

Determinants and intended consumer behaviour toward deformed fruits and vegetables



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Master Thesis

Determinants and intended consumer behaviour toward deformed fruits and vegetables

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Abstract

Background: Due to the assumption that the consumers will not accept oddly shaped fruits and vegetables, retailers refuse to distribute or sell them. Thus, contributing to the global food waste.

Methods: The study aims to examine the perceptions and determinants linked to consumer's intention to purchase oddly shaped fruits and vegetables. It uses The Theory of Planned Behavior as a framework. The study examined 35 quantitative surveys and five qualitative interviews, using respectively conjoint analysis, ANOVA (for the survey) and thematical analysis (for the interviews).

Results: The price ($p < 0,05$; $p = 0.00$) and freshness had the highest priority for the target group. Consequently, the most influence on the willingness to purchase oddly shaped vegetables. Although, participants had positive perceptions and intention to buy deformed fruits and vegetables, there was no correlation between attitudes ($p > 0,05$; $p = 0,78$), perceived behavioral control ($p > 0,05$; $p = 0,106$) and willingness to purchase.

Conclusion: Research in the area of consumer preferences towards oddly shaped vegetables can be the first steps for the fight against food waste and help create interventions that work.

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Introduction

According to FAO, food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. (1996 World Food Summit) Based on this definition, there are four dimensions of the food insecurity: availability, access, stability and utilization . In this context by food availability it is meant the level of food production, supply , stock levels and net trade. Although, the data indicates that significant percentage of people worldwide suffer from food insecurity, there is evidence suggesting that it may not be due to lack of food availability (World Food Programme 2017) . Globally, the food availability per capita has increased from 2220 kcal/person/ day from 1960s to 2790 kcal/person/day in 2006-2008 (World Hunger Education Service 2016). According to FAO, for the region of Europe the annual per capita growth for all food products, within 2000-2011, has increased with almost 2 percent (FAO 2014) .

There is evidence that shows a reduction of consumption of meat in the EU region (FAO 2014). Correspondingly, two-thirds of the population of EU-28 is reported to consume at least one portion of fruit and vegetable per day (Fruit and vegetable in the EU). Within the European Union vegetable production has increased exponentially, in 2001 and 2010 54% higher than in 1991-2000 (FAO 2014) It is however, unevenly distributed among the Member states where 22.1% of all farms in Romania produce vegetables as opposed to Denmark where it is less than 1 % (Cicco De Antonella 2016)

On the other hand, 14.6% of all farms in EU produce fruits, which similarly to the vegetables are unevenly produced through the region with Italy (25.8% share of EU producing organic fruits and berries), Poland (20.4%) and Denmark (0.9%) (Cicco De Antonella 2016). Consequently, the production and consumption of fruits and vegetables is major part of the everyday life and economy of the European Union.

Food waste

Although, there is more than sufficient amount of food produced worldwide to feed everyone, that does not necessarily mean that the food produced reaches the consumer or that it is not wasted through the value chain.

Around one third of the food meant for human consumption or about 1.3 billion tons is lost or wasted annually on a global scale. For developed regions such as Europe, North America and Oceania the waste and losses are 250 – 300 kg per person/ year, as opposed to Sub-Saharan Africa or South & Southeast Asia where it is well under 200kg per year (FAO 2017). Overall, substantial portion of the food waste worldwide lies between the production and retail stage in the value chain and less so when the product reaches the consumer. Globally, the percentage of fruits and vegetables wasted or lost annually is high (worthily 45%) in comparison with meat for example where it is about 20% or fish with 35%(FAO 2017)

In Europe, the amount of food wasted would feed 200 million people (FAO 2017). Food waste in EU-28 as well as worldwide is distributed irregularly throughout the value chain (supply chain). Similarly, to the European estimates, Denmark wastes food mainly between the production and retail sector, for instance primary production is responsible for 14% of the annual food waste in the country, industry (19%) and retail (23%) (Stopspildafmad 2015). As a whole, Denmark wastes over 700 000 tones annually of food. The largest share of food waste is of fruits and vegetables with 41% of the yearly food waste, which is about twice the food waste of meats and meat products (24%) (Tonini, Brogaard et al. 2017). Therefore, steps for reduction of fruits and vegetables food waste will benefit the Danish environment and economy.

State-of- art

Second-class fruits and vegetables

By definition second-class fruits and vegetables are *reasonably good quality produce, which may show one or more defects (depending on the product)*(Rural Payment Agency 2011).

Within this class are the so called “oddly shaped vegetables”, which have the same nutritional value as the first class, but have an abnormal shape. Up to two fifth of those fruits and

vegetables that are wasted are second-class (Daily Telegraph 2013), in England for example 30% of those fruits and vegetables are not harvested due to not meeting the retailers' exacting standards on physical appearance (The Guardian 2013). However, that is not isolated case. In general, retailers retain the right to reject portions of crops, or even entire crops, if the physical appearance of the products is substandard (Loebnitz, N. et al. 2015). One of the reasons for that may be due to the assumption that consumers prefer cosmetically perfect fruits and vegetables (Loebnitz, N., Grunert, K.G. 2014). Thus, there is little to no second-class vegetables in the supermarkets and retail in Denmark (Loebnitz, N. et al 2015). Therefore, there is a need for further research regarding consumer behavior and attitudes towards oddly shaped fruits and vegetables., on the basis of which

Determinants of food choice

There is a broad sphere of research on the topic of fruits and vegetable consumption. More specifically on the determinants influencing the consumption of fresh produce. One of them points out of two types of factors that affect the consumption of fruits and vegetables overall: extrinsic (i.e. price and label) and intrinsic (shape, organic, local, color) (Loebnitz, Schuitema et al. 2015). According to Gao et al., intrinsic determinants such as freshness, flavor, appearance are extremely important for consumers (Gao,Z et al 2011). However, how these determinants influence the behavior depends to a high extent of the characteristics of the consumers, such as the demography of the target population: *age, gender, marital status* (Gibney 2004).

Although there is plenty of data on the consumption of fruits and vegetables, there is no evidence on the intended behavior of consumers concerning oddly shaped vegetables (Gao, House et al. 2011, Loebnitz, Schuitema et al. 2015). Thus, there is little to no data on the intended purchase and consumption of these products in the Danish market (Loebnitz, N. et al 2015).

Aim and Motivation for this study

In the past several years there have been successful campaigns aimed to increase the purchase and consumption of oddly shaped vegetables around the globe. Among these campaigns are the French campaign "The Inglorious fruits and vegetables" (Cliff, M. 2014). In the United Kingdom some of the supermarkets have also started to sell oddly shaped fruits and

vegetables on lower prices (Smithers, R. 2015). In Denmark, there are supermarkets such as WeFood, which sell produce that might have been thrown otherwise by supermarkets, at large oddly shaped vegetables are not available for the Danish population. Additionally, there is not enough data to show whether the consumers would purchase deformed fruits and vegetables, if available.

The aim of this study is to fill the literature gaps. This will be done, firstly, by examining the perceptions towards oddly shaped fruits and vegetables and intention to purchase them, using the Theory of Planned Behavior as a foundation (i.e. examining the attitudes; social norms; perceived behavioral control). Secondly, the paper will assess the relationship of a number of determinants (shape, location of purchase, price, type of produce, gender) with the intention to purchase/consume oddly shaped vegetables. Finally, the paper will attempt to give suggestions for strategies that will increase the consumption of oddly shaped fruits and vegetables.

Problem statement

The objective of this paper is to analyze the perceptions of university students and staff and their intention to purchase/ consume oddly shaped vegetables. It also aims to assess the determinants governing their behavior regarding deformed produce. Additionally, this paper will suggest possible strategies to improve the access and consumption of oddly shaped vegetables.

Research questions

What are the perceptions of university students and staff on oddly shaped vegetables in Denmark?

What are the determinants influencing the purchase and consumption of parsnip?

What strategies can be used to improve the availability and consumption of oddly shaped vegetables in Denmark?

Delimitations

This paper focuses mainly on the university's students and staff perceptions and intended behavior with regard to oddly shaped vegetables. As there are wide range of oddly shaped

types of vegetables, parsnip was used as a case study for the quantitative part of the research. Parsnip was selected because it needs additional preparation (peeling) before consumption as opposed to, for example, an apple. The research of the paper will be done, using mixed methodology (i.e. quantitative survey and qualitative interviews) due to the complexity of the research topic. The Theory of Planned Behavior will be used as a framework for the research. In the next subsection underlines some of the terms that will be used throughout the thesis.

Definition of terms

Food waste and food loss - can be defined differently according to different actors in the supply chain. However, this paper uses the definition of FAO for food waste and loss: *the decrease of food in subsequent stages of food supply chain intended for human consumption* (FAO 2018) .

Specific market standards (SMS) - standards created and enforced by the retail companies.

Consumers - a person who buys goods and services for their own use. (Cambridge dictionary, 2018).

Oddly shaped vegetables - vegetables with different shape and size than the one of regular vegetables (first class vegetables).

Second - class vegetables - are vegetables which have irregular shape, color, size. They could include also first class vegetables that were not sold.

EU-28 - represents the European Union (EU) and the number of states/countries it incorporates.

Eu-28 is the last enlargement of the EU as of 1 July 2013 (Eurostat 2014).

Utility score- quantitative measure of preference of each factor level, where the larger values higher preferences values(*SPSS base 14.0 user's guide*. 2005).

Theory

Theory of Planned Behavior (TPB)

The theory of planned Behavior (TPB) is one of the most widely used and accepted models of the belief-attitude relationship within the health literature (Dunn et al. 2011) (Ajzen 2011)It is an extension of the Theory of Reasoned Action (TRA), which is based on the premise that the likelihood of certain Behavior can be predicted by the intention of the consumer to perform that Behavior (Bogers, Brug et al. 2004) . There are significant differences between TPB and TRA. TPB has more attention for cognitive than affective attitudes, for subjective norms in contrast to

descriptive ones and perceived Behavioral control compared to TRA's self-efficacy (Bartholomew, Parcel et al. 2011). What the TPB implies is that the intended Behavior is determined by three components: the attitudes, subjective norms and perceived Behavior control of the target group (Bartholomew, Parcel et al. 2011).

TPB has been widely applied and accepted framework for predicting Behavior in the health literature (Dunn, Mohr et al. 2011, Conner, Armitage 1998) The theory has in a previous study been found to reliably explains between 40% to 50% of the variance in intention, with intention consequently explaining between 20 and 40% of the variance of Behavior (Dunn, Mohr et al. 2011). Although, the theory is relatively good at predicting health-related Behavior in general, when it comes to more complicated Behavior such as diet and food choice the predictive value of TPB may be more limited (Bogers, Brug et al. 2004) (Dunn, Mohr et al. 2011). However, using TPB may help in circumstances where it is not certain, or there is no data of a current Behavior, as is the case of this study.

As mentioned previously there is little to no availability of oddly shaped fruits and vegetables in the retail in Denmark. Thus, there is insignificant evidence of the current purchasing /consumption Behavior of the target group in regards to deformed fruits and vegetables. One of the ways to assess how would the target group would behave, if the produce was available, is to determine the intended Behavior (intended consumption and purchase of oddly shaped fruits and vegetables). Thus, the TPB was found to be the most suitable for the aim of this paper and the context of the research, despite the shortcomings of the theory in the consumer Behavior and food choice research.

Generally, TPB is used as a framework on the basis of which health promotion campaigns and interventions are created (Bartholomew, L. K. et al 2011). In this paper it will be utilized as a background theory for the research on the intention of consumption/purchase of oddly shaped vegetables and the determinants influencing that Behavior. For example, part of the questions in the survey questionnaire will be based on the components of TPB (attitudes, subjective norms, perceived Behavioral control)(Appendix 2). While the interview guide will be entirely build using TPB elements (Table 1). On the base of that framework and the results of the research will be given suggestions for strategies that could be used in a possible future health promotion campaign for improvement of the access, availability and consumption of oddly shaped vegetables.

Model of the Theory of Planned Behavior

The model of the Theory of Planned Behavior (Figure 1) is based on the original model of Ajzen and It will be interpreted according to the research topic in the discussion section.

