards the options with spices. And all with significant different between the attributes. The consumer preference towards sweeteners as well similar that low or no calorie sweetener are more appreciated. Crispy always the texture that Chinese consumer not so welcomed and with same high significant different compare to the chewy/soft texture. The biggest different between the high and low health sacrifice consumer groups is the preference towards the colour of dried mango. For the high health sacrifice consumer group, except dark orange, there is no significant difference between other colours, but it is not the case for the low health sacrifice consumer group. The pale orange (colour index provide in previous chapter), which is the colour that closest to the ripe fresh mango is the most preferred by the low health sacrifice consumer group, follow by pale yellow that also similar to the fresh mango. The bright orange and dark orange are not really welcomed by this group, and there shows significant differences among all colours for low health sacrifice consumer group. For the rest of the attributes (dominant taste, mango flavour) have the same relative importance as well the significant difference.

The relative utilities of health preoccupation consumer groups are similar to the health sacrifice consumer groups, the detail information are shown in appendix 4 and 5.
Figure 14 Relative utilities (Zero-centred Diffs) of attributes of low health sacrifice consumer group (n=100) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).
Figure 15 Relative utilities (Zero-centred Diffs) of attributes of high health sacrifice consumer group (n=37) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).
5. CONCLUSION

This consumer research is the follow up quantitative research towards dried tropical fruit products after the qualitative research (focus group). The goal of it is to find out the Chinese consumers’ preference towards dried tropical fruits, in this case dried mango. The aim of this study is to answer the research questions – ‘What is the profile of intrinsic quality attributes of dried mango?’, ‘What is the preference of intrinsic quality attributes of dried mango?’ and ‘How does the profile and preference of intrinsic quality attributes between consumers with different health orientation?’.

Regarding to the “optimum profile” of intrinsic quality attributes, it is essentially important to know there should be no extra flavour ingredients for Chinese consumers in dried mango, as well necessarily remain its natural taste. Secondarily is Chinese consumers do not prefer hard and crispy textured dried mango product. From the sweetener perspective, low or no calorie sweetener is much preferred than the natural high calorie sweetener. For the colour, dominant taste and mango flavour of dried mango, there is no significant difference among these attributes. The preference towards these attributes can be simply concluded as remaining the natural characteristic of fresh mango.

Different consumer groups had been analysed in this report. Due to the fact, there is a relatively high percentage of experienced dried mango eaters among Chinese respondents, therefore, the consumers were grouped into frequent eaters (weekly, month consumed dried mango) and non-frequent eaters (consumer only eat dried mango few times a year or not even had experience). There shows a significant difference between the groups as well between the genders. Based upon health orientation questions, the consumers were also groups into high/low health sacrifice and preoccupation, difference also shows between the groups.

To sum up, based upon the research, the dried mango product that goes to the Chinese market should fulfil the consumer preferences that are mentioned in this research. It is important to know the exact target consumer group for the new product development. For Chinese consumers, the dried mango product should maximally remain in its natural form.
6. RECOMMENDATION

In this study, a conjoint analysis was done to study the optimum profile of intrinsic quality attributes of dried mango in Chinese market. During the project, there are some difficulties as well some improvements still needed upon this study for further product development.

- China due to its enormous landscape and different economic development, a more detailed quantitative research needed. For example, focus on one specific region and increase the respondent volume; divide China into different region with significant difference based upon eating preference and do comparison study between different regions etc.

- Survey still not a format widely acknowledged therefore result in high incomplete rate. A more attractive way of presenting survey need to be studied.

- Based upon the research result, specify a focused target group, do more detailed quantitative studies, for example, select frequent female eaters, ask from intrinsic to extrinsic, from specific mango type to additive etc.

- Produce ‘optimum profile’ product from this survey and do a sensory test towards Chinese consumers, to verified the study result.


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8. APPENDICES

Appendix 1: Conjoint survey used in this consumer study

Appendix 2: Relative utilities (Zero-Centred Diffs) of frequent eaters

Appendix 3: Relative utilities (Zero-Centred Diffs) of non-frequent eaters

Appendix 4: Relative utilities (Zero-Centred Diffs) of low health preoccupation consumer group

Appendix 5: Relative utilities (Zero-Centred Diffs) of high health preoccupation consumer group
Appendix 1:

亲爱的参与者，

您好！我们是荷兰瓦赫宁根大学的学生，打扰您宝贵的几分钟来填写这份问卷。我们在开发新的芒果干产品，这份问卷是有关于芒果干的调查，主要目的是为了了解中国消费者选购芒果干时的偏好与要求。

这份问卷一共有6个部分，大约需要15分钟来完成。我们会确保您提供的所有信息都不会被泄露。

非常感谢您参与本次问卷调查！

致致，
Dangyiqi Wu，Ita Sulistyawati & Bea Steenbekkers
荷兰瓦赫宁根大学食品科学系
如果您对此问卷有任何问题请联系: dangyiqi.wu@wur.nl

The full Chinese conjoint survey link:

https://DMCNfinal.sawtoothsoftware.com/login.html
Appendix 2 Relative utilities (Zero-centred Diffs) of attributes frequent eaters (n=29) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).
Appendix 3 Relative utilities (Zero-centred Diffs) of attributes of non-frequent eaters (n=108) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).
Appendix 4 Relative utilities (Zero-centred Diffs) of attributes of low health preoccupation consumer group (n=54) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).
Appendix 5 Relative utilities (Zero-centred Diffs) of attributes of high health preoccupation consumer group (n=83) Average utilities values indicates how attractive are levels in each attribute. A higher utility, from a negative to a positive value, means a higher attractiveness or preference for certain level when compare to others. Different letter indicates significant differences between level in each attribute (p-value<0.05).