Consumers' choice values and the role of communication on the purchase behaviour of visually non-conforming fruit and vegetables

MSc Thesis

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Consumers' choice values and the role of communication on the purchase behaviour of visually non-conforming fruit and vegetables

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Abstract

Visually non-conforming (VNC) fruit and vegetables are wasted as a result of aesthetic requirements (i.e. colour, size and shape of products) that are set by the EU, retailers and consumers. By adding VNC fruit and vegetables to their assortment, retailers can have a great impact on food waste reduction. However, consumers do not equally value visually conforming (VC) and VNC fruit and vegetables, making it difficult for retailers to sell VNC fruit and vegetables. Price reduction has been suggested as a method to increase VNC fruit and vegetable sales, but does not offer a long-time solution as it leads to lower profits for both retailer and producer, and encourages a lower value perception. Consequently, a different approach is needed to change consumers' value perception and in-store decision making regarding VNC fruit and vegetables. The aim of this research is therefore to map the choice values that are of influence on consumers' product choice regarding VNC fruit and vegetables, and examine the effect of a positive-framed point-of-purchase message on consumers' purchase behaviour of VNC cucumbers. This study is using a multi-method design including 21 qualitative semi-structured interviews and two in-store experiments in the Netherlands. The interviews reveal that consumers use functional, personal, financial and social choice values to make a choice decision regarding VNC fruit and vegetables. In addition, habitual purchases and supply in-store also influence product choices. The in-store experiments show that 15% to 28% of the consumers are willing to buy VNC cucumbers when equally priced to VC cucumbers. Moreover, data implicates that communication stressing the equal taste of VC and VNC fruit and vegetables in combination with raising food waste awareness offers a potential intervention to raise sales of VNC vegetables in the supermarket. The findings lead to several recommendations for retailers and policy makers to offer VNC fruit and vegetables for a fair price, but also raise questions for further research.

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1. Introduction

1.1 Food waste problem and how to tackle it

Food waste is a growing problem and needs to be addressed as it has environmental, economic and social impacts (FAO, 2013, 2014; Papargyropoulou, Lozano, Steinberger, Wright, & bin Ujang, 2014). Wasted foods are defined as foods "intended for human consumption that are either discarded or left to spoil because of actions and decisions taken by stakeholders across the supply chain" (Colbert, 2017, p. 5). The greatest production of food waste exists in the fruit and vegetable sector, accounting for approximately 45 percent of the in total 1600 million tonnes of fruit and vegetables produced worldwide (Gustavsson, Cederberg, Sonesson, Van Otterdijk, & Meybeck, 2011). Fruit and vegetables are lost in all stages of the food supply chain; agricultural production, processing, distribution and consumption. In Europe, at least 50% of the fruit and vegetables produced is wasted in the agricultural production stage, largely due to post-harvest selections (Gustavsson et al., 2011). Post-harvest selection takes place at the farm, where foods are discarded based on aesthetic requirements. Out of fear to undersupply, producers increase their production (Colbert, 2017; Parfitt, Barthel, & Macnaughton, 2010), leading to even higher rates of food waste. The aesthetic requirements – colour, size and shape of products – used during post-harvest selections are set by the EU, retailers, and consumers (Adam, 2015; Göbel, Langen, Blumenthal, Teitscheid, & Ritter, 2015; Gustavsson et al., 2011). All fruit and vegetables that do not conform to the aesthetic requirements, but that are still perfectly edible and safe to eat are here referred to as 'visually non-conforming' (VNC) fruit and vegetables. To reduce the wastage of VNC fruits and vegetables because of aesthetic requirements, a change needs to be made by the stakeholders at the end of the food supply chain.

Two quality standards for fresh produce can be identified in EU-regulations (EU, 2011a, 2011b): 1) general marketing standards and; 2) specific marketing standards. The general marketing standards apply to all fresh fruit and vegetables. These marketing standards consist of minimum quality requirements regarding the freshness, safety and shelf-life of a product and guarantee the consumers' safety and wellbeing. However, the specific marketing standards apply to only 11 fruits and vegetables and consist mostly of aesthetic requirements, including the product's colour, size and shape. The elimination of the specific marketing standards for 25 crops in 2009 (from a total of 36) (EU, 2008) was expected to lead to a reduction of food waste in the fruit and vegetable sector. However, retailers have been maintaining the old and their own quality requirements as a guideline (de Hooge, Van Dulm, & Van Trijp, 2018) and have been reluctant to sell VNC fruit and vegetables (Loebnitz, Schuitema, & Grunert, 2015; Waarts et al., 2011). Apparently, changing EU-regulations alone is not enough to decrease waste of fruit and vegetables due to post-harvest selection.

By adding VNC fruit and vegetables in their assortment, retailers can have a great impact on food waste reduction, as they have high sale volumes of fruit and vegetables. However, retailers are hesitant to ease aesthetic requirements, because of practical reasons such as logistics, packaging and shelf space (de Hooge et al., 2018; Raak, Symmank, Zahn, Aschemann-Witzel, & Rohm, 2017), because they assume that consumers are not willing to buy VNC fruit and vegetables and because selling VNC fruit and vegetables might affect their image as high quality store (de Hooge et al., 2018). Earlier studies show that a larger share of consumers prefer conformingly shaped fruit and vegetables to non-conformingly shaped ones when equally priced (de Hooge et al., 2017;

Helmert, Symmank, Pannasch, & Rohm, 2017; Loebnitz & Grunert, 2015; Loebnitz et al., 2015). This could be explained by the fact that consumers use the appearance of VNC fruit and vegetables as a measure for its intrinsic quality (Aschemann-Witzel, de Hooge, Amani, Bech-Larsen, & Oostindjer, 2015; Creusen & Schoormans, 2005; de Hooge et al., 2017; Göbel et al., 2015; Helmert et al., 2017). These findings suggests that consumers do not equally value visual conforming (VC) and VNC fruit and vegetables, making it difficult for retailers to sell VNC products. In order to make consumers willing to buy VNC fruit and vegetables, they need to have an equal value perception of VC and VNC fruit and vegetables (Raak et al., 2017). Recently, a handful of retailers have taken the initiative to sell VNC fruit and vegetables for reduced prices (e.g. 'buitenbeentjes' by Albert Heijn in the Netherlands and 'inglorious fruit and vegetables' by Intermarché in France). Although the initiatives appear to be effective in increasing sales of VNC fruit and vegetables (Aschemann-Witzel, de Hooge, & Normann, 2016; Kulikovskaja & Aschemann-Witzel, 2017), price reduction is not a long-term solution to reduce food waste. Firstly, price reduction might strengthen the consumers' perception that VNC fruit and vegetables are of lesser quality than VC fruit and vegetables (Aschemann-Witzel, Jensen, Jensen, & Kulikovskaja, 2017; de Hooge et al., 2018; Grewal, Krishnan, Baker, & Borin, 1998; Völckner & Hofmann, 2007). Secondly, selling low priced VNC fruit and vegetables next to more expensive VC fruit and vegetables might in the long term lead to reduced profits for both retailers and producers (Adam, 2015; de Hooge et al., 2018). Therefore, a different approach is necessary to change consumers' value perception and in-store decision making regarding VNC fruit and vegetables.

1.2 Consumers' value perception and decision making

Peoples' food choice decision making is complex and dynamic and a variety of decision theories can be found, such as rational choice, behavioural and social decision theories (Sobal & Bisogni, 2009). However, central to all decision making are the conscious and unconscious decision making systems (Dijksterhuis & Nordgren, 2006). Conscious decision making can be described as rational and time consuming, whereas unconscious decision making can be described as affective, routinized and fast. When making food choice decisions, consumers generally perform value-negotiations (Furst, Connors, Bisogni, Sobal, & Falk, 1996). In value-negotiations people consciously compare and evaluate their most important choice values related to the food choice situation (Furst et al., 1996). People then make their food choice following the food product with the highest perceived value. Food choice values are the most important considerations that come to mind when people get confronted with food choices (Sobal & Bisogni, 2009). When people have to make the same product choice repeatedly, they usually develop a routine over time to simplify and speed up the product choice in the future (Furst et al., 1996). The choice process then changes from a conscious into an unconscious process. This implicates that people making a product choice can do this both consciously and unconsciously.

In general, product choice values can be divided into four groups: personal, social, financial and functional (Sweeney & Soutar, 2001). Personal choice values are related to a person's understanding of a product and the feelings that a product gives to a person (Seegebarth, Behrens, Klarmann, Hennigs, & Scribner, 2016). Social choice values are related to what the consumption of the product communicates to others. Earlier research shows that consumers consider if a VNC cucumber is suitable for serving to others (de Hooge et al., 2017; Yaqub, 2016), stressing the influence of the social value in VNC vegetable choice. Financial choice values are related to the value a person receives for his

money. When consumers are confronted with a discount, consumers' are more willing to buy VNC fruits and vegetables (de Hooge et al., 2017; Helmert et al., 2017), indicating that financial choice values play a role in VNC fruit and vegetable choices. Lastly, functional choice values are related to the expected performance or quality of a product. According to Sobal and Bisogni (2009) consumers' food behaviours influence their product choices. When consumers have to choose in-store which fruit or vegetable to buy, they consider food behaviours, such as how to prepare, serve, eat, store and who is going to eat it (Aschemann-Witzel et al., 2017; Sobal & Bisogni, 2009). Overall, multiple choice values, even from different groups, can be used in a choice process. However, when having a value-negotiation people just choose one value is dominant in the decision making (Furst et al., 1996).