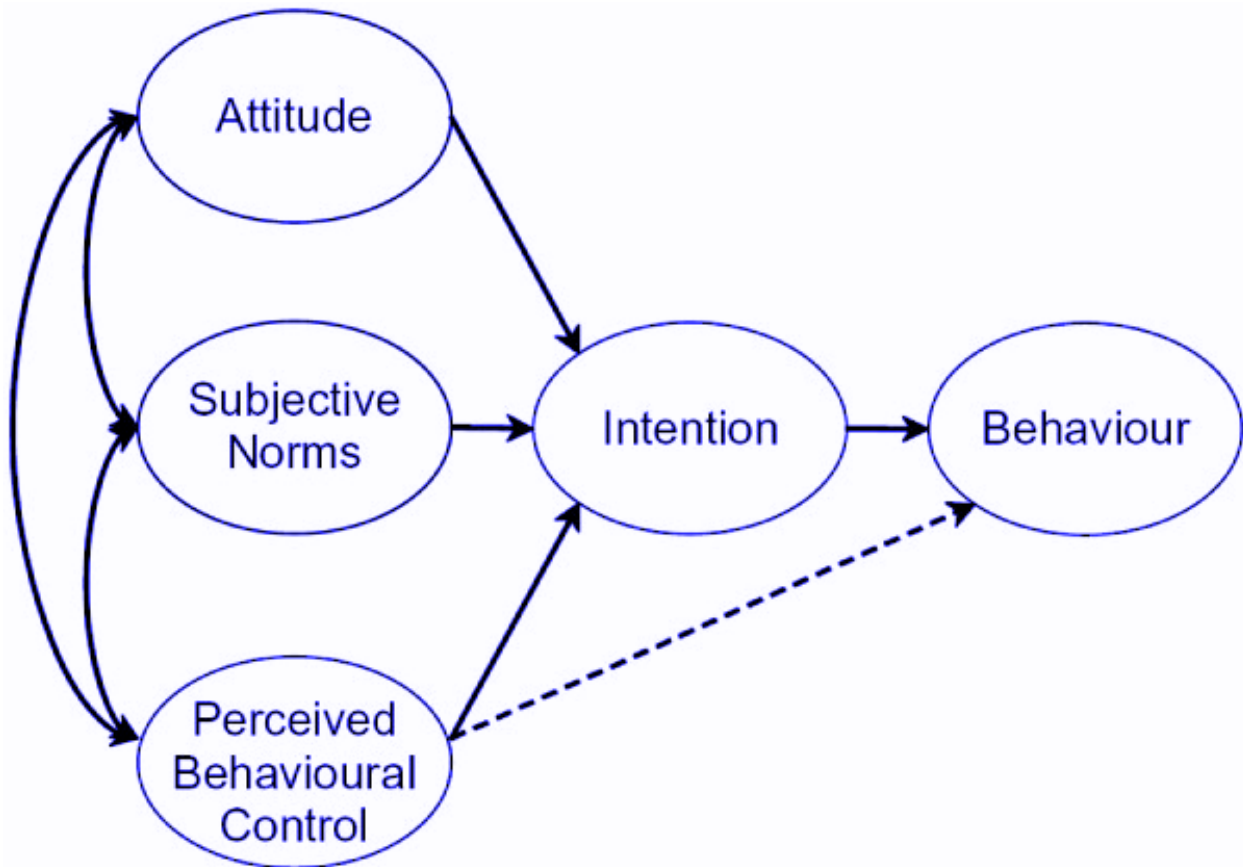


Figure 1 Model of the Theory of Planned Behavior, inspired by (Ajzen 1991).
https://www.researchgate.net/figure/Theory-of-Planned-Behavior-Ajzen-1991_fig1_5407720

As mentioned in the previous sub-section the theory will be used as a tool for constructing and analyzing the quantitative survey and interviews, by examining the determinants leading to intention for Behavior and in turn Behavior itself. To do that a quantitative questionnaire will be composed using the three components determining the intention of Behavior: attitudes, subjective norms, perceived Behavior control. A definition of the different components of the theory (Figure 1.) will be presented in the next section. The purpose of this is to give deeper understanding of the model and the important concepts that will be used in this paper.

Attitude are the beliefs about the outcome of the Behavior as well as evaluations of these outcomes (Dunn, Mohr et al. 2011). The Behavior beliefs lead to a favorable or unfavorable Behavior attitudes (Hoppe, Vieira et al. 2013) such as expression of positive attitude:” I believe that it is healthy to consume fruits and vegetables.” This paper will examine the beliefs of target group towards consumption/purchase of oddly shaped vegetables.

Subjective norms (SN) or perceived social expectations, according to Bartholomew et al. is a function of beliefs that specific, individuals or groups (social reference) approve or disapprove of the focal person performing the Behavior and how important that opinion is to the person (Bartholomew, L.K. et al 2011, p.72) e.g. “Most of the people I know believe that consumption of fruits and vegetables is healthy”. This particular component of the model will be researched briefly and as underlying determinant for intended Behavior. For example, by examining whether the social circle of the participants consider the to be safe for consumption.

Perceived Behavior Control (PBC) refers to people’s perception of the ease or difficulty of performing the Behavior of interest (Ajzen 1991) , e.g. “ I feel very comfortable preparing and cooking fruits and vegetables”. The PBC is to a certain extend similar to or compatible to Bandura's concept of self-efficacy(Conner, Armitage 1998).

Conjoint analysis (CA)

TPB explains to a certain extend the components (attitudes, subjective norms, perceived Behavior control) that lead to an intention for Behavior (purchase and consumption of oddly shaped fruits and vegetable). It does not, however explain how and why consumers would prefer or not oddly shaped vegetables over normal ones. In marketing the choice of alternative products can be described as profiles on multiple attributes and that individuals consider various attributes while making a choice (Rao 2014).For example, a study examining the preferences of pork among Chinese consumers, characteristics such as: price, origin and packaging of the pork (Ma, Verkuil et al. 2017). For that purpose, a conjoint analysis will be used to define the preferences of the consumers in relation to shape, price, origin, location of purchase and their willingness to purchase oddly shaped vegetables.

This theory is suitable for this study because it is a set of techniques ideally suited to studying customers’ choice processes and determining trade-offs (Rao 2014). The CA will be used as a part of the quantitative questionnaire, where there will be three categories of deformed

vegetables i.e. normally shaped, moderately deformed and very deformed (Figure 3.). Moreover, the CA will include attributes such as price, location of purchase, origin (organic vs. conventional) and origin of the product (Danish, European, Worldwide). These components will be added in an Orthogonal design in SPSS to create product profiles which then will be translated into the quantitative survey.

Methods

Mixed methods

Mixed method is the combination of quantitative and qualitative research methods (Bryman,A. 2008, p.603). Usually, the aim of such a combination of methods is to make most of the strengths and counterweight the weakness of both of the methods (quantitative and qualitative). This type of methodology can be used in many ways to answer the research questions of a paper by combining the quantitative and qualitative methods according to the aim of the study (Bryman 2008)

In this paper, the research questions searches to examine the perceptions/ attitudes of the consumers, the determinants influencing their intention for consumption and purchase of oddly shaped vegetables. Normally quantitative methods address research questions about causality, generalizability, or magnitude of effects, while qualitative methods are applied to research questions to explore why or how a phenomenon occurs (Fetters, Curry et al. 2013). Thereof, the quantitative survey will examine the perceptions and a range of determinants and their relationship with intended consumption/purchase of oddly shaped vegetables. Whereas the qualitative interviews will analyze in more detail why investigate the participants' attitudes and how the determinants influence their intended behavior. Here both of the data collection and analyses will be done in parallel, employing a convergent approach of integrating mixed methods (Fetters, Curry et al. 2013). In this study the integration of the methods will be done after the data of both methods was analyzed. Then the two separate sets of results will be merged and /or compared. Finally, the outcome will be interpreted (Figure 2).

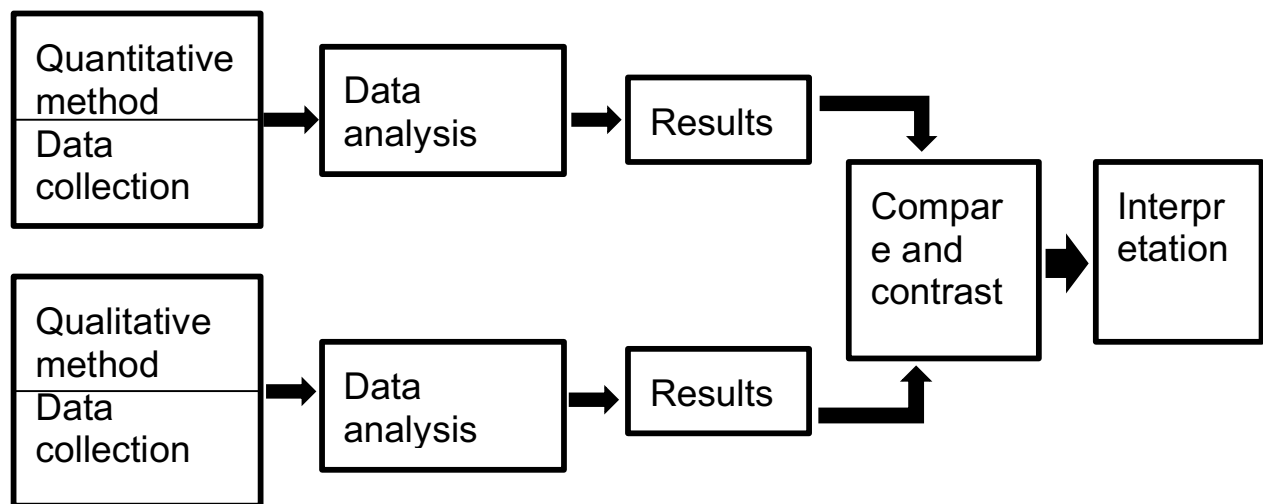


Figure 2 Flow chart of the data analysis inspired by (Fetters, Curry et al. 2013)

Ethical considerations

The purpose of an information consent (IC) is to protect both the researcher and the participants of a study, by being honest towards oneself and the others (participants) (Beisiegel 2010)).

Before any kind of research take place an informed consent should be presented orally or by writing to the participants in a study. There are different forms of informed consent forms, however they are based on the same principals. According to The European Commission these principles are: adequate information, voluntariness and completeness(European Commission 2013).

Since this research is based on mixed methods, there are two types of informed consent.

During the distribution of the quantitative survey the prospective participants were informed on the purpose and topic of the research. Additionally, they were informed that their (interviewees') participation is anonymous and voluntary (it is assumed on the web survey that by participating they voluntary do so) as well as contact information in case of any questions or concerns regarding the research.

Similar considerations were employed whilst designing and using the information consent for the qualitative interview. Before each interview an IC form (Appendix 1)(a copy of which was given to the participants to keep) will be presented and presented orally by the researcher.

Quantitative survey

One of the methods used in this paper is electronic web survey. The purpose of it is to examine, firstly, the determinants influencing university students and staff fruit and vegetables consumption such as: educational level, price, organic vs. non-organic produce, freshness, convenience and origin of produce. Secondly, to assess the attitudes of the participants towards oddly shaped vegetables by examining, for example, whether they perceive oddly shaped vegetables to be appealing or safe to consume.

Research design

The present research has a cross-sectional design. This design is usually a survey of population at a single point in time and can be used to determine the prevalence of risk factors and disease in defined population (Margetts, B.M., Kearney, J.M., Arab, L. 2004, p.32). However, since this paper is not concerned with risk factors of a disease, this study design will be used to determine the determinants of intended Behavior among the target population (University students and staff). It also aims to evaluate on a broader scale whether the target group has positive, negative or neutral attitudes of oddly shaped vegetables. Furthermore, it is relatively quick and easy to perform in comparison to other design studies, such as cohort studies (Bailey, L. et al 2005) and is best suited for the research's aim.

Sampling

University students and staff are chosen as a target population. University students in Denmark are multinational, multicultural population that comes from all walks of life and are constantly challenged to make healthy food choices (dos Santos, Nogueira et al. 2017, Deliens, Clarys et al. 2014). Despite that, it has been reported that students in Denmark tend to eat more fruits, vegetables and salads in comparison to fast food (El Ansari, Stock et al. 2012). Examining the determinants and attitudes of the students could provide a useful indicator of the willingness of the young consumers (18 - 40 years age) to purchase and eat oddly shaped vegetables. Additionally, both university students and staff are chosen largely on the base of convenience sampling. Most large universities in Denmark have official Facebook pages as well as student sites, they are most convenient to reach and study. Since both university students and staff have access to these webpages it was decided that both of them will be part of this study.

As a demographic, the participants (target group) had to be above 18 years old, so they wouldn't require parental approval. Also they had to undergo and/or have graduate and/or

undergraduate education and they must reside in Denmark. There was no set limitation on nationality or gender.

The quantitative survey used a non-probability, convenience sampling. The target sample was drawn from 3 different universities situated in Denmark. The size of the sample was not pre-defined, though for a commercial conjoint studies it usually ranges from 100 to 1,000. However, it must be noted that in some conjoint studies is found that smaller sample size (less than 100) are typical (*SPSS base 14.0 user's guide*. 2005). Based on this a sample size of 100 would be recommended.

Survey questionnaire

The aim of the questionnaire is to examine on a broad scale the perceptions of university students and staff towards oddly shaped vegetables and the determinants (Appendix 4) influencing their consumption (or lack of thereof). The questions of the survey were inspired by a study on oddly shaped vegetables from Aarhus University (Loebnitz, Schuitema et al. 2015)

The questionnaire (Appendix 2 - Quantitative questionnaire) consists of 39 questions which include the conjoint analysis. The survey is a combination of different type of questions such as: multiple choice questions (for example: *Generally do you consider oddly shaped vegetables to be: appealing / safe to consume/ easy to prepare/ none of the above / all of the above / I don't know*), ordinal scale questions (for example ranking the likability of the packaging of the parsnips, where 1=definitely buy; 3 least likely to buy), five point Likert scale was used for the conjoint analysis and the matrix (comprised of questions linked to the attitudes, subjective norms and perceived Behavioral control: for example, *Buying oddly shaped vegetables would be beneficial for my health*) that follows.(Appendix 2 - Quantitative questionnaire) (Niederhauser, Mattheus 2010)

The survey questionnaire is made up of 3 parts: 1) demographics and consumption questions; 2) conjoint analysis; 3) questions based on the TPB (Appendix 2: Questionnaire).

Demographics and consumption questions

This part of the questionnaires is mainly concerned with two types of questions. Firstly, establishing the demographics of the target population: *age, gender, nationality, education, marital status*. Secondly, questions regarding the participant's consumer Behavior: *responsibility for grocery shopping* (“*To what extent are you responsible for grocery shopping in your household?*”), *frequency of consumption of fruits and vegetables*(“*How frequently do you consume fruits and/or vegetables?*”), *allocated time for cooking*(“*How much time do you spend on cooking per day?*”). These questions are designed to produce a “profile” of the consumers / participants and background information regarding their consumption.

Conjoint analysis

A significant part of the survey questionnaire is the conjoint analysis. It consists of 22 profiles of parsnip, where the respondents are required to grade to what extent would they purchase certain product (profile) using the Likert scale (*Strongly agree; Agree; I don't know; Disagree; Strongly disagree*). These profiles were generated by SPSS, using Orthogonal Design. Each of these profiles incorporates 6 characteristics of a product : *shape of parsnip (normal; moderately deformed; very deformed)*, *location of purchase (supermarket; corner shop(kiosk); farmer's market)*, *origin of produce (Danish; European; Worldwide)*, *type of produce(organic; conventional)*, *price (4 kr./500 gr; 10 kr./500gr. ; 18 kr./500 gr.)*. To illustrate the shape of the parsnip, three parsnips with different appearance have been purchased and then photographed for the survey questionnaire(Figure 3 Illustrations of three different shapes of parsnip (normal; moderately deformed; very deformed)

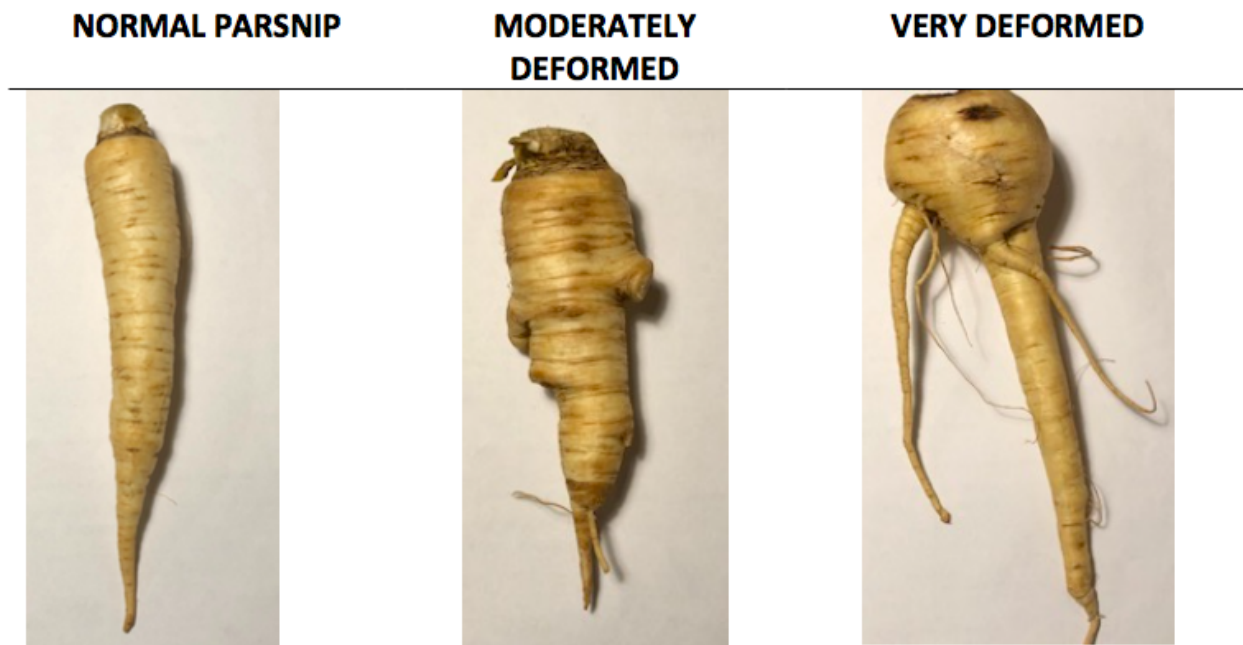


Figure 3 Illustrations of three different shapes of parsnip (normal; moderately deformed; very deformed)

The price range was determined based on observations of different retailers (Internet shops and tangible shops) (Appendix 3 Price). Thereafter, the lowest and the highest price correspond to the lowest and highest price found, the medium price corresponds to the average of the prices observed.

Some of the determinants of consumption such as *location of purchase, type of produce, price* as well as some questions mentioned above (*gender, nationality marital status, children*) are inspired by various literature on consumer Behavior (Appendix 4 Determinants and literature).

Questions based on the TPB

These questions aim to evaluate the three components of The Theory of Planned Behavior: *attitudes* (“Buying oddly shaped vegetables would be beneficial for my health”; “Generally do you consider oddly shaped vegetables to be...”), *perceived behavior control* (Cooking oddly shaped vegetables will require extra effort).

Distribution and data collection

The survey was created with SurveyXact and it takes 10 minutes to complete. The distribution was done, using a self-created link in three waves: *pilot study; first distribution; follow-up distribution*.

One of the methods for distribution was by posting it on various university and students' Facebook web pages (Aalborg Universitet København, Danske Tekniske Universitet - DTU, The PhD Association at DTU, Det Humanistiske Fakultet, København). The survey was also partially distributed face-to-face, where the respondents were asked to fill the questionnaire on a computer at Aalborg University in Copenhagen.

Pilot study

A pilot study was used, to evaluate the content and accessibility of the questionnaire, using researcher's connections with university students. A comment section was added at the end of the survey, where the participants had the opportunity to leave feedback concerning the survey. The pilot was conducted at 1st of December 2017 for a period of a month. During which 70 questionnaires were distributed and only 4 of the completed. The overall feedback was positive.

First distribution

On the base on the positive feedback of the pilot study an official distribution was executed at 10th of January 2018 for a period of one month. It was distributed through the official Facebook webpages of DTU, Copenhagen university and Aalborg University as well as in the Moodle webpage of Aalborg University. However, only 50 questionnaires were distributed of which only one completed. Thus, there was a need of a follow-up distribution.

Follow-up distribution

Considering that the first two stages or waves of distribution were unsuccessful, it was decided to broaden the distribution channels and make a minor changes in the questionnaire (for example, deleting questions on income of the participants) for the follow-up distribution. Consequently, the questionnaire was not only distributed again to the previous Facebook pages but also the researcher used a "snowball effect" of distribution. In other words, participants were asked to redistribute the questionnaire to other students of university staff. Additionally, the researcher collected data by going to Aalborg University in Copenhagen and enquired of willing participants. At this stage of distribution and data collection (from 4th March - 20th of March), 183 questionnaires were distributed of which 32 completed the survey. Although the recommended number of participants are 100, due to time constraints there would not be further distribution of the survey.

Data analysis

SPSS (Statistics Packaging for Social Science) is a statistical software that helps researchers to create and/or analyze quantitative data. The data from the quantitative survey will be exported from SurveyXact to SPSS for analysis.

Conjoint analysis

SPSS Conjoint analysis uses the full-profile approach, where the respondents are asked to rank set of profiles or cards, according to preference (SPSS base 14.0 user's guide. 2005)

Usually the analysis method depends on two major factors: the nature of the scale used to evaluate the preferences and the desired level of data aggregation (SPSS base 14.0 user's guide. 2005).

An non-numeric, ordinal scale was used to evaluate the preferences of the participants. More specifically Likert scale (*Strongly agree; Agree; I don't know; Disagree; Strongly Disagree*). Although, the desired samples size was about 100 participants, only 36 completed/semi-completed the survey compared to the 267 distributed overall. This makes the data aggregation comparatively small.

The researcher did the conjoint analysis and utilities using SPSS. Additionally, Pearson's and Kendall tests were employed to test the validity of the model.

Running Conjoint Analysis

To analyze the data from the conjoint analysis, Conjoint procedure, using command syntax must be used (SPSS base 14.0 user's guide. 2005). The process of running the conjoint analysis on SPSS requires two types of files: *plan file* (the 22 profiles generated by the Orthogonal design in SPSS) and *data file* (the imported file from SurveyXact, with the preferences of the sample group). It was referred in the previous subsection that the data was "scored" using ordinal scale. However, the software has only three options where the recording of the data is concerned: *sequential; ranking and preference score*. (SPSS base 14.0 user's guide. 2005) The one that is closest to the scale type used in this research method is the preference score, where instead of scoring using numerical data, it is used ordinal data that has been coded as numerical (Strongly agree:1; Agree: 2; Don't know: 3; Disagree: 4; Strongly disagree: 5). After the Score command, questions s_11 to s_32 were used to indicate, the placement of the conjoint profiles in the survey (Figure 2). Although, the sample will be analyzed as whole, the Subject subcommand will be used in the syntax, so the software will not consider that the data to originate from one subject (SPSS base 14.0 user's guide. 2005). Since the subjects had not

identification number, the values of the “age” (s_1) were used as an index for an individual respondent (Figure 4. Running conjoint analysis: Command syntax).

```
CONJOINT  
PLAN="/Users/magdalenapetrovadokuzova/Documents/Parsnip_attitudes.sav"/DATA=*  
/SCORE= s_11 TO s_32/SUBJECT= s_1
```

Figure 4. Running conjoint analysis: Command syntax

The objective of the paper is to examine the determinants of consumption of oddly shaped vegetables. In that case the primary factor while creating the profiles was the shape of the product. Moreover, no assumptions were made about the relationship between the factor and the scores. Thus, within the factor subcommand, a discrete model was used (SPSS base 14.0 user's guide. 2005)

Qualitative interviews

The aim of the qualitative interviews in this paper is to examine the intended behavior and determinants in parallel with the quantitative method by using convergent design of integration of mixed methods, on a methods level. In other words one database (the survey) links to the other (the interview) through sampling (Creswell, J.W., Curry, L.A., Fetters, M.D. 2013). It also aims to validate the results from the survey. This method uses the same target group (university students and staff). It adds deeper understanding on the perceptions/attitudes the target group as well as the determinants influencing their choice of raw produce.

Sampling

The sample of the qualitative interviews overlaps to a certain extent to the quantitative survey. Gathering participants for the interviews was done in two different ways. In the first distribution of the survey the participants were encouraged to write their email if they would wish to participate in the interviews. Since, there was a low number of completed surveys and even lower number of willing interviewees, the method and channels of distribution of the survey have changed. Which lead to changing the way of collecting participants for the qualitative interview. Thereafter, some of the participants in the survey online and face-to-face were invited to participate again in the interviews. Those who wished to participate, gave contact information

(such an e-mail). Overall, there were 5 university students, from various backgrounds were willing and chosen to participate in the interviews.

Semi-structured interviews (SSI)

The interviews will be semi-structured. SSI is designed to identify *subjective responses from persons regarding a particular situation or phenomenon they have experienced* (McIntosh, Morse 2015). In this research the interviews will be focused on discerning the attitudes and determinants linked to consumption and purchase of oddly shaped vegetables. This type of interviews have a specific set of questions that all interviewees will be asked on. Also there could be additional probing and/ or clarifying questions depending on the answers the interviewees provide. This flexibility of SSIs, makes them preferable over structured interviews, because they give opportunity to examine more in depth the social worlds of the interviewees (Bryman 2008).

Interview guide

The interview guide consists of two parts. The first one is a background information on the interviewees: *age; education and nationality*. None of the participants, however were asked about their name, since the interviews are anonymous. The background information is to purely for comparison with the demographics of the sample from the quantitative survey.

The interview guide were structured on the base of The Theory of planned behavior (TPB), where the questions will be grouped according to the elements of the theory i.e. attitudes/beliefs ("What do you associate with oddly shaped vegetables?"), subjective norms ("How most of the people you know perceive oddly shaped vegetables?"), perceived behavior control ("How confident do you feel in preparing/cooking oddly shaped vegetables (show picture of oddly shape parsnip?)") (Table 1 Interview guide.). Examining these components will give an indication for the intended behavior (in that case consumption of oddly shaped vegetables), according to the TBP. Thus, based on the intended behavior and the determinants, health promotion strategies will be suggested and discussed under the discussion section of this paper.