Food choice decisions and the value-negotiations taking place are largely dependent on the food choice context (Machín, Giménez, Vidal, & Ares, 2014). The characteristics of the food choice context include time constraints, social surroundings, physical surroundings and cultural influences (Köster, 2009). Consumers accept products that would normally not be accepted when the supply is low, but reject it when the supply is high (Göbel et al., 2015). These context factors need to be taken into account for all food decisions, as the context is different for each food choice.

1.3 The role of in-store communication on consumer value perception of VNC fruit and vegetables

As consumers choose the product with for them the highest perceived value, consumers' value perception of VNC fruit and vegetables needs to be increased. To make changes in consumers' value perception, intervention has to take place consciously in the mind of the consumer (Dijksterhuis & Nordgren, 2006). The use of point-of-purchase messaging has appeared to be an effective method to intervene in consumers' value-negotiations and steer consumers' food choices (Bender, Brandenburg, Reincke, & Bokelmann, 2015; Buscher, Martin, & Crocker, 2001). However, not all consumers use conscious value-negotiations, which makes changing the consumers' value perception more difficult. By making consumers process and read a message, conscious processing of information takes place, which eventually may lead to a higher purchase intention of VNC fruit and vegetables (Helmert et al., 2017). Therefore, to change the value-negotiation process of both value-negotiating and routinely shopping (i.e. unconscious) consumers, they need to consciously register and read the point-of-purchase message.

The influence of a message on consumers' product choice behaviour is dependent on the way a message is framed (Amatulli, De Angelis, Peluso, Soscia, & Guido, 2017; Buscher et al., 2001; Yang, Lu, Zhu, & Su, 2015). Generally, a message can be framed positively or negatively (Levin, Schneider, & Gaeth, 1998). A positive frame focuses on the benefit of purchasing or consuming the concerned product, whereas a negative frame emphasises the consequences of not purchasing or consuming the product (Gifford & Bernard, 2006; Levin et al., 1998). Because VNC fruit and vegetables are relatively unfamiliar to the consumer, low-risk products (regarding food safety and money), and generally chosen with low consumer involvement, positive framing is most suitable (Cucchiara, Kwon, & Ha, 2015). The message is most effective when it communicates the most important consumer values (Cucchiara et al., 2015). Therefore, the most important consumer choice values need to be targeted in the message. In addition, in order for VNC fruit and vegetables to be perceived as equally valuable as VC fruit and vegetables, equal quality of the products

need to be stressed. Consumers with a high commitment to environmental sustainability (de Hooge et al., 2017) and with high food waste awareness (Loebnitz & Grunert, 2015; Loebnitz et al., 2015) have a higher purchase intention for VNC shaped fruit and vegetables. It is expected that, by making consumers aware of the fact that VNC fruit and vegetables are often wasted (Kulikovskaja & Aschemann-Witzel, 2017) and stressing equal quality of VC and VNC products, more consumers will buy VNC shaped fruit and vegetables.

1.4 Knowledge gap and research objectives

A large research project, the COSUS project (Oostindjer et al., 2017), was set up to find out how consumer acceptance for varying 'suboptimal' food products could be increased focusing on in-store and in-home food waste practices, price reduction strategies and message-framing. A hypothetical food choice situation where consumers had to choose between a (higher priced) VC vegetable and a (lower priced) VNC vegetable with a food waste message next to it, led to contradictory results in purchase intention for VNC fruit and vegetables (Aschemann-Witzel, 2018; Aschemann-Witzel, Giménez, & Ares, 2018; Yaqub, 2016). Overall, a complete overview of consumers' considerations when buying VNC fruit and vegetables is lacking. In addition, it is unknown which methods, besides price reduction, are effective in-store to increase VNC fruit and vegetable purchases.

The aim of this study is to map the choice values that are of influence on consumers' product choice regarding VNC fruit and vegetables, and use these choice values to formulate a positive-framed message. In addition, the study aims to examine the effect of the positive-framed point-of-purchase message on consumers' purchase behaviour of VNC cucumbers in-store. In this study, research is done in the Netherlands, because of practical reasons. The research aim leads to the following research questions:

1. Which choice values are of influence on Dutch consumers' product choice regarding VNC fruit and vegetables?
2. What is the effect of a positive-framed point-of-purchase message on Dutch consumers' purchase behaviour of VNC cucumbers in-store?

To answer these questions, a multi-methods design is used, containing both qualitative (semi-structured interviews) and quantitative (in-store experiments) research. Combining the two methods in this study allows to both map the value perception and food choice process of consumers and to observe the role of communication in-store. The results of this study will therefore provide an in-depth understanding regarding the choice values and purchase behaviour of VNC fruit and vegetables. This in-depth understanding will help identify potential ways to influence consumers' value perception of VNC fruit and vegetables and contributes to further research in tackling the waste of fruit and vegetables in the retail sector.

2. Materials and methods

2.1 Choice value research

Semi-structured qualitative interviews were carried out to assess consumers' considerations and related choice values when confronted with a hypothetical purchase decision regarding six different VNC fruit and vegetables. A qualitative method was chosen, because the research area was relatively unknown and a holistic understanding was needed (Eriksson & Kovalainen, 2015). Semi-structured interviews were used, because this method gave the opportunity to study the 'what' and 'how' of individual consumer product choices for the same six choice tasks (Eriksson & Kovalainen, 2015). Pictures of VC and VNC fruit and vegetables were used in order to stimulate the participants' imagination of the purchase decision.

Pre-testing with four persons was done and then 21 interviews were conducted in a one-month period. The participants' characteristics were written down and an overview was made (Appendix I.1). Participants had to be Dutch consumers who were responsible for purchasing fruit and vegetables in their household. People were randomly approached in public spaces (i.e. central train station in Utrecht and Tilburg and a community centre in Roosendaal). They were asked to participate in an 8-minute interview to contribute to a master student's research on fruit and vegetable choices. First, anyone was approached. Later, people were selected based on a pre-fixed scheme to make sure the sample was divided equally based on age and education (Table 1). Gender was not needed to be divided equally, as women are still the main purchasers of groceries in the household (CBS, 2015). The interviews were carried out until saturation of information was reached.

Table 1. *Overview sample characteristics*

Characteristic	Groups	Number of participants
Age	20 – 29	5
	30 – 39	4
	40 – 49	4
	50 – 60	4
	> 61	4
Education	Lower educated	9
	Higher educated	12
Gender	Female	18
	Male	3

The interview consisted of two parts: hypothetical choice tasks and an intervention question (Appendix I.2). Participants first received six hypothetical choice tasks (Appendix I.3), in which participants were shown two pictures of the same fruit or vegetable. However, the products deviated in shape: one of the two was conformingly shaped, the other was non-conformingly shaped. The choice tasks and pictures were randomised to reduce the effect of an order bias. Participants were asked which of the two products they would buy when they would be equally priced and would lie in the same crate. Then they were asked to explain their product choice, in order to identify the participants' choice value(s). When the participant's choice value(s) were identified for one choice task, the next choice task was offered to the participant. For the choice tasks both fruits (i.e. kiwifruit, cherries, apple) and vegetables (i.e. cucumber, bell pepper, carrot) were chosen,

in order to explore if the consumers' choice values for these two product groups differed. The three different fruits and vegetables were chosen as they were perceived to have a different use purpose. The product could be either processed in a dish (e.g. bell pepper, apple), cut or peeled before eating raw (e.g. cucumber, kiwifruit), or eaten directly out of hand (e.g. carrot, cherries). For products deviating in shape was chosen, because these products' taste was not different from regularly shaped produce. For the VNC apple and cherries in the choice task applied that both colour and shape were different. When participants only focused on the colour, they were asked if their choice would be the same when both products were of the same colour. In the second part of the interview, participants were told about the problem wastage of fruit and vegetables due to aesthetic requirements. Participants were asked what would be a good way to stimulate them or others to buy VNC fruit and vegetables, in order to find out if the use of point-of-purchase messaging could be influential. The choice values found in the choice value research were then used, in combination with background literature, to formulate a message for the intervention research.

2.2 Intervention research

To measure the effect of point-of-purchase messaging on Dutch consumers' purchase behaviour regarding VNC fruit and vegetables, two six-week quantitative in-store experiments took place in a three-month period (Appendix I.4). For two different stores was chosen as their target groups differed. The first experiment took place in a Dutch greengrocer's for six days a week which was located at a farm in Heerle[1]. Approximately 100 consumers visited the store daily. The greengrocer's mainly attracted older consumers or consumers with children. These consumers generally visited the store, because of the direct contact with the farmer and the search for fresh produce. The second experiment took place in a Dutch supermarket in Wageningen[2] for seven days a week. During the measurement period the store was closed for one day during Easter. Approximately 1400 consumers visited the store daily. The supermarket attracted consumers from all ages and households. A large group identified were students from the Wageningen University that mainly did their grocery shopping during the weekdays. During the weekend, mostly non-student-consumers could be found shopping for groceries. Overall, the supermarket consumers were assumed to be relatively 'green' and environmentally aware due to the green character associated with the Wageningen University. Besides, the educational level of the customers in the supermarket was expected to be higher compared to those of the greengrocer's, due to the University nearby. The experimental design for both experiments was the same.