Table 1 Interview guide

Topics	Sub-questions
Food habits and practices and determinants	<p>What type of eater do you consider yourself to be? (someone who eats more veggies, meat, fast food etc.)Do you have any dietary preferences?</p> <p>How often do you shop for raw veggies?</p> <p>How comfortable do you feel cooking raw produce(veggies)?</p> <p>What do you consider when you are doing your grocery shopping for fresh vegetables?</p> <p>What criteria has the highest priority when you buy fresh produce?</p> <p>Why? (Freshness, taste, organic, local, price, shape, etc.)</p>
Attitudes /Perceptions	<p>Do you have any experience or memories with oddly shaped vegetables? If so, what are they?</p> <p>What do you associate with oddly shaped vegetables?</p> <p>To what extent do you think oddly shaped vegetables are safe or unsafe to eat? Why?</p>
Social norms	<p>How most of the people you know perceive oddly shaped vegetables?</p> <p>Do most of the people you know perceive oddly shaped vegetables to be safe or unsafe to eat?</p>
Perceived behavior control	<p>Please tell me what kind of considerations do you have while shopping for raw vegetables?</p> <p>How confident do you feel in preparing/cooking oddly shaped vegetables (show picture of oddly shape parsnip)?</p>

Collection of data

Using qualitative interviews as part of the mixed methodology can be rewarding but also time-consuming. According to Bryman, conducting and transcribing interviews should be done in an adequate amount of time (Bryman 2008).Due to time constraints, however, only five interviews were conducted in the frame of two weeks, depending on the availability of the interviewees. The interviews themselves were about 10 minutes long, three of which were done face-to-face and two though Skype (with only audio, without videos). The place/channels the interviews, through which the interviews were administered, were chosen by the participants. All of the interviews were recorded with the assistance of a mobile recording application.

The interviews started with an information about the research, the interviewee's ethical rights and that they will be recorded during the interview. Additionally, each of the participants received a written informed consent inspired by National Centre for Postsecondary Improvement (National Center for Postsecondary Improvement 2003) (Appendix 1).Before

proceeding to the interview each of them confirmed their voluntary participation. None of the names of the interviewees were recorded before or during the interview. The interviewees were encouraged to speak in English, but were also given the choice not to (thus speaking in the language they are most comfortable with). As a result all of the participants chose to have the interviews in English.

Transcription and coding

The transcription of all of the interviews was done from recorded audio files directly from the application. All of the transcribing was done by the researcher, which may be time-consuming but gives the *benefits in terms of bringing the researcher closer to the data (Bryman 2008)*. The transcribing itself had to be done cautiously, so not important information or fragment to be misplaced or not recorded properly. This could lead to misinterpretation of the qualitative interview/s, thus undermining the validity of the method.

The focus of the transcription and coding was on the verbal as well as non-verbal (where that was available) communication during the interviews. However, some of the interviews were done only through audio without any visual prompts. Consequently, the verbal (transcribed) portion of the interviews takes priority in this research.

The interview guide already has themes based on the components of the TPB. According to those themes/topics, the transcriptions will be coded. On the basis of the code and the components of the TPB a thematic analysis will be conducted.

Results

Quantitative survey

As the quantitative survey is compiled of three types of questions. One of which is the demographic questions concerning the characteristics of the participants such as: age, nationality, marital status. Other part concerns the preferences and intended behavior of the participants. The results in this case will start by summarizing the demographic characteristics of the target sample. Then presenting the results of the conjoint analysis. Finally, assessing the relationships between the attitudes and perceived behavioral control and the participant's willingness to purchase oddly shaped vegetables.

Demographics

The survey was distributed 305 times, only 35 of the participants completed or partially completed the questionnaire. From Table 2 it can be observed that larger portion of the participants are female (51,1%). The age range among the participants was relatively wide, from 22 to 58 years of age. However, over 50% of the sample were young, between 25 and 30 years of age.

In general, the sample was well educated, where 37,1% have a College and/or Bachelor degree and 34,3% have a Master degree. There was some diversity in nationality among the participants such as Australian, Russian, Nepalese, Bulgarian, Danish. However, relatively larger portion of the participants are either Danish (3,3%) or Nepalese (4,3%).

Most of the participants claim to have a partner, as 65,7 % are married and 11,4% are in relationship. What is more, majority (62,9%) do not have children, as oppose to 37,1% who do.

Table 2. Social demographic characteristics of survey participants

Characteristic	Mean \pm SD.	(n)	(%)
Age	29.17 \pm 8.559	35	
Gender	-		
Female	-	20	51,1%
Male	-	15	42,9%
Completed education	-		
High school diploma	-	6	17,1%
College and Bachelor degree	-	13	37,1%
Technical school	-	4	11,4%

Master degree	-	12	34,3%
Marital status	-		
Single	-	8	22,9%
In relationship	-	4	11,4%
Married	-	23	65,7%
Children	-		
Yes	-	13	37,1%
No	-	22	62,9%

Food-related behavior

From Table 3. It can be seen that large part of the participants are responsible grocery shopping (74,3%) in their respective households more than 3 times per week. We can see that 32,3% of the participants are responsible for cooking 2-3 times a day, but 48,4% of them cook more than twice a week. The results show that the respondents use similar amount of time preparing and cooking to the average of the Danish population (Danskernes måltidsvaner, holdninger et al.), where 68,6% of them use between 30 minutes to an hour per day. It must be noted that majority of the target sample (74,3%) have encountered in the past oddly shaped vegetables.

Table 3 Food-related behavior

Food-related habits	(n)	(%)
Responsible for grocery shopping		
5-7 times per week	8	22,9%

3-4 times a week	18	51,4%
------------------	----	-------

1-2 times a week	9	25,7%
------------------	---	-------

Responsibility for cooking

2-3 times a day	10	32,3%
-----------------	----	-------

1 time per day	3	9,7%
----------------	---	------

5-6 times per week	7	22,6%
--------------------	---	-------

2-4 times per week	8	25,8%
--------------------	---	-------

1-2 times per week	2	6,5%
--------------------	---	------

Rarely/Never	1	3,2%
--------------	---	------

**Frequency of consumption of
fruits and vegetables**

6 + times per day	1	3,2%
-------------------	---	------

4 – 5 times per day	5	16,1%
---------------------	---	-------

2 – 3 times per day	15	48,4%
---------------------	----	-------

1 time per day	5	16,1%
----------------	---	-------

5 – 6 times per week	2	6,5%
----------------------	---	------

2 – 4 times per week	2	6,5%
----------------------	---	------

1 – 2 times per week	1	3,2%
----------------------	---	------

Cooking time (daily)

0-30 minutes	6	17,1%
--------------	---	-------

30 min - 1 h.	24	68,6%
---------------	----	-------

1-2 h.	4	11,4%
--------	---	-------

2h<	1	2,9%
-----	---	------

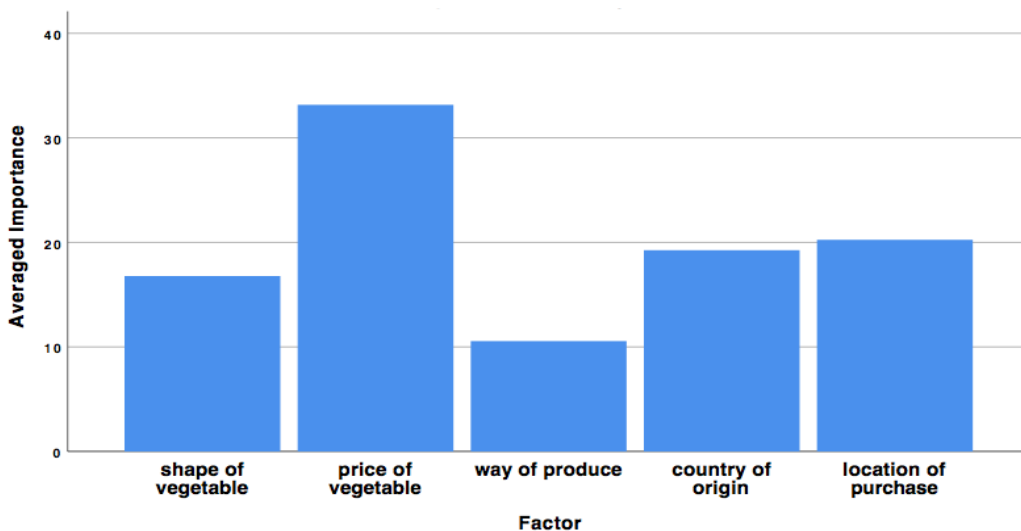
Previous experience with oddly shaped vegetables

Yes	26	74,3%
No	9	25,7%

Conjoint analysis

The purpose of the conjoint analysis is to analyze the participants' preferences and the determinants influencing their willingness to buy oddly shaped vegetables or in this case the consumption of oddly shaped parsnip. This subsection will focus separately on four factors used in the conjoint analysis: shape, price, produce origin and location. Overall, price played the highest importance when choosing parsnip, followed by location of purchase (Figure 4), (Table 3 Results of conjoint analysis: utility estimates and importance values). For the respondents, the type of produce (organic and/or conventional) was least important determinant of purchase (Figure 4. Average Importance).

Figure 4. Average importance values, derived from conjoint analysis results (Table 4.)



Shape

Part of the objective of this paper is to examine the consumer's perceptions on the shape of the vegetables (the parsnip). Among the three types of shape (very deformed; moderately deformed; normal), moderately shaped parsnip is the most preferred with Utility Estimate (UE) of 0.116 (Table 4.). On the other hand, it seems that very deformed parsnips were least preferred with UE of - 0.108 (Table 3.). Finally, normally shaped parsnips were with estimate of - 0.009, which is not significant to estimate positive or negative preferences.

Price

Where price is concerned, there was significant difference (Table 4.) in preferences within the price range. Participants had a highest preference towards the lowest price range (4kr /500 gm. with 0.356 UE and lowest preference towards the highest price range (18 kr. /500gm) with - 0.290 UE (Table 4.).

Produce and origin

There was relatively strong preference among respondents towards Danish (0.194 UE) and organic (0.013 UE) parsnips. Parsnips originating from Europe (- 0.108) were less likely to be preferred over parsnips from Worldwide (-0.087 UE) (Table 4.).

Location

There was also a significant difference among different locations of purchase (supermarket; corner shop (kiosk); farmer's market). Respondents were least likely to buy parsnips "sold" in farmer's market (- 0.207 UE). Corner shop (kiosk) seemed to be the most preferred location for purchase (0.163 UE) in comparison to supermarket (0.043 UE) (Table 3.).

Table 4 Results of conjoint analysis: utility estimates and importance values

Factors	Level	Utility estimate	Importance value
shape	Very deformed	-.108	16.780
	Moderately deformed	.116	
	normal	-.009	

price	4 kr./500gr.	.355	33.161
	9 kr./500gr.	-.066	
	18 kr./500gr.	-.290	
Produce	conventional	-.013	10.559
	organic	.013	
origin	Worldwide	-.087	19.252
	European	-.108	
	Danish	.194	
location	supermarket	.043	20.248
	Corner shop (kiosk)	.163	
	Farmer's market	-.207	
Constant		3.221	
Pearson's R		.812	
Kendal tau		.682	
Kendall tau for holdouts		.913	

Univariate analysis

Determinants of intention/ willingness of consumption

Univariate analysis was used to determine the interactions between the determinants used in the conjoint analysis (price; shape; produce; origin; location), gender of the participants, the data from the questions on attitudes (*"Buying oddly shaped vegetable would be beneficial for*

my health “) and PBC (“*Cooking oddly shaped vegetables will require extra effort*”) with the willingness to buy (the score that the respondents gave on each of the profiles of the conjoint analysis) (Table 5.). Additionally, univariate statistical test was conducted to determine the effects of the participant’s marital status and the presence/absence of children on the participants’ willingness to buy oddly shaped parsnips. It shows that both the marital status ($p < 0,05$; $p = 0,26$) and the presence of children ($p < 0,05$; $p = .00$) influence the intention to purchase oddly shaped parsnips.

In general, from Table 5. it can be seen that among the factors used in the conjoint analysis only price ($p < 0,05$) plays a significant role in predicting and/or explaining participant’s willingness to buy oddly shaped vegetables. Determinants such as gender ($p = 0,062$), produce (organic/conventional) ($p = 0,054$), origin ($p = 0,084$) of the product had no significantly effect on the willingness to buy. Additionally, shape ($p = 0,567$) of the parsnips and location of purchase ($p = 0,709$) have no effect on the willingness to purchase parsnip.

Table 5. Univariate analysis of variance and interaction (ANOVA)

Test of Between – Subjects Effects	
<i>Dependent variable: Willingness to buy oddly shaped parsnip</i>	
Factor	Sig.
Gender	,062
Shape	,567
Price	,000
Produce	,054
Origin	,084
Location	,709
Attitude	,078

PBC	,106
Gender*price	,004

Attitudes and other determinants

Attitudes and PBC

In general, the participants had a positive attitude towards oddly shaped vegetables, where 33,3 % of the sample consider them safe, 6,7% consider them appealing. However, the linear regression shows that the attitudes($p > 0,05$; $p = 0,078$) and perceived behavior control($p > 0,05$; $p = 0,106$) have fairly low to no effect on the intended purchase of oddly shaped parsnips.

Other determinants

Additional determinants were examined i.e. gender, packaging. In the previous subsection it was mentioned that gender was examined as a factor that could influence the intention to purchase oddly shaped parsnips. After examining the gender and price interaction, the statistical test showed that gender ($p < 0,05$; $p = 0,004$) influence the amount of money the participants are willing to pay for a product (in this case parsnip)(Table 5.).Figure 5 shows that women tend to be more willing to buy than men at lower prices (4kr., 9kr.) and a shift is seen where men tend to be more willing to buy at higher prices than women (Figure 5.)

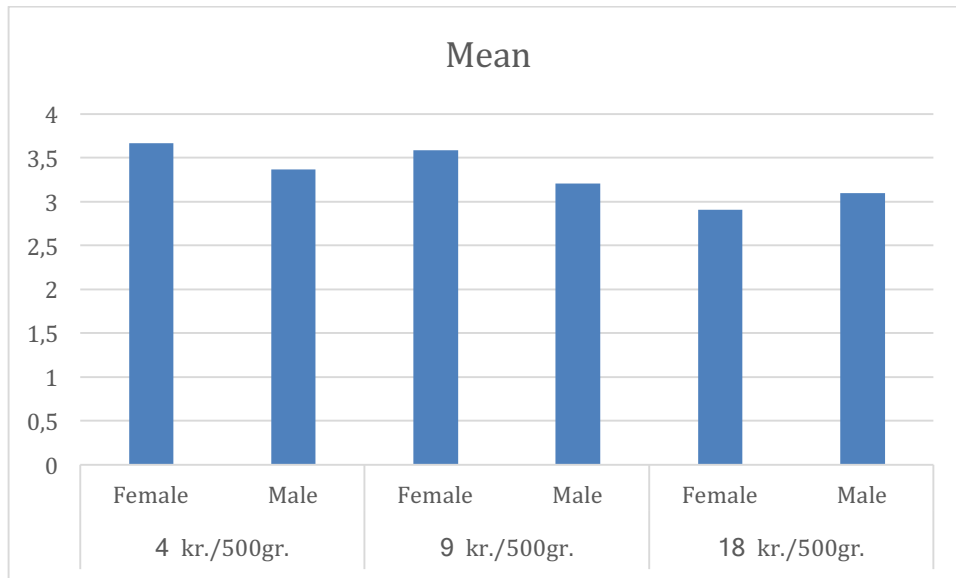


Figure 5 Effects of gender on purchasing behavior

Finally, a Kruskal – Wallis test was employed to assess the impact of different types of packaging (loose; bag; box; mix) on the purchasing behavior of the target sample. The results of the test show that packaging ($p < 0,05$; $p = 0,894$) does not affect the consumer's behavior.

Qualitative interviews

Descriptive

As mentioned previously, five separate, semi-structured interviews were conducted. Before the interview started background information was asked of the interviewees, regarding their age, nationality and education. From Table 6. it can be seen that there were three female, and two male interviewees, between the age of 28 – 35. Most of the interviewees (three of them) have background in Public Health and/or Sustainability. In general, the female participants are diverse in nationality, while the male interviewees are both Nepalese. Overall, the demographic characteristics to a large extent match the ones from the quantitative survey.

Table 6 Demographic characteristics of interviewees

Name (symbol)	Gender	Age	Nationality	Education
B.	male	35	Nepalese	Master in Public Health, Global Health
G.	female	28	Swiss, grew up in Italy	Master in Sustainable cities
N.	female	35	Philippines	Master in Business Management
S.	male	33	Nepalese	Bachelor in Public Health
Y.	female	28	Russian	Master in Applied Economics and Finance

Frequency of consumption and food habits

When asked about their food preferences and vegetable consumption, all of the interviewees seemed to be conscious of what they consume. A couple of the interviewees referred to their diet as balanced: “(...) *balanced meal. (...) I don’t want to be vegetarian and I don’t want to be meat eater only so...*”(N.); “(...) *I like both, it depends on the situation (...) so I try to keep it more balanced*” (S.). While other interviewees indicated that they are health conscious: “*I am a little bit health concerned persons.*”(B.); “*I am conscious about what I eat (...)*”(G.); “(...) *I like to cook raw vegetables and fruits (...) because I think it is healthy to eat them (...)*”(Y.) The frequency of consumption and/ or purchase of fruits and vegetables vary among the interviewees some buy once a week (S.), while other three to four times a week.

In general, all of the interviewees seemed to be comfortable with cooking/ preparation of fruits and vegetables: “I am very much comfortable. I like to cook raw vegetables.”(B.); “Very comfortable(...) I grew up with it so ...always cooking with my parents.”(G.)

Determinants

Most of the participants considered price and freshness as main criteria while purchasing fruits and vegetables: “(...) *first of all appearance, when it looks very fresh that (...) it takes my attention very fast (...) I would go for price and a look of the vegetables and fruits*”(B.);

“*And it should be fresh looking.*”(N.); “(...) *freshness of fruits and vegetables and look is also important. (...) I would say combination of price and freshness*” (Y.)

S., however, underlined that for him freshness takes priority over price when he purchases fresh produce: “(...) *even though if it is cheap but the vegetable doesn't look fresh and nice I don't think I would buy it.*”(S.)

Four of the interviewees also agreed that they are more willing to buy organic produce over conventional one. However, the way the interviewees prioritize the different criteria (freshness, price and organic) varies. For G. and N. this criteria is of the most importance: “*I like to buy mostly organic if it is possible (...) I definitely prefer organic product and the rest a bit, it depends on the day.*”(G.); “*Organic ones! Yes, the priority is organic ones.*”(N.). On the contrary, for Y. organic produce is not as important as freshness and price: “*I am not looking for økologisk, for the ummm organic fruits and vegetables, but it has to look fresh and the price should be affordable for me.*”(Y.)

S., B. and G. are willing to spend more money, provided that the raw produce is organic: “(...) *if I get some organic vegetables in the vegetables in the same price of non-organic, I would prefer to buy the organic one* (...)”(S.); “*I don't mind spending a bit more money if I know that the product is good (...) I have that idea that organic is better for me and the environment* (...)”(G.); “(...) *if it looks very good and if it is organic and is very fresh, I am willing to pay extra bucks on it, but if it is regular one (...) if I have to just choose only on then I would choose for the price.*”(B.)

In general, the shape of the fruits and vegetables appears not influence the interviewees purchasing behavior towards fruits and vegetables. This is further confirmed by G.: “*I don't think I mind the shape but I guess if I had the choice and they were the same price, I will choose the normal ones, but then again if there are only ugly shaped ones then I would buy them as well.*”(G.)

Attitudes

Previous experiences

Each of the interviewees have had previous experiences with oddly shaped vegetables. For Y., N., S. and B. experience with oddly shaped vegetables extends to produce, that they have seen/ purchased, such as beetroots and soup vegetables: *"I don't think that is often but sometimes I think in supermarkets, the packaging of the fruits...of the vegetables(...)that was made for soups (...)sometimes they make...they put vegetables that are oddly shaped"*(Y.); *"Yes, mostly beetroots.(...)Yes, here in Denmark."*(N.). Whereas, G. have come across a promotion campaign of oddly shaped vegetables in her home country: *"(...)in Switzerland there is , there was a campaign in the supermarkets where they would also sell oddly shaped vegetables and I did it, I bought those vegetables."*(G.)

Overall, the attitudes towards oddly shaped vegetables were positive among the participants in the interviews. Regarding her experience with the campaign according to G. : *"I think it is good way to prevent food waste, prevent all those vegetables to be thrown. I think it is a shame that they don't reach the supermarkets..."*(G.). She further considers oddly shaped vegetables to be *"just like normal (vegetables)"*(G.). The rest of the interviewees had similar attitudes towards this type of products: *"Nothing it is just a food"*(N.); *"I think shape does not determine the quality of food...I think it is safe to eat."*(S.); *"I know that quality doesn't really degrade with shape and size...they are just modified versions of the same normal fruits and vegetables "*(B.)

In equivalent, the interviewees in general regard oddly shaped vegetables to be safe for consumption: *"they are safe as the fresh or nice shape fruits and vegetables because they grow in the same place"*(B.); *"I don't think it is unsafe to eat...it's just appearance I think"*(N.)

Social Norms

According to some of the interviewees, most of their friends and family have a neutral attitude/ perceptions towards oddly shaped: *"...so I guess for them it is also about preventing food waste and being sustainable , so its maybe less of an issue that it should look good..."*(G.); *"We buy oddly shaped vegetables. It is not a big thing."*(N.)

S. and Y., however, indicated that the reduced availability of oddly shaped vegetables does not give a ground for discussion on this topic among his friends and family: *"friends don't have an idea of what is oddly shaped vegetables because it is very hard to find in the supermarkets so I*

really don't know what is their perceive (their perception) on the topic."(S.); *"I don't think that everybody knows about oddly shaped vegetables even for me it takes time to think..."*(Y.)

Finally, there was significant distinction of the perceived opinions of friends/family and of a third party (according to the interviewees): *"Other people will just have a second thought...the oddly shaped...it's always the first the appearance. First impression as you say it."*(N.); *"...if I have to consider as normal persons, I don't like when it looks odd, oddly shaped..."*(B.); *"...some high price category of people, they might look at that because they might feel discomfort of peeling or it does not look as it is supposed to be(...)"*(Y.); *"They could think it looks ugly or they could think that because it is oddly shaped maybe it is genetically modified so they might not like it"*(S.).

Perceived Behavioral Control (PBC)

An indicator for the PBC was interviewees' confidence in preparation and cooking of oddly shaped vegetables. Most of them declared that they are sure of their capability to prepare and/or cook oddly shaped vegetables: *"(...) pretty confident, I don't think it makes big difference if the vegetables are oddly shaped"*(S.); *"I have never had an issue with it (...) so yeah shape is not a problem"*(G.); *"Very confident. It does not make difference."*(N.). Y. adds still that oddly shaped vegetables sometimes are *"uncomfortable to peel"* and *"the way to prepare it might feel discomfort able"*, but otherwise *"it is totally fine to use it for eating"*.

Underlying determinants

Though, the interviewees had an overall positive attitudes and PBC regarding oddly shaped vegetables, the results from the analysis of the transcriptions (Appendix 5.) show that there might have been an underlying determinants influencing the participant's perceptions. One of these determinants seem to be the education. This was specifically was underlined by B.: *"(...)since being a students of public health, I am very much concerned about food (...) but since I am public health student and I know that quality doesn't really degrade with shape and size ..."* (B.). Another underlying determinants that could have an influence on the attitudes towards oddly shaped vegetables are previous experiences through work or person's 'upbringing (culture): *"Well I was working in a restaurant...two times and then where we have to use lots of vegetables and fruits and then we were buying actually mini ugly shaped fruits and vegetables (...)"*(B.); *"I grew up on a farm actually so we always had big garden and yeah I, I grew up with it*

(...)I grew up in this organic farm and I kind of miss that kind of and I have that idea that organic is better for me and the environment(...)"(G.);"(...) in Nepal I think, how I grew up is just fry most of the vegetables so that's how we eat it(...)"(S.)

Discussion

In the beginning of this paper, it was mentioned that a combination between qualitative and quantitative results will provide the final product of this research. It must be noted that results described in the previous section are not equipment with each other. In this section of the research paper, the results will be analyzed discussed and compared to the current literature on the topic. Moreover, the results I will be also discussed in the respect of the theory of planned behavior. Finally the validity and reliability at are the research will be put under question as well as underlying future perspectives. By future perspectives it is meant possible future research and Health intervention regarding oddly shaped fruits and vegetables.

The objective of this paper is to examine the intention of behavior (of purchase) of the consumers towards oddly shaped vegetables. This was done by determining, what are the factors influencing their intention of purchase.(write some more)

Both the quantitative and qualitative methods have examined the intended behavior towards oddly shaped vegetables and the determinants leading to them: physical environment/ individual determinants (price; freshness of the produce; organic production ;marital status; presence of children) and TPB determinants/ components (attitude; social norms; perceived behavioral control).

Determinants

The results of the study show that the main determinants influencing the intended purchase of oddly shaped vegetables are the price, freshness of the produce. There were also demographic determinants, such as marital status and children that show significant effect on the target group's choices regarding oddly shaped fruits and vegetables. Extrinsic determinants such as packaging and shape of the produce did not affect the consumer preferences.