In both experiments VNC cucumbers were sold next to VC cucumbers and were equally priced. Price was kept constant as only one independent variable was allowed; the message. The VNC cucumbers differed from the VC cucumbers based on shape. For VNC cucumbers was chosen, as this product was in season during the measurement period, only differed in shape from regular products, could be kept relatively fresh for a longer period of time, and could be provided by growers close to the stores. The experiment consisted of three parts, including a 14-day baseline observation, a 14-day intervention and a 14-day follow-up (Figure 1 and 2). The purchases of both VNC and VC cucumbers were registered and compared for each measurement period in order to analyse if the message influenced the percentage of VNC cucumbers bought. The baseline observation

[1] Boerderijwinkel Luysterburg: https://luysterburgbv.nl/

[2] Jumbo Verberne Wageningen

period functioned as a baseline measurement for the percentage VNC sold without an intervention. Then an intervention period, where the message was shown to consumers, was done to measure the percentage VNC sold with a sign. Lastly, the follow-up measurement was done to see if after removal of the message still an effect could be found compared to the baseline measurement. In the greengrocer's, purchases for VC and VNC cucumbers were registered by counting the number of cucumbers sold each day, whereas in the supermarket this was done by using the data from the cash register. Human mistakes in scanning VNC cucumbers were reduced in the supermarket by making a special PLU-code for VNC cucumbers. VC and VNC cucumber crates were refilled as much as possible to decrease the effect of a social norm bias. In addition, old cucumbers were removed when not fresh and direct communication with the grower led to less wastage and to more freshness of products. When employees were asked questions by customers they were instructed to not mention the experiment's objective. In the greengrocer's experiment, a mistake was made in placement of the VNC cucumbers in the crate (i.e. random vs. horizontal) in period 1 (Appendix I.5). In this period VNC cucumbers were one week placed horizontally and one week randomly in the crate. In order for placement not to be of influence on the purchase data, the same was done for period 2. For period 3, miscommunication led to random placement only. In the supermarket, at the same time of the experiment a "No Waste" shelve (Appendix I.6) was launched. This shelve contained and promoted products made out of food that would have otherwise been wasted. The shelve was placed two days after starting the experiment. In the second week of the experiment this shelve was promoted by national and local television and by newspapers[3].

Note: placement of VNC cucumbers in period 1 and 2 were both random and horizontal, placement of VNC cucumbers in period 3 was only random. Besides, cucumber prices decreased in the baseline period from €0,90 to €0,70.

Figure 1. Photos greengrocer's experiment

[3] https://www.rtlnieuws.nl/editienl/gekke-groente-in-de-gratie-mensen-durven-steeds-vaker-lelijke-komkommers-te-kopen

P1	**P2**	**P3**
Baseline	Intervention	Follow-up

Note: Cucumber prices decreased from €0,98 to €0,85 in week 4. At the same time, country of origin of the VC cucumber changed from Spain to Holland. The VNC cucumber's country of origin was Holland all along.

Figure 2. Photos supermarket experiment

Dutch consumers were targeted by using a Dutch message. Background literature and the choice values found in the choice value research were used to formulate the point-of-purchase message. The message for the VNC cucumbers included a positive-framed message stressing the equal taste of VC and VNC cucumbers and stressing the issue of food waste (Figure 3). In the greengrocer's a sign of 29,7 x 42 cm was placed above the crate in which the VNC cucumbers were sold. For the supermarket the same message was used, but a larger sign of 59,5 x 100 cm was placed above the shelve. A large sign was used, because the frame in the supermarket required these dimensions. Based on the results from the first experiment, also a smaller sign of 10,5 x 15 cm was placed at the VNC crate in the supermarket to make more consumers notice the sign, specifically for routinely shopping consumers. For placement of the sign above as well as at the crate was chosen, because the aim was to target consumers who already planned to purchase a cucumber. In the supermarket experiment a promotional message regarding cucumbers from the supermarket was present during period 1 and 3. This was not the case for the greengrocer's experiment.

Note: Translation = Wonky cucumbers often do not end up on our plate due to their appearance. "I am just as tasty as my straight brother". Prevent waste and choose wonky

Figure 3. Message used in the intervention period for the in-store experiments

Additionally, in-store observations were done and short semi-structured interviews with customers were held. Observations were done to gain a better understanding of the actual purchase behaviour in relation to the purchase data found. Semi-structured interviews were conducted to gain a better understanding of consumers' in-store product choices and used choice values regarding VC and VNC cucumbers. In the greengrocer's, employees were able to observe customers and observations were written down. In addition, the researcher did a one-day observation during the intervention period. In the supermarket experiment employees did not have the opportunity to observe customers, partly due to the larger store. Therefore the researcher did in-store observations in each period during peak hours (4.30 pm - 6 pm) to analyse consumer behaviour in-store. At the end of both experiments short interviews (Appendix I.7) were held with customers at the checkout. Both VC and VNC buying customers were interviewed. For the interviews in the supermarket it was made sure that both students and non-students were interviewed. Interviews were held until saturation of information was reached, in the greengrocer's 18 interviews were held and in the supermarket 24.

2.3 Analysis

During the semi-structured interviews in the choice value research audio recordings were made for transcription. After transcribing the interviews, the data was coded for analysis. All transcriptions and coding-overviews can be found in the document 'Data Overview' (Goossens, 2018). Open coding was used to identify respondents' choice values and relate them to the respondents' food choices (Eriksson & Kovalainen, 2015). All answers that belonged to the same code were put together for each product separately. Choice values leading to acceptance or rejection of VNC fruit and vegetables were analysed within and across products (Appendix II.1) and underlying relations of values were studied by using the four groups of choice values (Sweeney & Soutar, 2001). The choice values identified in the choice tasks were visualised (see results Figure 6). The answers on possible intervention methods obtained in the second part of the interview were directly coded, again by using open coding. The codes identified in the second part were summarised.

For the in-store experiments it was expected that the use of a point-of-purchase message as an intervention method would increase the percentage of VNC cucumbers bought. It was therefore hypothesized that the percentage of VNC cucumbers bought would be significantly higher in the intervention period compared to the baseline period (H1). It was further expected that the anticipated positive effect of the message found in the intervention period would also be present after removal of the message. This led to the hypothesis that the percentage of VNC cucumbers bought would be significantly higher in the follow-up period compared to the baseline period (H2).

H_{01}: percentage VNC p1 = percentage VNC p2
H_{a1}: percentage VNC p1 < percentage VNC p2

H_{02}: percentage VNC p1 = percentage VNC p3
H_{a2}: percentage VNC p1 < percentage VNC p3

To test these hypotheses, the data from the two experiments was analysed separately using the statistical software program IBM SPSS Statistics 23. First, the purchases – either VC or VNC – were set out against the three measurement periods. Second, the percentage of consumers buying the VNC cucumbers across the different measurement periods was calculated. Third, the percentages between the three measurement periods were tested

for significance ($\alpha<0.05$) by using a *Pearson's Chi-Square Test*. For a *Pearson's Chi-Square Test* was chosen as this test offered the possibility to compare two nominal variables (i.e. purchases vs. period). Besides, this test was able to analyse whether the observed difference in frequencies of VNC cucumbers purchased was significantly different between the three periods (Field, 2013). It is often argued that for a small sample size the approximation of the distribution in a Chi-Square Test becomes less reliable, leading to inaccurate significance tests (Field, 2013). However, the sample size in this study was large enough for both tests (i.e. frequencies in each cell higher than 5), so a *Pearson's Chi-Square Test* could be used. One-sided p-values were used, as the alternative hypotheses were one-tailed and directional.

The results from the observations and semi-structured interviews from the intervention research were summarized. These results were used as a descriptive and explaining tool and was used additional to the experiment data. The purchase data and the transcripts of in-store observations and interviews can be found in the document 'Data Overview' (Goossens, 2018).

3. Results

3.1 Choice value research

Overall, respondents' purchase intention was higher for all VC fruit and vegetables than for VNC fruit and vegetables (Figure 4) and in total 63.5% chose VC products (Figure 5). Besides, many choice values could be identified that were of influence on respondents' product choice. These values were found to differ between and within products. Also, respondents sometimes used the same choice value to accept one product and reject another product. In the following paragraphs, first a comparison of choice values between and within products is done. Then, the choice values leading to rejection and acceptance of VNC fruit and vegetables are discussed using the four choice value groups (Figure 6). Following, contextual influences, unconscious thinking and value conflicts in relation to purchases and non-purchases are discussed. In addition, an overview of observations in consumers' food waste awareness in relation to their food choices is given. Lastly, respondents' suggestions regarding interventions are described.