The scope of the determinants and the way they were examined varies within the methods that were used (quantitative surveys; semi-structured interviews). The quantitative method explored various number of determinants on the basis of the state-of the art (Appendix 4.). The

interviews, however, were more exploratory, where the participants had the opportunity to grade which factors/ qualities govern their choice (in their perspective).

Price as determinant have shown the highest priority for the target population. Both the quantitative and qualitative data show that price of the product can significantly change consumer preferences. This results are not new however, in the research area of the consumer behavior. This result is in alignment with the literature concerning consumer behavior and more specifically purchasing behavior of university students (Deliens, Clarys et al. 2014). This may be explained on the grounds of that university students (especially those living apart of their parents) and staff are self-dependent, which implies that prices of products become more important (Deliens, Clarys et al. 2014).

The study does not provide any evidence that the type of produce (organic vs. conventional) could predict or explain consumer's preferences towards oddly shaped vegetables. It can certainly influence how much is the target sample willing to spend on those type of products. The participants are willing to pay higher premium if the product is organic, which is in consensus with some of the literature (Moser, Raffaelli et al. 2011). There is however no correlation between environmental attributes such as locality and type of produce and the intended purchase of oddly shaped vegetables.

The results of the study and the literature identify freshness of the produce as important factor in selecting and then purchasing fruits and vegetables (Gao, House et al. 2011). That, however cannot completely confirmed by the quantitative survey since “freshness” was not examined as a determinant in this method. Furthermore, the concept of “freshness” could be interpreted in various ways by the target group and the researcher. Thus, if it were to be examined as a factor, further delimitations and concrete definitions of the concept would needed.

This study adds to the research of the oddly shaped vegetables and the consumer behavior of university students by validating that price and freshness have higher priority over shape of the produce (Loebnitz, Schuitema et al. 2015). In fact, in this research, shape does not show any significant effect on the consumer choices linked to their preferences of fruits and vegetables. This both contradicts with the expectations of the study and of the literature on the topic (Loebnitz, Schuitema et al. 2015).

Additionally, the literature has indicated that certain demographic characteristics such as marital status and presence of children could influence the consumption of fruits and vegetables (Gao, House et al. 2011, Ragaert, Verbeke et al. 2004). The results of the research, not only confirm with the literature but also build on it. According to the quantitative survey, the marital status

and the presence of children in the household affect positively on the willingness to buy oddly shaped vegetables.

Theory of planned behavior

In this paper, The Theory of planned behavior was used as a backbone of the research. In the quantitative survey, only two of the components (attitude and perceived behavioral control) of TPB were used. The objective was to measure their effect on the willingness/ intention to buy oddly shaped vegetables. However, neither attitudes or PBC showed a statistically significant effect on the intention to purchase oddly shaped parsnip.

In the qualitative interviews , however, it was assumed that the combination of positive: attitudes, social norms and perceived behavioral control, will lead to the intended behavior. In that respect, the interviewees did have positive perceptions towards oddly shaped vegetables, their friends and family had positive or neutral attitudes, and there were confident in their skills to prepare and/or cook oddly shaped vegetables.

According Dunn et al., the predictive power of the TPB is generally weaker when applied to dietary behavior and may not necessarily capture all of the predictors of more complex behavior such as food choice (Dunn, Mohr et al. 2011). Therefore, positive attitudes, SN and PBC does not necessarily mean that the target group has a positive intention to purchase oddly shaped vegetables. This in turn gives a substance to the results from the quantitative survey.

Consequently, the most that could be expected in terms of correlation among the TPB constructs(i.e. Attitudes, social norms, perceived behavioral control) coefficient of about 0.60(Ajzen 2011).

In comparison to other articles using TPB as main theory, this research paper differs in method of measurement of its components. For example, Bogers et al. used 7-point bipolar scale to measure the components of TPB, while Kothe et al. uses 100-point visual analogue scale (Kothe 2012, Bogers, Brug et al. 2004). On the basis of these scales Bogers and Kothe, analyze their results using SPSS and Cronbach's α or inter-item correlations (Bogers, Brug et al. 2004, Kothe 2012). In this research, however, the components are measured both using 5-point Likert scale and qualitatively, through semi-structured interviews. In turn, this could lead to misinterpreting and/or miscalculating the data from the research.

Limitations of the methods

Although, mixed methodology is very useful for analyzing the Behaviors and the determinants leading to these Behaviors of the target population, they have their limitations. In this subsection these limitations will be discussed regarding quantitative and qualitative methods as well as conjoint analysis.

Quantitative survey

One of the limitations of the quantitative survey (self-completion web survey), is that there is nobody that could help the participants if they have difficulties understanding and responding the questions(Bryman 2008)

The way the survey questionnaire was constructed and presented, could have led to misinterpretations and non-response by the target sample. The questions were presented together. Therefore the participants could read through all of them. This could be problematic as the conjoint profiles were meant to be viewed separately. Showing all of the profiles on the same page might have given the wrong impression to the participants.

According to Bryman et al., respondents are more likely to become tired of answering questions that are not very salient to them, or are perceived by the participants as boring/ irrelevant to the research topic(Bryman 2008)

Qualitative interviews

As a method qualitative interviews tend to be subjective in terms of constructing the interview guide and interpretation of the results (Bryman 2008) In other words the results could be subjected to interviewer bias, where the way the information is solicited, recorded or interpreted could be influenced by the preconceived notions of the interviewer on the research topic (Pannucci, Wilkins 2010)

Another limitation of the qualitative interviews is limited possibility for replication of the results(Bryman 2008). Since the method is subjective and the results are derived from the viewpoints of the interviewees, it would be nearly impossible to gather the same participants with the same background and demographic characteristics (age, gender, education).

The results obtained by this method could not be generalized for the whole target population(Bryman 2008).

Reliability and Validity

Quantitative survey

Stability

The stability of the quantitative survey convey whether a measure is stable over time, so the researcher is confident that the results relating to that measure for a sample of respondents do not fluctuate(Bryman 2008). In this paper, however, it was not possible to examine the stability of the measurement, as it would require considerable amount of time and effort. It is also very possible that the measurements could be affected by the first measurement.

Internal reliability

The internal reliability depends on whether or not the indicators measured in the survey relate to the same thing, or in other words, whether there is coherence(Bryman 2008). In this paper, the Cronbach's alpha was measured to discern that. According, to that measurement (Cronbach's alpha) the study has low internal reliability with coefficient equal to 0,279, which is a great deal less than the recommended minimum of 0,65.

Validity

In the quantitative survey , a face validity was measured. The validity of the questionnaire was determined by the researcher. On the basis of that, it was determined that the survey was valid. However, measurement using face validity could not ensure with certainty the validity of the questionnaire.

Qualitative interviews

External reliability

The external reliability is the degree to which the study can be replicated (Bryman 2008). As mentioned in the previous subsection, qualitative methods can hardly if ever be replicated. This is also valid for the interviews in this paper.

Validity

Validity of the qualitative study refers to the degree to which findings can be generalized and validity should be used to judge the quality of the research (Bryan, 2004, p. 273). To maintain the quality of this study, a careful research plan was executed. Interview guide was prepared

based on the aim of the study while complementing the result of previous studies on the topic and guided by the theoretical framework. Ethical consideration were mentioned and participants were fully informed regarding the aim of the study and their anonymity.

Bias

Non-response bias

The target sample of the quantitative survey was relatively small. From over 200 distributed surveys online, only 35 were completed or partially completed. This makes over 90% non-response rate. To improve the response rate, broader range of channels were employed. The survey was also altered after the first distribution to boost the response rate. These measurements had only slightly improved the response, increasing it from 20 to 35 participants. Possible reasons for the small sample size could be the number of questions (over 20 questions) or it could be due to a wrong sampling method. Furthermore, the smaller the sample size, increases the size of the standard error and reduces the likelihood of demonstrating statistically significant relationships, such as between the determinants and the willingness to buy oddly shaped vegetables (Gibney 2004). That however, does not mean that if the sample is biased the size could increase validity of the research.

Sampling bias

The sample gathered for the interviews was from a willing participants of the survey, using convenience sampling. Thus, constricting to only those interested in the research topic. As mentioned, most (three out of five) of the interviewees have had previous education in public health and/or sustainability. Their background knowledge may influence their answers to the interview questionnaire. Thus, the sample used in the qualitative method is not representative for the target population.

Confounding factors

Food choice is a complex field of research. It depends of many variables and more often than not the subjects(consumers) are not always conscious of the reasons behind their preferences of certain type of foods(Gibney 2004). Despite the broad range of factors that were examined by both the qualitative and quantitative methods, there is still a possibility that confounding factors

might have influenced the outcome of the research. For example, the effect of the media and advertising might have influenced the attitudes of the consumers in regards to oddly shaped vegetables.

Implications and future perspectives

According to the results of the study, consumers seem to have overall positive perspectives of oddly shaped vegetables. Some of the interviewees even expressed that they have had previous positive experiences with those types of produce. That is crucial, as studies show that positive experiences with certain food may increase the consumer's willingness to purchase and consume that food in the future (Gibney 2004).

Continuation and promotion of consumption of oddly shaped fruits and vegetables is important for reduction of food waste. The higher of consumption of oddly shaped vegetables the lower is the percentage of not only wasted produce, but water and other resources. Additionally, promotion of oddly shaped fruits and vegetables essentially means promotion of healthier diet (Gibney 2004).

As whole the European Parliament has food waste high on their agenda and is taking steps in making oddly shaped fruits and vegetables available within the European Union (Fyens Stiftstidende 2017). Consequently, In the recent years there have been established a number of fairly successful campaigns and initiatives taking with the aim to promote purchase and consumption of oddly shaped vegetables within Europe. Initiatives such as “Wonky vegetables” in United Kingdom, for example, sell consumers and give to charities oddly shaped vegetables (Wonky Vegetables 2018). In Switzerland, a similar initiative by the market- leader Coop, marketed oddly shaped fruits and vegetables under the name “Unique” (The Local 2013). In both of the initiatives, however, the prices for the deformed fruits and vegetables is significantly lower compared to its counterparts (the “normal” fruits and vegetables), sometimes nearly 60% lower than the first-class (The Local 2013).

Despite, organizations such as Madspild and Wefood there still isn't wide availability of oddly shaped fruits and vegetables in Denmark. Based on the results of the thesis and on the aforementioned campaigns, certain strategies for future initiatives/ campaigns could be proposed. They could include: lower prices for deformed fruits and vegetables (as price seems to have highest priority for the target group); re-branding of the produces (e.g. “Wonky”, “Unique”), but mostly making deformed fruits and vegetables accessible and available in the retail sector for the public.

Since the present research , examines only parsnip as a case and has small sample size, it would not be feasible to give more specific suggestions or plan future intervention. To pave the way for a possible campaign regarding oddly shaped fruits and vegetables, further research on the topic, with larger sample size, is needed.

Conclusion

This study is one of the few in Denmark examining the determinants and perceptions of university students and staff towards oddly shaped fruits and vegetables. A broad range of possible factors of purchase and consumption was used in the research. The results of the study discovered that only two determinants influenced university's students and staff intended consumer Behavior: *price; freshness of produce*. Furthermore, gender and organic labeling seem to affect the premium they are willing to pay for raw produce. It was examined as a possibility that background of the participants (i.e. education, culture, upbringing) may have effect on their preferences. This study paves the way to future research aiming to improve the knowledge of the consumer preferences towards oddly shaped fruits and vegetables. Subsequently, developing interventions intended to improve the access and availability of oddly shaped fruits and vegetables.

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Appendix 1

Consent for Participation in Interview Research(National Center for Postsecondary Improvement 2003)

I volunteer to participate in a research project conducted by Magdalena Dokuzova from Aalborg University. I understand that the project is designed to gather information about perceptions and determinants regarding oddly shaped vegetables. I will be one of approximately 5 people being interviewed for this research.

1. My participation in this project is voluntary. I understand that I will not be paid for my participation. I may withdraw and discontinue participation at any time without penalty. If I decline to participate or withdraw from the study, no one on my campus will be told.

2. I understand that most interviewees will find the discussion interesting and thought-provoking. If, however, I feel uncomfortable in any way during the interview session, I have the right to decline to answer any question or to end the interview.

3. Participation involves being interviewed by researchers from Aalborg University. The interview will last approximately 10 minutes. Notes will be written during the interview. An audio tape of the interview and subsequent dialogue will be made. If I don't want to be taped, I will not be able to participate in the study.

4. I understand that the researcher will not identify me by name in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

5. I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

6. I have been given a copy of this consent form.

Magdalena Petrova Dokuzova

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telephone: 26822289

Appendix 2 - Quantitative questionnaire

19/03/2018

SurveyXact

Age

Gender

- ☐ Female
☐ Male

Nationality

Completed education

- ☐ Elementary school
☐ High school diploma
☐ College and Bachelor degree
☐ Technical school
☐ Master Degree
☐ Phd.
☐ Other _____

Marital status

- ☐ Single
☐ In relationship
☐ Married

Do you have any children?

- ☐ Yes
☐ No

To what extend are you responsible for grocery shopping in your household?