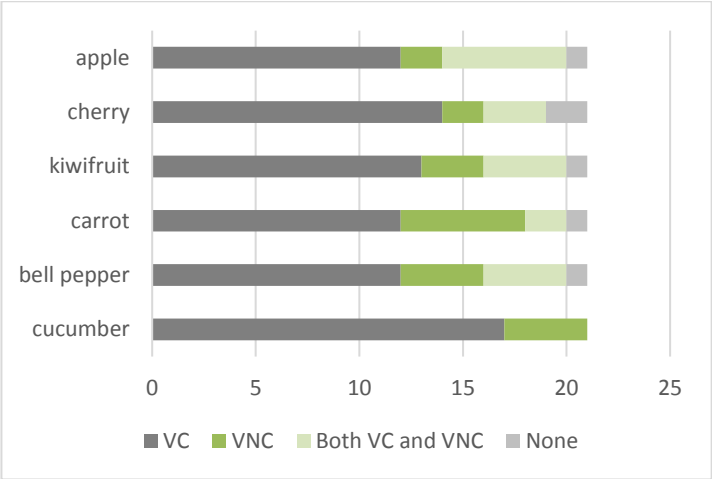


Figure 4. Product choices per choice task

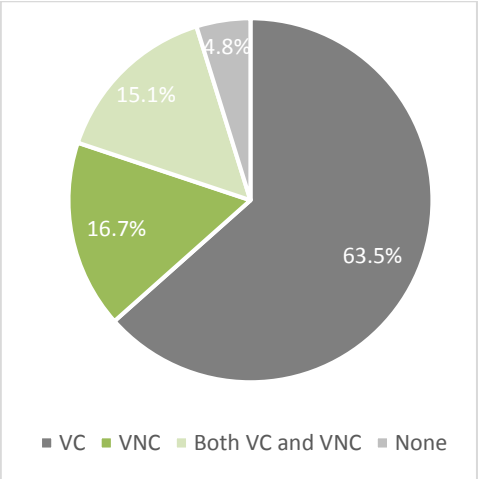
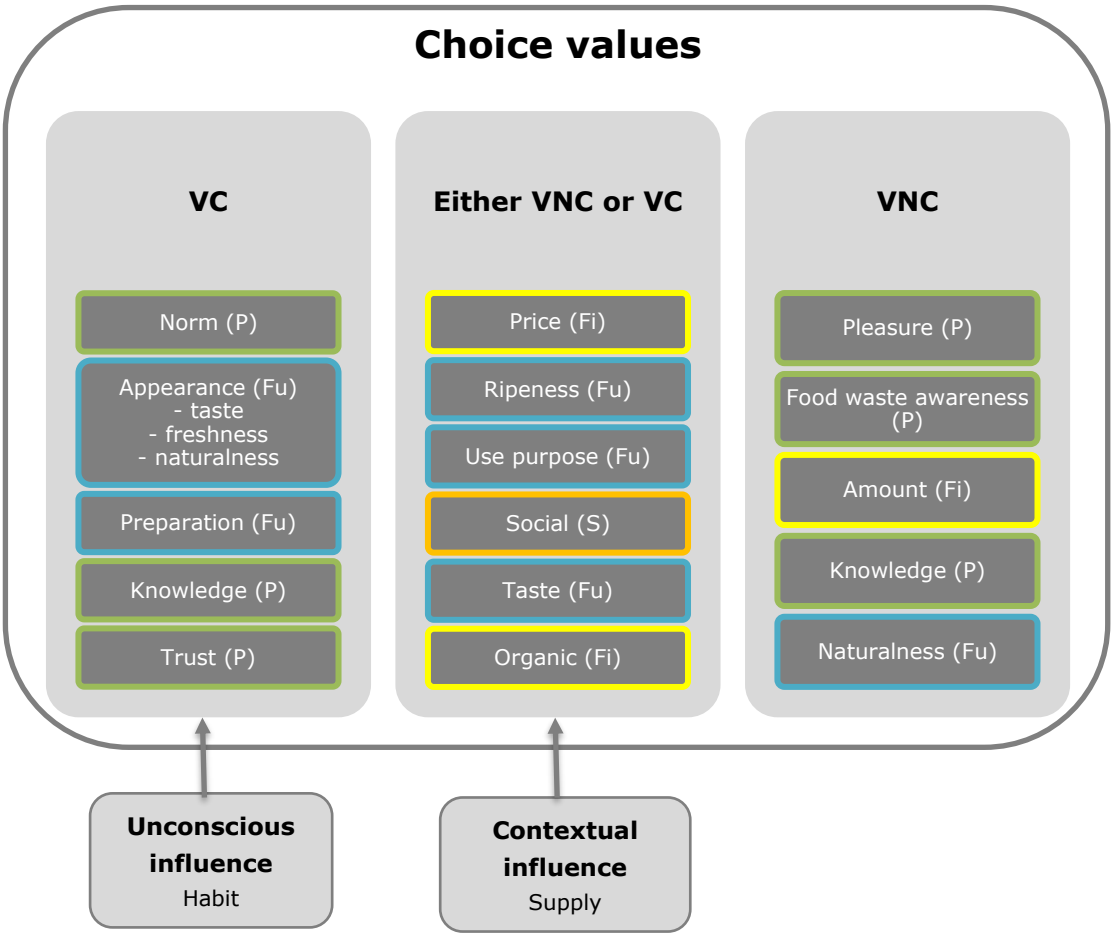


Figure 5. Product choice distribution of 126 choice tasks

3.1.1 Choice values in relation to different product groups

Overall, respondents rejecting the VNC fruit and vegetables compared for both product groups the appearance of the products to their perceived norm of how the product should look. Besides, for all fruit and vegetables was mentioned that habit played a role when choosing VC instead of VNC. However, differences in choice values between fruits and vegetables were also found. Mainly for vegetables, in particular cucumber and carrot, the preparation factor turned out to play a large role in the rejection of VNC vegetables. For fruit ripeness and taste were mentioned as important values in the product choice.

Choice values related to specific products could also be identified based on the respondents' answers. Mainly for the VNC cucumber and kiwifruit, respondents' knowledge was limited. Moreover, the VNC cucumber and carrot both had a high mentioned pleasure value, for some respondents serving as a reason to buy the VNC vegetable. For cherries and apples the colour was often mentioned as a barrier for acceptance. For carrot specifically, some respondents mentioned to buy it due to a better amount/price ratio.



Note: Choice values from most often mentioned to least often mentioned. Between brackets the four groups of choice values (Fu=functional, P=personal, Fi=financial, S=social)

Figure 6. Considerations leading to consumers' rejection or acceptance of VNC fruit and vegetables

3.1.2 General choice values

Based on the respondents' considerations for accepting or rejecting VNC fruit and vegetables, multiple choice values could be identified. Very frequently **functional choice values** were mentioned by respondents, mostly in favour of the VC fruit and vegetables. Mainly for vegetables respondents indicated that the preparation (i.e. cutting and peeling) would be difficult, leading them to choose the VC fruit or vegetable. This preparation motive was once linked to a time constraint. However, for others the shape did not matter as the product would be processed anyway:

"Then I would also buy the less good-looking bell pepper as well [...] Because you often cut it in pieces and process it in your food." (2, bell pepper)

Closely linked to the consumers' preparation consideration was the use purpose value. Few respondents indicated that the way the product would be eaten or processed was of influence on their product choice:

"Honestly I have to say, if I see a bruised apple and so on, and I want to make apple sauce, then it doesn't matter to me." (15, apple)

Based on their use purpose or way of eating, respondents would choose the product that best fit their wishes regarding the degree of ripeness or taste:

"With kiwifruit I think it's important that it's not a rock let's say. So if this one (VC) would be a rock and that one is also there and that one is right (VNC), then I would eventually take that one (VNC)" (16, kiwifruit)

In addition, based on a product's appearance several respondents formed either positive or negative quality expectations of the product, including expectations on taste, freshness or naturalness:
"That one is more glossy and looks more symmetrical. [...] And here the stem looks nice, the stem of the other one is a bit shrivelled. It looks as if that one is fresher (VC)." (4, bell pepper)

Moreover, respondents often referred to **personal choice values** in their product choice. A value largely leading to the rejection of VNC fruit and vegetables was the perceived norm. Respondents indicated to compare their perceived norm of how the product should look to the actual appearance of the product. All but one concluded that the VNC fruit and vegetables did not fit their perceived norm:
"Everything that's different in shape I would not choose. You choose based on how it should be" (17)

Besides, the appearance of the VNC fruit and vegetables led in a few cases to a lack of trust:
"But I think because of it looking different that you can't know if it's good or something. [...] Yes, if the production has gone well or something." (8, cucumber)

Another often-mentioned personal choice value, especially for cucumber and kiwifruit, was the respondents' knowledge of the product. Half of the respondents did at least once not recognise certain VNC fruit and vegetables due to their appearance:
"*The one on the left, I don't know what that is*" (7, cucumber)

Out of the values that led to the acceptance of VNC fruit and vegetables, pleasure and food waste awareness were the greatest influencers. Respondents with a food waste awareness motive had a consistent product choice (i.e. VNC fruit and vegetables) for all choice tasks. For respondents who did not have a food waste motive the pleasure factor was most mentioned, especially for the VNC cucumber and carrot:
"The one on the right, because it has legs […] it looks funny [...] when I see one like that I would think: he runs away!" (5, carrot)

Frequently, respondents related their food choice to **financial choice values**. These respondents indicated that their product choice was dependent on which product was best in line with their wishes regarding the products' amount, price, and whether it was organic. If the VNC fruit or vegetable would best fit their product demands, then respondents would accept the VNC fruit or vegetable. If product prices would be equal, price-focused respondents would not choose the VNC fruit or vegetable. However, these respondents argued that when the VNC fruit or vegetable would be reduced in price, this would better fit their price-value ratio and they would purchase it:
"Look if that would lie there for half the price, then I think I would choose one […] Well I would have a bit more work with that one, but then it would be worth it, for a lower price" (16, carrot)

For carrots several respondents mentioned to look at the price-amount ratio in favour of the VNC carrot:
"Because then you have more carrot for your money" (20, carrot)

Several respondents mentioned a **social choice value**. For these respondents the *social* environment in which the product would be given or consumed mattered to them. These respondents explained they would not want to give the VNC fruit or vegetable to someone else, afraid of the other's response:
"Say I would give it as a present to someone, or someone that is ill, then I would take the perfect one. […] I would feel like explaining myself. I would not want them to think it's because of spending less money, because of input from my side" (18, kiwifruit)

3.1.3 Unconscious processing and contextual factors

Respondents not only used their conscious processing, but also their unconscious processing in making a product choice. Several respondents indicated to choose based on their habits (i.e. unconscious system) and not on conscious value-negotiations. These respondents argued in favour of the VC fruit and vegetables that their purchase habits were influential in their product choices:
"You buy what you are used to" (2, cucumber)

When respondents were asked to make a product choice between equally priced VC and VNC fruit and vegetables, they also frequently mentioned that their product choice was dependent on the specific choice context. The *supply* in-store was often indicated to be of influence on the respondents' product choice. Only when the VC fruit or vegetable would not be available or present in the store, these respondents would choose the VNC fruit and vegetables:
"If it's not available, yes well then I will get a bend one. If there wouldn't be another option. But if there are straight ones I will get the one on the right (VC)" (14, cucumber)

3.1.4 Value-conflicts

Frequently respondents experienced value-conflicts when making their product choice. Several respondents mentioned that the shape of a product would not change its taste. Nevertheless, these respondents would still prefer the VC to the VNC fruit and vegetables, due to preparation (cucumber) or norm motives:
"Yes, but you're not going to choose the bend cucumber if there is a straight one next to it right?" (16, cucumber)

Several respondents indicated to accept the shape of VNC fruit and vegetables, as they would have to process the product anyway. However, these respondents in the end would not choose for the VNC fruit and vegetables, because of norm, social or knowledge values. In addition, a respondent with a food waste awareness motive had a value-conflict between her food waste value and her social value. She would buy VNC fruit and vegetables for herself, but not for others. Other respondents indicated that they did not mind the shape of products. One of them even mentioned to be aware of food waste. However, these respondents explained that regardless of their tolerance they would probably buy the VC fruit or vegetable out of habit:
"Yes, that's an unfortunate carrot, but that doesn't matter actually. Because if you see how much food is thrown away, what does not look perfect, then… But again, probably you will choose the box with the straight one." (1, carrot)

3.1.5 Food waste awareness

Few respondents noted to be aware of food waste in relation to VNC fruit and vegetables. Their food waste concern made the respondents choose the VNC fruit and vegetables. One respondent made clear that choosing VNC fruit and vegetables because of food waste concerns is a conscious choice:
"As it is the same price I would tend to choose the good-looking bell pepper […] On the other hand, I would probably choose the other one [...] that would be my first instinct, but then I would think about it […] Because if I don't do it and neither others then […] it will not be sold anymore." (18, bell pepper).

This was confirmed by another respondent saying her food waste awareness was in conflict with her habits, leading her to buy VC fruit and vegetables:
"If you see how much food is thrown away, that does not look perfect, then… But again, probably you will choose the box with the straight one." (1)

3.1.6 Possible intervention methods

Respondents were asked how they or other consumers could be influenced in-store to buy VNC fruit and vegetables. An intervention method that was largely mentioned by respondents was price reduction.
"It should be cheaper [...] You are not going to take a bend cucumber if there's a straight one next to it, right?" (11)

When respondents were told that price reduction would not be an option, a large group of the respondents mentioned that communication or other promotion techniques in-store could influence themselves or other consumers to buy VNC fruit and vegetables. Regarding communication, respondents mentioned that raising food waste awareness, explaining the production process, stressing the products' equal value, making the product special, or giving the product name would be good methods to influence consumers:
"I like it when I know: ok otherwise it will be thrown away and nothing will be done with it. [...] For me that's enough [...] But that cucumber I wouldn't recognise [...] So then mention what it is." (21)

Besides communication, respondents mentioned two other promotion methods to influence consumers; make consumers taste the product and product placement*:*
"Maybe the way of placement or promotion. [...] that you place the less nice-looking products in a more attractive way in the store" (19)

Another intervention mentioned was making changes in the supply in-store, either positive or negative. The positive respondents indicated that VNC fruit and vegetables should be made available in every store, just to get consumers aware of the alternative option and to make them familiar with the VNC fruit and vegetables:
"I think it already goes wrong with the fact that it is not in the shelves [...] Often people have a limited image of how vegetables look and then choose what they know. I think it just has to lie between the others. [...] Otherwise you don't know that is also an option" (3)

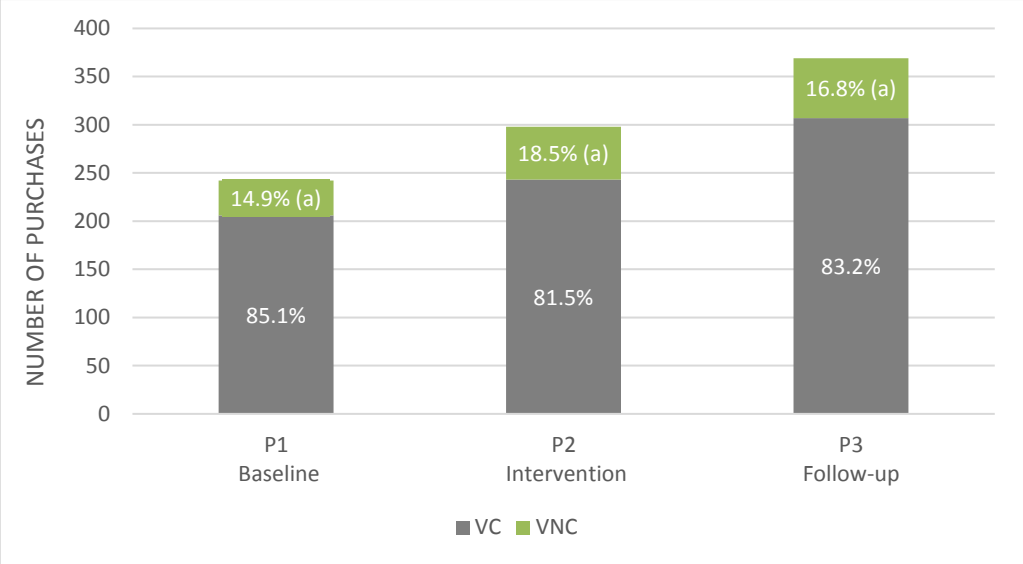
Respondents who had a negative view on the supply in-store, stressed that they would only buy VNC fruit and vegetables when there would be no another option:
"If there would be nothing but wonky ones in the crate, well then I have to take it. [...] Say there would be good-looking ones and ugly ones for the same price, then everyone would take the good-looking ones. Even if the price is normal" (14)

Lastly, an intervention revealed was processing the VNC vegetables in a meal so that consumers cannot see the misshaped vegetables:
"Of course you can also cut it and process it in a meal, no one will know. And if it has the same taste, what does it matter?" (5)

3.2 Intervention research

3.2.1 Greengrocer's

In the baseline period the percentage of VNC cucumbers sold was 14.9% (Figure 7). The percentage VNC cucumbers sold increased with 3.6 percentage points (24.2%) from baseline to intervention period. However, the *Pearson's Chi-Square Test* showed that the percentage from period 2 was not significantly higher than the one from period 1, $X^2(1, N=540)=1.22$, $p=0.161$. In addition, an increase from 1.9 percentage points (12.8%) from baseline to follow-up was found. Again, the percentage from period 3 was not significantly higher than the percentage of period 1, $X^2(1, N=611)=0.40$, $p=0.302$. A slight decrease of 1.7 percentage points (10.1%) could be found from the intervention to the follow-up period which was not significantly lower, $X^2(1, N=667)=0.31$, $p=0.324$. A complete overview of the purchase data can be found in the appendix (Appendix II.2).