- ☐ 5 - 7 times a week
☐ 3 - 4 times a week
☐ 1 - 2 times a week
☐ Rare/Never

To what extend are you responsible for the cooking your household ?

- ☐ 2 - 3 times a day
☐ 1 time per day
☐ 5 - 6 times per week
☐ 2 - 4 times per week
☐ 1 - 2 times per week
☐ 1 - 3 times per month
☐ Rarely/Never

<https://www.survey-xact.dk/servlet/com.pls.morpheus.web.pages.CoreSurveyPrintDialog?surveyid=851517&locale=en&printing=true&enableAdvanced=false> 1/14

How much time do you spend on cooking per day?

- ☐ 0- 30 minutes
- ☐ 30 minutes - 1 hour
- ☐ 1 - 2 hours
- ☐ more than 2 hours
- ☐ other _____

How frequently do you consume fruits and/or vegetables?

- ☐ 6 + times per day
- ☐ 4 - 5 times per day
- ☐ 2 - 3 times per day
- ☐ 1 time per day
- ☐ 5 - 6 times per week
- ☐ 2 - 4 times per week
- ☐ 1 - 2 times per week
- ☐ 1 time per week
- ☐ 1 - 3 times per month
- ☐ Rarely/Never

Have you had previous experience regarding oddly shaped fruits and vegetables?

- ☐ Yes
- ☐ No

Generally do you consider oddly shaped vegetables to be:

- ☐ Appealing
- ☐ Safe to consume
- ☐ Easy to prepare
- ☐ Non of the above
- ☐ I don 't know
- ☐ All of the above



This parsnip is organic and of European origin,
located in farmer 's market for 9 kr./500gr.

I would like to purchase the product

- ☐ Strongly agree
- ☐ Agree

- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Danish origin, located in farmer's market for 4 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of Worldwide origin, located in corner shop (kiosk) for 9 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Worldwide origin,
located in farmer's market for 9 kr./500 gr.

I would like to purchase the product

- ☐ Strongly agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of Worldwide origin,
located in supermarket for 18 kr./ 500 gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of Danish origin,
located in farmer's market for 18 kr./ 500 gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of European origin,
located in supermarket for 18 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Worldwide origin,
located in corner shop (kiosk) for 4 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of Danish origin,
located in supermarket for 4 kr. / 500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Danish origin,
located in corner shop (kiosk) for 9 kr./ 500 gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of European origin,
located in farmer's market for 4 kr./ 500 gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Danish origin,
located in supermarket for 9 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of European origin,
located in corner shop (kiosk) for 18 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of European origin,
located in supermarket for 9 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of European origin,
located in corner market (kiosk) for 4 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Worldwide origin,
located in supermarket for 4 kr./ 500 gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Danish origin,
located in corner shop (kiosk) for 18 kr./ 500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Worldwide origin, located in farmer's market for 18 kr./ 500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of European origin, located in supermarket for 18 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Danish origin, located in supermarket for 4 kr./ 500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is organic and of Worldwide origin, located in corner shop (kiosk) for 9 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



This parsnip is conventional and of Worldwide origin, located in supermarket for 18 kr./500gr.

I would like to purchase the product

- ☐ Strongly Agree
- ☐ Agree
- ☐ Don't know
- ☐ Disagree
- ☐ Strongly Disagree



Please rate the packaging (where 1= definitely buy, 3= least likely to buy)

- ☐ 1
- ☐ 2
- ☐ 3



Please rate the packaging (where 1= definitely buy, 3= least likely to buy)

- ☐ 1
☐ 2
☐ 3



Please rate the packaging (where 1= definitely buy, 3= least likely to buy)

- ☐ 1
☐ 2
☐ 3



Please rate the packaging (where 1 = definitely buy, 3 = least likely to buy)

- ☐ 1
☐ 2
☐ 3

To what degree you agree to these statements

	Strongly Agree	Agree	Don't know	Disagree	Strongly Disagree
Every time I go grocery shopping I am health conscious of the food I buy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oddly shaped vegetables are generally available in shops where I usually purchase food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooking oddly shaped vegetables will require extra effort	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Buying oddly shaped vegetables would be beneficial for my health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taste is the most important factor when I purchase food products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to buy only organic products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I try to buy only locally produced products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freshness is the most important factor for me when I purchase fruits and vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 3 Price

Retail	Price	Produce Organic/coventional	Origin	Packaging	Location
Økovejen	12 kr. Per 500gr.	Økologisk			online
Coop	(rodfrugter) 11,33 kr. Per kg	Conventional	Danish		Online
Osuma.dk	17.50 kr. Per 500g	Økologisk	Danish		Online
Kvikly and Super Brugsen	13 kr. Per 500 gr.	Økologisk	Danish		Online
Økolageret	15 kr./ 500gr.	Økologisk	Holland		Online
Coop	12 kr./500gr.	Økologisk	Danish		online
Netto (Øgo)	10 kr./500gr	Økologisk			butik
Rema 1000	5 kr. /500gr. "vej selv"	Økologisk		Loose	butik
Lidl	Dansk rodmix 15 kr / 1,5 kg	conventional	Danmark	packaged	Butik
Føtex	4 kr. / 500gr.	Økologisk	Danmark	loose	butik

	18 kr./500gr.	Økologisk	Danmark	packaged	
Fakta	10 kr./500gr.	Økologisk		packaged	

Appendix 4 Determinants and literature

Determinants	Literature
Gender	(dos Santos, Nogueira et al. 2017)
	(Costell, Tárrega et al. 2010)
Nationality	(dos Santos, Nogueira et al. 2017)
Education	(Ragaert, Verbeke et al. 2004)
	(Costell, Tárrega et al. 2010)
Marital status	(Gao, House et al. 2011)
Children	(Ragaert, Verbeke et al. 2004)
Time	(Deliens, Clarys et al. 2014)
Type of produce (organic vs.	(Loebnitz, Schuitema et al. 2015)

conventional)	(Moser, Raffaelli et al. 2011)
Location of purchase	(Blitstein, Snider et al. 2012);
	(Hoppe, Vieira et al. 2013)
	(Gao, House et al. 2011)
Price	(Deliens, Clarys et al. 2014)
	(Costell, Tárrega et al. 2010)
	(Gao, House et al. 2011)

Appendix 4 Transcriptions of qualitative interviews

Interviewee - B

M: What type of eater do you consider yourself to be? Do you have any dietary preferences?

B: Well not really but since being a students of public health, I am very much concerned about food, especially I would say among very greeny person. I don't like to eat junk food things. I am a little big health concerned persons.

M: How often do you shop for raw vegetables?

B: Uhhmmm at least 3 to four times a week, because I always prefer to...because all the supermarket very close to mine house...local kiosks to the supermarkets. Every time in the morning you go walk and then ...almost three to four times a week.

M:Ok. How comfortable do you feel cooking raw vegetables?

B: I am very much comfortable. I like to cook raw vegetables

M: Do you consider...what do you consider when you are doing your grocery shopping for fresh vegetables

B: For me I would say...first of all appearance, when it looks very fresh that ...it takes my attention very fast

M:uhhhum

B: Looking fresh ummm and price wise also more affordables, so I would go for price and a look of the vegetables and fruits.

M: Ok. What criteria has the highest priority when you buy fresh produce? And why?

B: I would say the price and again if I say the price of the product it is not really valid because if it looks very good and if it is organic and is very fresh, I am willing to pay extra bucks on it, but if it is just regular one uhmmm if I have to just choose only on then I would choose for the price.

M: Ok. Do you have any experience or memories with oddly shaped fruits and vegetables, if so what are they?

B: Ahhhmmm not really but mostly I have encountered some like celeriac....

M: Yes....

B: ...that's the only vegetables that we can find in the supermarket. The shape are not really good, but these days mini supermarket they just serve it and put nicely in package so ...I don't know how to say it but yeah but if I have to take just one vegetables I encountered celeriac (pause) and I have bought several times celeriac because I like to put it everywhere actually, in a soup in a vegetables it is also good.

M: Ok. What do you associate with oddly shaped vegetables?

B: Uhhhhh in the beginning I ...if I have to consider as normal persons I don't like when it looks odd, oddly shaped because the uhhh...

M: Yeah....?

B: but since I am public health student and I know that quality doesn't really degrade with shape and size ...

M:Yes...

B:...so for me I don't know how to answer these questions ...can you a little bit elaborate what you are really....?

M: Like what comes in your mind when you hear oddly shaped fruits and vegetables?

B: ahhh...so ok if somebody say oddly fruit and vegetable for me it says it's a ahhh which are not really fit for the supermarket to sell in the markets?

M: yes....

B: and they are not really come to the markets and people don't like, because of the shape, just the look. That is my perception all that you put in fruits, even the name suggests ugly so I don't really know ...I have a little bit negative perception when I say the ugly fruits and vegetables. I

would like to hear more like ...some different or unshaped or ...different shaped things instead of ugly fruits or vegetables

M: Ok. Ahhmm to what extend do you think oddly shaped vegetables are safe or unsafe to eat and why?

B: I would say they are pretty odd...they are safe as the fresh or nice shape fruits and vegetables because they grow in same place (not understanding) so they are just modified versions of the same normal fruits and vegetables so for me I would say the quality of taste shouldn't be different should be the same and I am not really concerned about they are ugly or something. For me it's equally ...they are equal to the fresh uhhh normal fruits and vegetables.

M: Ok. How most of the people you know perceive oddly shaped vegetables if you know?

B: Well I was working in a restaurant...two times and then where we have to use lots of vegetables and fruits and then we were buying actually mini ugly shaped fruits and vegetables directly from the producer so its pricewise it was very cheap and there was no difference in the taste so the people I know that area they were very much satisfied with that one. Ahhhh...but since it is a restaurant they were privileged to order directly from the producer in low cost but other regular person even they want to buy these it is not available in everyday supermarket in Denmark, especially here in central Copenhagen, I would say. So the person I know they are very positive, they are still using because they are ordering directly from the producer so they have a good attitude because they did not find any difference in taste.

M: Do most of the people you know perceive oddly fruits and vegetables to be safe or unsafe to eat?

B: Uhmhm I don't think so, I don't think so. As I said before even the...start with ugly shaped fruit and vegetables in this way normal, common people lay people will ahhhh... will perceive in negative way. Even though I am public health student, I know most of the things, even I have problem with a 100% to be sure to think the positive perception so uhmmm I assume most of the people have negative perceptions on ugly fruits and vegetables. Because what I think it would different parameter for the shape, the size is unusual as not really regular they used to see from their childhood to their adulthood and other one may be by chance they find it is difficult for preparation I think, because you have a lot of...when you are cleaning when you have chpping things so you have to throw most of the parts and like this way . so usually people have negative perception on it.

M: How confident you fee in preparing or cooking oddly shaped vegetables?

B: I am very confident, I don't have any problems so far I ...so far I have used only fruits...only vegetables is ahh ugly shaped celeriac and sometimes just kål(not understandable) but for me if

it is some regular person or always use salad or something, for them I think it is a little bit challenging to clean it and other thing. It has a very different shape and size so it is difficult to clean and other things but as personal for me I think I don't have any issue.

M: Than you. That was the last question.

B:I was talking overall in general but....

Interviewee - Y

M: What type of eater you consider yourself to be?

Y:Oh well, I think I am eating everything...

M:Uhhmm...

Y:I like both vegetables and fruits and I would say that...I ummm, I am eating vegetables at least once or twice a day, so I think it is pretty healthy house (not understand)

M:Ok. How often do you shop for fruits and vegetables?

Y:Umm I would say at least four times a week.

M: Ok. How comfortable do you feel cooking raw produce? Like veggies.

Y: Uhhh yeah I think it is really nice.Yeah. I like to cook raw vegetables and fruits uhhh beacause I think it is healthy to eat them instead of using frozen one, so you can save you can feel all the vitamins and (hahaha)Ye.

M: What do you consider when you are doing your grocery shopping for your raw vegetables?

Y: Ummm I would say the price uhh the freshness of the fruits and vegetables and look is also important

M: Ok. What criteria has the highest priority when you buy vegetables?

Y: I would say it is combination of the price and freshness

M: Uhhmm...

Y: So...oth of the parametares are important for me. I am not looking fo økologisk for the ummm organic fruits and vegetables, but it has to look fresh and the price should be affordable for me.

M: Ok. Do you have any experience or memories with oddly shaped vegetables, if so what are they?

Y:Uhhh I don't think it wa soften but sometimes I think in supermarkets, the packaging of the fruits ..of the vegetables ahhh that was made for soups

M:Uhhmm...

Y: Sometimes they make...they put vegetables that are oddly shaped. Uhhhhhmm it's not often but sometimes it happens and normally I would say I don't really ...ummm for me it's not really important uhhh but sometimes is some discomfort of peeling the vegetables

M: (giggles) I understand that.

Y: (giggles)

M:Uhhmmm. Where was it ...ok what do you associate with oddly shaped vegetables?