Note: percentages with the same letters are not significantly different ($p<0.05$)

Figure 7. Cucumber sales greengrocer's for three periods, including percentages

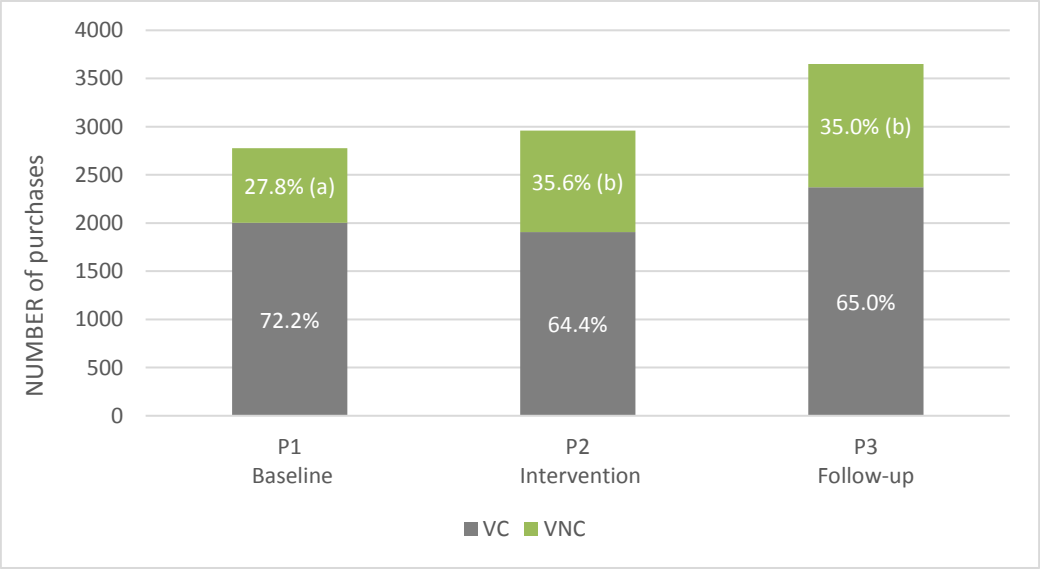
From observations by employees in the greengrocer's became clear that only few customers communicated to store employees about the VNC cucumbers. In the baseline period, one customer asked what the difference between the two cucumbers was and what the goal of the setup was. Two other customers bought the VNC cucumber, because they thought it was funny. These customers bought the most bend VNC cucumbers and told the store employees: *"It doesn't matter for the taste"*. In the intervention period, two customers mentioned to the store employees that they thought it was a nice initiative and that the two cucumbers taste the same anyway. One person asked why there was no price difference: *"usually the wonky ones are cheaper right?"*. Another customer said: *"I buy a J, because my name is José".* Observations by the researcher showed that not many customers seemed to see or read the sign. Especially customers that used a shopping list and did not need a cucumber, but also customers that needed cucumbers and who compared the VC and VNC ones did not look at the sign or read it. The latter consumers were focused on the crates, compared the products by touching it and compared the prices.

Interviews showed that very often customers who had bought a cucumber had not seen or read the sign in the intervention period. These respondents mentioned that they had probably missed the sign because they already knew what to take and did not pay

attention, were in a hurry, followed their usual route through the store or did not need cucumbers in the intervention period. One of these respondents was very surprised that she had not seen the sign: *"How could I have missed that?" (17).* According to the same respondent the sign and products should be placed somewhere where it would be seen, outside of the regular shopping routines of the customers. Some of the respondents that had not seen the sign, also hadn't seen the VNC cucumbers as they had automatically chosen the VC ones. All respondents that had not seen the sign, except for one, had chosen the VC cucumber. Most respondents argued to do this out of habit. Other respondents mentioned to base their choice on which one is most fresh, biggest or on use purpose. One respondent did not like the appearance of the VNC cucumber and would choose the best looking one. Several respondents mentioned that the shape did not matter to them when they would eat the cucumber out of hand, but it mattered when it needed to be peeled or cut. However, some respondents indicated to choose the VNC cucumber when there would be a price reduction. When a respondent was made aware by the researcher that there were also VNC cucumbers, she chose the VNC cucumber: *"Now that you say so, this bend one is actually quite funny, a smiley. And my kids would also like it"* (5). Several customers had seen and read the message above the crate and had bought the VNC cucumber, even before the sign was there. These respondents were already aware of food waste and mentioned that the two cucumbers tasted the same.

3.2.2 Supermarket

Total sales of VC and VNC cucumbers in this study were comparable to total sales of VC cucumbers in the same period last year; 9383 vs. 9294 respectively. The data of the supermarket experiment (Figure 8) showed that the percentage VNC cucumbers sold significantly increased with 7.8 percentage points (28.1%) from baseline to intervention period, $X^2(1, N=5733)=40.31$, $p=0.000$. In addition, a significant increase of 7.2 percentage points (25.9%) from baseline to follow-up was found, $X^2(1, N=6425)=37.66$, $p=0.000$. A slight decrease of 0.6 percentage points (1.7%) could be found from the intervention to the follow-up period, which was not significantly lower, $X^2(1, N=6608)=0.27$, $p=0.311$. A complete overview of the purchase data can be found in the appendix (Appendix II.2).



Note: percentages with different letters are significantly different ($p<0.05$)

Figure 8. Cucumber sales supermarket for three periods, including percentages

Observations showed that customers scanned the shelves for the product they were looking for. When these customers found the targeted product they either took their time to compare and feel the products or they quickly made their decision, often without comparing. Observations in the baseline and follow-up period were comparable. In both periods most customers immediately made a choice for a cucumber without looking at the other options. In addition, most customers chose the VC cucumber, however this group was larger in the baseline. Several customers shortly compared the VC and VNC cucumbers, product choices varied. Interestingly, once customers made the decision to purchase either VC or VNC cucumbers, several of them looked for the optimal cucumber in the crate. Few consumers changed the product after their first choice, which happened for both VC and VNC cucumbers. In the baseline, the VNC cucumbers attracted attention. A picture was made and one student pointed to the 'No Waste' shelve. Some people looked for more information around and above the shelve. In the follow-up period a few children played with the VNC cucumbers and a group of students discussed the VNC cucumbers.

Observations in the intervention period showed that customers who did not need a cucumber generally did not see the sign. Customers who saw the sign mostly focused on and read the smaller sign directly placed at the crates. Half of the observed customers read the sign and chose the VNC cucumber or no cucumber at al. Only one person bought a VC cucumber after reading the sign. The other half of the observed customers immediately made a product choice without seeing the sign or looking at the other options. Out of this group, most customers immediately chose the VC cucumber and only a few chose the VNC cucumber. Again, once customers made the decision to purchase either VC or VNC cucumbers, several of these customers looked and felt for the optimal cucumber in the crate. Interestingly, several children were observed to start playing with the VNC cucumbers and several customers took a picture of the shelve and the sign.

Interviews showed that respondents overall had not seen the sign. When respondents had seen the sign it had not influenced them, as they already bought VNC cucumbers before. One person indicated that the sign had influenced him to take a VNC cucumber. Choice values that led respondents to purchase VNC cucumbers included packaging, pleasure, price/amount ratio (linked to use purpose), knowledge and awareness. Packaging was most often mentioned as a choice factor: *"I think it's ridiculous that everything has to be packaged nowadays. I choose as much unpackaged produce as possible"* (4). As the VNC cucumbers were often bigger in shape, some respondents argued to get more product for their money. However, one girl mentioned that she would only buy the biggest one when she could be sure to consume it all. Several participants recognised the VNC cucumber: *"the plants in my garden never give straight-shaped cucumbers"* (21). One person indicated he had read about the experiment, but that he had chosen the VNC cucumber because of the absence of packaging. Besides these choice values, respondents argued that they looked for the most fresh cucumbers within the crate.

Values that led respondents to purchase VC cucumbers included habit (linked to time constraint), quality/value, convenience and use purpose. Most respondents argued to buy VC cucumbers, because it was their habit or because they were in a hurry and used their usual shopping routine: "*that one I always choose*" (6, 12, 14). Moreover, respondents argued that the VNC cucumbers were of lower value or quality: "*It's just a residual product*" (8). Several respondents also mentioned that VC cucumbers were more convenient to transport or store. Lastly, one respondent chose the VC cucumber, because he needed to

keep it longer and the plastic packaging would increase the cucumber's shelve life. Overall respondents argued to buy VNC cucumbers when these products would be lower priced or when it would be organic.

Interestingly, some people had changed their product choice during the experiment due to value-conflicts or routinized behaviour. One respondent had bought the VNC cucumber as she had seen the sign and thought it was a good cause. However when she was going to make slices with her machine, a VNC cucumber would not work. Another respondent had bought the VNC cucumber before, because he thought it was healthier and organic. However, at another shop visit he was in a hurry and experienced it was more convenient to take a VC cucumber. One person did not have a value-conflict, but took a VC one out of habit, even though she had bought a VNC one before. As the interviewer made her aware of her choice, she changed her product for a VNC one.

4. Discussion

Findings from both study 1 and 2 support previous research that consumers largely prefer VC to VNC (fruit and) vegetables when equally priced (de Hooge et al., 2017; Helmert et al., 2017; Loebnitz & Grunert, 2015; Loebnitz et al., 2015). The qualitative findings show that the choice values influencing product choices regarding VNC fruit and vegetables include all four choice value groups: functional, personal, financial and social (Sweeney & Soutar, 2001). Generally, respondents used multiple choice values to make their product choice. However, when two or more values were in conflict, respondents only used their most important value in the choice process (Furst et al., 1996). Next to choice values, contextual factors (Köster, 2009) and habitual purchases (Furst et al., 1996) were of influence on the VNC fruit and vegetable choices. The supply in-store turned out to influence product choices (Göbel et al., 2015), as respondents only considered buying VNC fruit and vegetables if no VC fruit and vegetables would be available.

Respondents' product choices were largely related to functional and social considerations including preparation, use purpose, quality expectations and social environment. Based on their intended food behaviour, respondents evaluated which of the two products (i.e. VC or VNC) best suited their way of preparing, eating, storing or sharing (Aschemann-Witzel et al., 2017; Sobal & Bisogni, 2009). VNC vegetables were often rejected because of their shape, since vegetables were planned to be processed in a meal and therefore needed to be easy to cut. In addition, respondents would accept VNC fruit and vegetables when they would eat it themselves, whereas they would reject it when serving or given it as a snack to others (de Hooge et al., 2017; Yaqub, 2016). These respondents argued that they wanted to give the best quality products to friends and family (Furst et al., 1996; Yaqub, 2016) and that the VNC fruit and vegetables affected their image as it communicated having a lack of monetary resources to others. The findings on quality expectations counterargument the studies which indicate that consumers use the appearance of VNC fruit and vegetables as a measure for intrinsic quality (Aschemann-Witzel et al., 2015; Creusen & Schoormans, 2005; de Hooge et al., 2017; Göbel et al., 2015; Helmert et al., 2017), given several respondents perceived the non-conformingly shaped fruit and vegetables to be of equal taste and naturalness.

Personal choice values were also of influence on VNC fruit and vegetable choices, given respondents indicated to use values related to their norm, recognition, trust, food-waste awareness and pleasure. The norm value was mentioned for all VNC fruit and vegetables, largely leading to rejection. When the respondents' perceived norm of how fruit and vegetables should look like was (not) in line with the appearance of the VNC fruit or vegetable, they accepted (rejected) the product. In addition, fruit and vegetables that had a relatively high non-conformity in shape more often induced pleasure in the consumer, leading to acceptance. Yet, high shape non-conformity resulted in a lack of product recognition, which led to the rejection of VNC fruit and vegetables. However, it is likely that this finding was a result of the images used in the choice tasks, as in-store interviews showed that all respondents recognised the VNC cucumber. Knowledge of the VNC fruit and vegetables, meaning respondents had seen or consumed it before, led to VNC fruit or vegetable choices. Lastly, food waste aware respondents appeared to be more willing to choose VNC fruit and vegetables (Loebnitz & Grunert, 2015; Loebnitz et al., 2015). However, for the food waste aware respondents to choose a VNC fruit or vegetable, the respondents needed to find the food waste value important (Cucchiara et al., 2015) and had to process values consciously.

Price-focused respondents mentioned to only choose VNC fruit and vegetables if these products would be reduced in price (de Hooge et al., 2017; Helmert et al., 2017) or if they would be organic. Findings show that consumers with a lower value perception of VNC compared to VC fruit and vegetables are not willing to buy VNC fruit and vegetables and would only choose VNC fruit and vegetables if more value would be added. Several price-focused respondents would buy VNC carrots or had actually bought VNC cucumbers, because they perceived the VNC vegetables to offer more product for money.

Quantitative findings, firstly, show that for both greengrocer's and supermarket consumers 15% to 28% respectively are willing to buy VNC cucumbers for a fair price (de Hooge et al., 2017), even without the communication present. However, it is likely that the baseline percentage of the supermarket is influenced by the absence of plastic packaging, given respondents argued to choose the VNC cucumber out of environmental waste concern. As the VNC cucumber was not packaged in plastic, and the VC cucumber was, they preferred the VNC cucumbers. Packaging could not lead to an increase of percentage VNC cucumbers sold across periods, as packaging was constant during the experiment. Moreover, the baseline percentage could also be explained by the target group of the supermarket, as in-store interviews show that respondents with a core value for food waste awareness already purchased VNC cucumbers before the message was there.

Secondly, quantitative findings show that the hypotheses of this research can be partly accepted and rejected. For the greengrocer's experiment no significant influence of the point-of-purchase message is found on the sales of VNC cucumbers, but in the supermarket experiment a significant influence of communication on VNC cucumber sales if found. From baseline to intervention period a significant increase of VNC cucumber sales of 7.8 percentage points was found. The effect of communication stayed relatively stable in the follow-up period, which implies that the previous communication still had an effect after removal. However, in-store interviews show that consumers can easily fall back into habitual purchase behaviour (i.e. purchasing VC cucumbers) (Labrecque, Wood, Neal, & Harrington, 2017) and therefore it is unclear how long the effect after removal of the communication will stay for. The significant increase of VNC cucumber sales is linked to 'communication' and not to the point-of-purchase message, because it is unclear if the message, the media attention from the 'No Waste' shelve or a combination of the two led to the effect. However, the shelve promotion only lead to a slight, non-significant increase of VNC cucumber sales in week 2. This implicates that the message in itself or the media attention in combination with the message led to the steep and significant increase in sales. However, in-store interviews and observations implicate that the message increased VNC cucumber sales. Price changes in the experiment could have influenced VNC sales in both experiments, but could not have led to the different results of the two experiments. The presence of foreign students in the supermarket could have influenced the purchase data of the supermarket. However, the influence of non-Dutch customers changing their purchase during the experiment was assumed to be small.

The different findings of the two experiments can be explained by several factors. Firstly, the fact that customers in the greengrocer's often did not see or read the message due to habitual shopping routines could have led to a less strong effect of the message on VNC cucumber sales. The extra sign at the crate in the supermarket experiment could have led to more customers noticing and reading the sign. Secondly, it could be that the message did not suit the most important choice values of the specific target group of the greengrocer's (Cucchiara et al., 2015). The supermarket was expected to have a relatively

environmentally and food-waste-aware target group. The message used in the intervention period could therefore have been more in line with the customers' core values and might have had more effect on the VNC cucumber sales compared to the greengrocer's experiment. Thirdly, the sample in the supermarket experiment is relatively high, which more easily leads to significant statistics (Field, 2013).

5. Conclusion and implications

5.1 Conclusion

The research allows two conclusions. Firstly, qualitative research shows that consumers use choice values from all four choice value groups – functional, personal, financial and social – to make a choice decision regarding VNC fruit and vegetables. Beside conscious choice values, habitual purchase behaviour and supply in-store also play a role in product choice. On the one hand, norm, quality expectations, habits and intended food behaviours serve as barriers for accepting VNC fruit and vegetables. On the other hand, values such as pleasure, food waste awareness and amount/price ratio lead to acceptance of VNC fruit and vegetables. Consumers who are in doubt base their product choice on the product that at the moment of purchase best fits their financial and intended food behaviours. Secondly, in analysing supermarket sales of equally priced VC and VNC cucumbers, it emerges that a positive-framed point-of-purchase message in combination with media attention about food waste and equal taste of VNC cucumbers offers a potential method to increase VNC cucumber sales.

5.2 Practical implications

The results of both studies in this research have several implications for retailers and policy makers. Based on qualitative findings it becomes apparent that the deeply rooted norm of consumers regarding how fruit and vegetables should look should be intervened with at an earlier stage, for example in childhood. This could be done by offering VNC fruit and vegetables in-store, making consumers and especially younger children familiar with VNC fruit and vegetables. Moreover, stressing added value of VNC fruit or vegetable (e.g. organic, amount/price ratio) could influence price-focused consumers to choose a VNC fruit or vegetable. Quantitative findings show that retailers should offer VNC fruit and vegetables to their assortment, as 15% to 28% of the consumers are willing to buy VNC cucumbers when equally priced to VC cucumbers. Results show that not all consumers use the appearance of VNC shaped fruit and vegetables as a measure for intrinsic quality and show that consumers are capable of equally valuing VC and VNC fruits and vegetables. Moreover, it appears that stressing the equality in taste of VNC fruit and vegetables in combination with raising food waste awareness, offers a potential intervention method to raise sales of VNC vegetables for certain target groups.

5.3 Implications for future research

It is still unsure which form(s) of communication (media attention or message) leads to the increase of VNC fruit and vegetable sales in the supermarket. In addition, the communication had an effect for the relatively environmentally aware consumers in the supermarket, but it is unclear if the same findings are to be found for 'regular' supermarket consumers. Moreover, the current study is done for VNC cucumbers, but as results of the semi-structured interviews have shown, choice values and behaviour might differ for different products. Therefore, the same study should be replicated for different forms of communication, different target groups and different VNC fruit and vegetables. Besides, future research could be done on other methods to intervene in the value perception and purchase behaviour of consumers regarding VNC fruit and vegetables. The choice values found in this research could be used as a basis. To specify intervention methods for different target groups, more in-depth research regarding consumers' choice values could be done by comparing choice values of lower and higher educated consumers or different age groups. Besides, as habitual purchases and intended food behaviours serve as a barrier

to choose VNC fruit and vegetables, more research is needed on how to intervene in product choices of these consumers regarding VNC fruit and vegetables. Moreover, the implementation of VNC fruit and vegetables to the assortment in-store brings some practical challenges – such as logistics, packaging and shelve space – and some challenges regarding the willingness of retailers to change their image as high quality store. Therefore, more research on the optimisation and realisation of adding VNC fruit and vegetables to the assortment in the retail sector should be done.