Y: I would say it is vegetables that looks in a size different you would think it is suppose to be uhhh or uhhh for instance it is ..if it is a packaged of the vegetables, if most of the vegetables are the same size and others....and few are different.

M: Ok. To what extend do you think oddly shaped vegetables are safe or unsafe to eat?

Y: Uhhh in my opinion it doesn't really matter for safety of the (not understandable) so oddly shaped and definitely safe to eat.

M: Ok. How most of the people you know perceive oddly fruits and vegetables?

Y: uhhh in my opinion for most of the people it doesn't matter but (emphasis) of some high price category of people they might look at that because they might feel discomfort of peeling or it does not look as it is suppose to be, so uhhhmm , so I guess (pause) I don't know people for whom does...it really matters.

M: Ok. Do most of the people you know perceive oddly fruits and vegetables to be safe or unsafe to eat?

Y: Uhh...I think most...isn't...could you repeat please?

M: Ok. Do most of the people you know perceive...

Y: Ok.

M: perceive oddly shaped vegetables to be safe or unsafe to eat?

Y: Ok. Most of the people perceive its safe...yeah..

M: Ok. Last couple of questions. Please tell me what kind of considerations do you have while shopping for raw vegetables? Ok I think that's...yeahh

Y: Yeah its just price and freshness and I am not searching for organic fruit or vegetables so...if rice is affordable may be then organic as well

M: Ok. How often do you feel ...confident in preparing or cooking oddly fruits and vegetables?

Y: Uhhh yeah. I think It is quite sometimes uncomfortable to peel oddly shaped vegetables uhh but otherwise I think it is the same so only the peeling and the way to prepare it might feel discomfortable but otherwise I think it is totally fine to use it for eating

M: Have you had an experience here in Denmark?

Y: Yes!

M: ...about fruits and vegetables...?

Y: Yes, especially if sometimes it is in a pack, inside a package of this.. ahh soup vegetables or vegetables that are sometimes in afghan shops that are a little bit different in shapes but it is not often but sometimes it happens. Yeah.

M: Ok. So that's that. Thank you so much.

Y: I think it is quite difficult actually. I don't think that everybody knows about oddly shaped vegetables even for me it takes time to think....

Interviewee - N

M: What type of eater do you consider yourself to be? Like someone who eats more vegetables or meat or fastfood?

N: I eat both.

M: Both ?

N: Yeah. Vegetables and meat. The balance meal. Mostly chicken though.

M: Do you have any preference? Like vegetables only.

N: No, not exactly. I don't want to be vegetarian and I don't want to be meat eater only. So

M: How often do you shop for raw vegetables?

N: Raw vegetables ? what's raw? Salad and other vegetables?

M: Yeah like not frozen, salads and fresh vegetables.

N: Ummm...may be 3 times a week.

M: Are you comfortable cooking vegetables?

N: Yeah

M: What do you consider while shopping for raw vegetables? Like priority, price, organic, fresh looking?

N: Yeah, organic. And it should be fresh looking. And little bit of price.

M: What about its appearance?

N: Like when it does not look good? No, it's no problem. If it's organic and fresh looking. I will buy it.

M: What's your criteria?

N: Freshness, organic and cheaper.

M: If you have vegetables cheaper than organic ones. Would you buy it?

N: It depends. If it's fresh looking and comes with other organic food. Maybe I will buy the cheaper ones.

M: If there is oddly shape or ugly vegetables that are available. Would you buy it?

N: Yes.

M: What about in normal price?

N: If it's organic. I will buy in normal price. If its not, may be I will have a second thought.

M: Ok..Uhm if on the same aisle there are oddly shaped carrots and normal shaped carrots. What would you buy?

N: Hahaaa.. I don't eat carrots.

M: Ok...if its other vegetables, lets say parsnip.

N: I will buy it. Organic ones! Yes, the first priority is organic ones. And if no other option. Then I will buy it.. may be.

M: Do you have any experience or memories with oddly shaped vegetables? If yes what are they?

N: Yes, mostly beetroots. Mostly that grows under the ground.... Soil. Like potatoes.

M: Is it here in Denmark?

N: Yes here in Denmark. I see in kiosk. Sometimes also in normal supermarket which has this organic aisle.

M: What do you associate oddly shaped vegetables?

N: Nothing...its just a food.

M: To what extent do you think oddly shaped vegetables are safe or unsafe to eat? And why?

N: I don't think its unsafe to eat....its just the appearance I think. As long as they put on the shop, its safe to it. I think there is control or food safety thing. And there is some organization that look into

M: What do you think other people consider about oddly shaped vegetables? How?

N: Other people will just have second thought...he oddly shaped ...its always the first the appearance. First impression as you say it. Right!

M: In your opinion do most of the people you know perceive oddly shaped vegetables safe or unsafe to eat?

N: We buy oddly shaped vegetables. Its not a big deal. Freshness and organic is more important.

M: How confident do you feel preparing and cooking oddly shaped vegetables?

N: Very confident. It does not make any difference. You just cut the sides. I think you just cut the small shapes on the side. Like ginger. We cut the sides. And you eat the ginger don't you. So, its not problem.

M: That's all the question I have. Thank you for the interview.

Interviewee -G.

M: What type of eater do you consider yourself to be?

G: Eater?

M: Yeah.

G: So I am vegetarian. Uhhh I like to...eta healthy most of the time, I eat a lot of vegetables like I would say, I like almost everything uhhh yeah I eat a lot of veggies, fruit and I really like salad. Uhhmm I would say, I am conscious about what I eat and I like to, I don't mind spending a bit more money if I know that the product is good. So...eah it is something that is important to me, the food that I eat yeah...

M: How often do you shop for vegetables?

G: So, since I am here, I'm always going to this Foodcherry and give away free vegetables that can no longer be sold in supermarkets, so I actually go there once a week and so I don't have to buy that much. Buy some may be milk or cheese or past or things like that but vegetables I mainly get from this food cherry. But before I would say may be two or three times a week.

M: How comfortable do you feel cooking raw produce?

G: Uhhmm like preparing it or...?

M: Yeah.

G: Very comfortable. I grew up on a farm actually so we always had big garden and yeah I, I grew up with it so...always cooking with my parents. Yeah, we prepared the food from scratch every time so never had like convenient food or ready prepared meals. It was always fresh and always prepared by us.

M: That's nice. What you consider when you buy fresh vegetables, or in this case when you pick fresh vegetables?

G: Uhhh I like to buy mostly organic if it is possible, so uhhh that's the first criteria and then I try to buy in season, as locally grown mostly uhhm yeah but it is not like supper strict. I definitely prefer organic product and the rest a bit it depends on the day.

M: What criteria has the highest priority when you pick vegetables?

S: It is what I said, the organic one...

M: Uhhhmum...

G: ...and...

M: ...and why?

G: I think it is because of the way I was raised. SO, I grew up in this organic farm and I kind of miss that kind of nad I have that idea that organic is better for me and the evnvironment so ...I guess that is the reason behind it. (giggling)

M: Ok. If the oddly shaped vegetables are available in the supermarket and are the same price as the normal one which one would you choose?

G: The same price?

M: Yes.

G: Uhmmm...not sure actually ...uhmm I don't think I mind the shape but I guess if I had the choice and they were the same price I probably will choose the normal ones, but then again if there are only ugly shaped ones the I would buy them as well...hummm I am not sure (laughting)

M: What about if the oddly shaped vegetable was organic and the other one was convenient?

G: Then I would take the organic.

M: Ok. Do you have any experience or memories with oddly shaped vegetables?

G: Yeah as I, I don't know if you remember but I have told you in Switzerland there is, there was this campaign in the supermarkets where they would also sell oddly shaped vegetables and I did it, I bought those vegetables, but it wasn't always organic so that was a bit like limitation for me of the campaign because I think they could have done like oddly shaped and organic at the same time but yeah I think it is a good way to prevent food waste, prevent all those vegetables to be thrown out. Uhmm I think it is a shame that they don't reach the supermarkets because ... yeah I think people would buy it. May be a bit cheaper than the normal one?

M: Maybe. Uhmm what do you associate with oddly shaped vegetables?

G: Hmmm...ummm I don't have like a negative image, amy be because I grew up on this farm the vegetables there were neve standard size they were always different, so for me it is just like normal. It is not something negative, no.

M: To what extend do you think oddly shaped vegetables are safe of unsafe to eat? And why?

G: I think they are perfectly safe to eat. And I think it is just nature there is not scandalized size in nature it is just how it grows and just normal like from the quality is the same as a standardized vegetable (laughting).

M: Ok. How most of the people you know perceived oddly shaped vegetables, if you know?

G: uhmmm (pause) hmmm I am not quite sure I ever had conversation about it that one but uhmmm....

M: According, according to you, how do you think?

G: I mean I think there is some kind of aesthetic thing when you buy something, you also want to like if you are spending money to kind of have something nice or something that is fresh but I

think that's the point, like oddly shaped vegetable can still be fresh and smell good and be as good as standardized shape so I think more than the shape it is the freshness that influences if somebody buys it or not. I think a lot of my friend and the people I speak with are kind of like-minded cause I don't know, I have a lot of vegetarian friend, or friends that are sustainable conscious about what they eat and ...so I guess for them it is also about preventing food waste and maybe being sustainable, so its maybe less of an issue that it should look good but more about the taste, about the freshness, yeah if it is organic or not. Yeah.

M: ok. Oh, well in the same line do you think that most of the people that you know would perceive oddly shaped vegetables are safe or unsafe to eat?

G: I tink they precieve them as safe. I have a lot of friends that do this uhmmm dumpster diving, so they eat whatever they find. They don't care about the shape, yeah, that is not an issue, safety isn't an issue. (laughting)

M: Uhmmm... How confident do you feel in preparing or cooking oddly shaped fruits and vegetables?

G: Uhmmm I feel confident (laughts) uhh I never have had like un issue with it also if I had sometimes vegetables that are like, uhmm that have some parts that are maybe not good anymore I just cut it away and use the rest, so yeah the shape is not a problem. I cook everything.

Interviewee - S.

M: What type of eater do you consider yourself to be?

S: Like?

M: Do you have any dietary preferences, like are you someone who eats more vegetables than meat or do you prefer more meat, fast food ...what type of food do you prefer?

S: I don't think there is any preference uhgg I like both it depends upon the situation when I am eating so I try to keep it more balanced ...

M: Ok. How often do you shop for raw vegetables?

S: May be once in a week, because I am not the one shopping that much (laughting).

M:How comfortable do you feel cooking raw vegetables or produce?

S: Uhhh I am comfortable with cooking but I am learning to cook new dishes with raw vegetables uhhh in Nepal I think, how I grew up is just fry most of the vegetables so that's how we eat it. Yeah.

M: Ok. What do you consider when you are doing your grocery shopping for fresh vegetables?

S: Uhhh Money, money and uhh if I get some organic vegetables in the same price of non-organic, I would prefer to buy the organic one and it should be looking fresh and good.

M: What criteria has the highest priority when you buy fresh produce? And why?

S:Uhhh highest priority is uhhh money and fresh looking vegetables, eventhough if it is cheap but the vegetable doesn't look fresh and nice I don't think I would buy it and yeah that's the thing and another criteria would be uggh organic.

M: Ok. If oddly shaped vegetables were available in the supermarket and are the same price than normally shaped vegetables, which one would you prefer? What about if it was in farmer's market?

S: It really doesn't matter if it is oddly shaped or not (not understandable). I have no preference over shape. If it is available in low price I would definitely buy it.

M: If on the same aisle there is a normal carrot and an oddly shaped organic one which one do you think you would purchase?

S: Uhhhmmm...likewise it depends upon the prices you know, if oddly shaped it is a little bit cheaper then I would prefer oddly shaped vegetables but if they have the same prices, may be I would think about going for the better looking one.

M: Do you have any experiences or memories with oddly shaped vegetables if so what are they?

S: Uhhh not so much but I have seen some in shops but I might have not necessarily bought them but if could...if it was something I need it I don't have a problem.

M: What do you associate with oddly shaped vegetables?

S: The vegetables that are not usually the shape that we see in the supermarket that it is something different from our normal what do you call...normal understanding.

M:Ok. To what extend do you think oddly shaped vegetables are safe or unsafe to eat and why?

S:I think the shape does not determine the quality of the food so...I think it is safe to eat.

M: How most of the people you know percieve oddly shaped vegetables if you know?

S:Some people don't ugg some of my friends don't have an idea of what is oddly shaped vegetables because it is very hard to find in the supermarkets so I really don't know what is their percieve on this topic.

M: Do most of the people you know perceive oddly shaped vegetables to be safe or unsafe to eat?

S: I think, they think it is safe, in my opinion. They could think it looks ugly or they could think that because it is oddly shaped maybe it is genetically modified so they might not like it.

M: How confident do you feel in preparing/cooking oddly shaped vegetables?

S: Uggg pretty confident I don't think it makes big difference if the vegetables are oddly shaped.