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Appendix I – Experimental design

I.1 Sample characteristics semi-structured interviews

Table I.1. Overview of participant characteristics ordered based on education and age

Participant number, gender, age, household, purchase location and description
Lower educated
#20: Female, 22, living with parents, supermarket – Buys fruit based on ripeness and products on appearance. However, price influences her decision.
#5: Male, 24, living with mother and sister, supermarket – Focus on products' naturalness and product price.
#21: Female, 35, single-household, supermarket – Buys VNC fruit and vegetables, because of food waste concerns. Buys fruit based on ripeness.
#13: Female, 44, single-household, Turkish store/supermarket – Price most important deciding factor.
#17: Female, 44, with children, supermarket (Turkish store) – Would choose best looking product.
#19: Female, 45, with children, supermarket/greengrocer's – Knows VNC fruit and vegetables taste the same, but chooses standard looking products. Price influences her decision.
#16: Female, 50, with child, supermarket – Buys best-looking product, price reduction would change decision.
#12: Female, 55, single-household, supermarket – Chooses products based on appearance.
#14: Female, 67, two-person, all locations – Chooses best looking product.
Higher educated
#9: Female, 21, two-person, supermarket – Always pays attention to degree of shine of produce.
#8: Female, 22, single-household, (Turkish)supermarket – Chooses on recognition, focuses on production.
#2: Female, 28, single-household, supermarket – Buys fruit based on freshness.
#3: Female, 30, with small children, organic market – Chose VNC, because of food waste concerns.
#10: Male, 32, two-person, all locations – Knows VNC fruit and vegetables taste the same as VC ones.
#4: Female, 33 years, with small children, supermarket – Usually goes for best looking product.
#18: Female, 47, single with child, supermarket/farmers market – Buys VNC fruit and vegetables, because of food waste concerns.
#11: Female, 51, with children, supermarket/market – Knows shape of products does not influence its taste. However, in all cases she would buy the best looking product.
#1: Female, 60, two-person, supermarket – Aware of food waste, but would buy VC out of habit.
#15: Female, 65, two-person, supermarket – Knows tastes the same, but would choose best-looking product. Price reduction would change her decision.
#6: Female, 69, single-household, organic store – Always buys organic products and used to different shape.
#7: Male, 77, single-household, supermarket – If he can taste the product, he buys the one that tastes best.

I.2 – Interview questions semi-structured interviews

Bedankt dat u mee wilt doen aan mijn onderzoek. Ik doe momenteel onderzoek naar het keuzeproces van consumenten bij het kopen van groente en fruit. Voordat we beginnen wil ik graag een aantal algemene vragen stellen om te kijken of u tot de doelgroep behoort:

- Doet u de boodschappen voor uw huishouden?
- Wat is uw leeftijd?
- Wat is uw hoogst voltooide opleiding?
- Hoe groot is uw huishouden?
- Waar koopt u normaal uw groente en fruit?
- Staan groente en fruit van tevoren op uw boodschappenlijstje (gepland) of is dit een ongeplande aankoop?

In dit interview zal ik u verder vragen stellen over de aankoop van verschillende groente en fruit en waarom u deze wel of niet zou kopen. Het interview zal ongeveer 8 minuten duren en alles wat besproken wordt zal anoniem verwerkt worden. Om het verwerken van de antwoorden wat makkelijker te maken zou ik graag dit interview op willen nemen. Heeft u hier bezwaar tegen?

Nee: Oke dan gaan we beginnen. (recorder aan)
Ja: Prima, dan zal ik tijdens het interview uw antwoorden noteren.

Het interview zal uit twee onderdelen bestaan. Het eerste deel is een keuzeopdracht, waarin u moet kiezen tussen twee producten. Het tweede deel zal bestaan uit wat algemene vragen.

Keuzeopdracht

Ik laat u elke keer twee verschillende plaatjes zien van producten en u moet zich voorstellen dat deze twee producten samen in één bak in de winkel liggen voor dezelfde prijs. Ik vraag u elke keer welke van de twee u zou kopen. Er zijn geen goede of foute antwoorden! Uw mening is voor mij belangrijk.

- *Stel: deze (paren) liggen samen in een bak in de winkel voor dezelfde prijs. Welke kiest u en waarom?*
- *Hoe gebruikt u dit product normaal?*

Doel expliciet maken

Dit waren de plaatjes. Ik zal u nu het doel van mijn onderzoek wat beter uitleggen en dan volgen er nog een laatste vraag. Er wordt heel veel groente en fruit verspild doordat er strenge kwaliteitseisen zijn. Kromme, te grote/kleine of verkleurde groente en fruit komen daarom niet bij de consument terecht en worden bijvoorbeeld bij de boer weggegooid, worden verwerkt in andere producten of gebruikt als veevoer. In mijn onderzoek zoek ik uit of consumenten deze kromme groente en fruit zouden kopen en waarom wel/niet. Ook probeer ik een manier te vinden hoe consumenten gestimuleerd kunnen worden om deze producten wel te gaan kopen. Daarom aan u de vraag:

- *Wat zou ervoor kunnen zorgen dat u deze producten zou kopen?*

(bij focus op prijs, aangeven dat dit geen mogelijkheid is)

Dit was de laatste vraag van het interview. Heeft u zelf nog vragen of op- of aanmerkingen? Bij deze heel erg bedankt voor uw medewerking aan het onderzoek.

I.3 – Choice tasks semi-structured interviews

Visually conforming products	Visually non-conforming products
	
	
	
	
	
	

I.4 – Planning Experiments

Table I.4. Time planning experiments

	February		**March**				**April**		
	19	26	5	12	19	26	2	9	16
Period 1: Baseline (no message)									
Period 2: Intervention (message)									
Period 3: Follow-up (no message)									

Note: grey indicates the greengrocer's experiment, yellow the supermarket experiment

I.5 – Placement VNC cucumbers greengrocer's experiment

P1
Baseline

P2
Intervention

P3
Follow-up

I.6 – 'No Waste' shelve

I.7 – In-store interview design

Heeft u kort de tijd voor wat vragen over uw aankoop van deze komkommer?

- Waarom heeft u deze komkommer gekocht?
- Heeft u in de afgelopen weken (dezelfde) komkommers gekocht?
- Heeft u in de afgelopen weken kromme komkommers gekocht? Zo ja/nee, waarom?
- Wat vindt u van de kromme komkommers?
- Zijn ze u opgevallen?
- Heeft u het bord zien hangen bij de komkommers? Zo ja/nee, hoe komt dat en wat vindt u ervan?
- Heeft het bord u overgehaald om kromme komkommers te kopen?
- Wat zou u overhalen om wel kromme komkommers kopen?

Appendix II. Overview data

II.1 – Overview choice values data

Table II.1.: Overview of considerations mentioned in total and per product (incl. conflicts)

	Respondents (total = 21)	Cucumber	Bell pepper	Carrot	Kiwifruit	Cherry	Apple	**Total mentioned**
Rejection								
Norm*	**15 (2**)**	6	3 (1)	4 (1)	5	6	3 (1)	**27 (3)**
Appearance*/x	**18 (6**/3**)**	3	7	1 (1)	3	7 (2)	5 (3)	**26 (6)**
-colour	**10**	-	-	-	-	7	4	**12**
-taste*/x	**3 (4/5**)**	-	1 (2)	-	1 (2)	-	1 (1)	**3 (5)**
-freshness	**2**	-	2	-	-	-	-	**2**
-naturalness	**1**	-	-	-	-	-	1	**1**
Preparation*/x	**11 (6**/3**)**	8	2 (4)	6 (2)	- (1)	3 (1)	- (1)	**19 (9)**
Knowledge	**10**	6	-	1	6	-	1	**14**
Habit	**5**	2	1	1	3	1	1	**9**
Trust	**4**	1	2	-	1	-	-	**4**
Either VNC or VC								
Price	**5**	1	-	2	-	-	-	**3**
Ripeness	**5**	-	1	-	3	2	2	**8**
Supply	**6**	4	-	-	1	-	1	**6**
Use purpose	**2**	-	-	-	-	-	2	**2**
Social	**2**	-	-	-	1	-	1	**2**
Taste	**1**	-	-	-	-	1	1	**2**
Organic	**1**	-	-	1	-	-	-	**1**
Acceptance								
Food waste awareness x	**3 (1)**	2	2	3	2	2	1	**12**
Pleasure x	**5 (1)**	3	-	3	-	-	1	**7**
Amount	**2**	-	-	2	-	-	-	**2**
Knowledge	**2**	1	-	-	1	-	-	**2**
Naturalness	**1**	-	-	-	1	-	-	**1**

* Choice values which were several times positively perceived by people who accepted the VNC fruit or vegetable (between brackets).
x Choice values which were several times positively perceived by people who rejected the VNC fruit or vegetable (between brackets).
** Participants used same choice values to either accept or reject VNC fruit and vegetables.

II.2 – Overview in-store experiment data

Table II.2.1. Purchases VC and VNC cucumbers per period and placement – Greengrocer's

	VC sold	VNC sold	Percentage VNC of total sales
Period 1: baseline	**206**	**36**	**14.9 (a)**
-random	110	20	15.4
-horizontal	96	16	14.3
Period 2: intervention	**243**	**55**	**18.5 (a)**
-random	101	24	19.8
-horizontal	142	31	17.9
Period 3: follow-up	**307**	**62**	**16.8 (a)**

Note: percentages with the same letters are not significantly different ($p<0.05$)

Table II.2.2. Purchases VC and VNC cucumbers per period – Supermarket

	VC sold	VNC sold	Percentage VNC of total sales
Period 1: baseline	**2004**	**771**	**27.8 (a)**
Week 1 (shelve)	985	359	26.7
Week 2 (shelve promotion)	1019	412	28.8
Period 2: intervention	**1905**	**1053**	**35.6 (b)**
Week 3 (closed Sunday)	724	388	34.9
Week 4	1181	665	36.0
Period 3: follow-up	**2373**	**1277**	**35.0 (b)**
Week 5	1159	564	32.7
Week 6 (without Monday)	1214	713	37.0

Note: percentages with different letters are significantly different ($p<0.05$)