Effect of perceived risks, naturalness, usefulness and ease of use on the consumer acceptance of 3D food printing

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Abstract

Background: The market of 3D food printers for general consumers has the potential to grow. While the effects on consumer acceptance of new technologies are clear, the effects on consumer acceptance of 3D food printing are less clear and need to be investigated.
Objective: The aim of this research is to find out which factors influence the consumer acceptance of 3D food printing.
Design: An online experiment was conducted in the form of a quantitative research. The research included a 2x2x2 design, with eight different conditions. The study consisted of 157 participants that were randomly assigned to these eight conditions.
Results: Risk perception did not significantly predict usefulness perception ($p = .567$). In contrast, naturalness perception significantly predicted usefulness perception ($p = .011$). Ease of use perception did not significantly predict attitude ($p = .058$). In contrast, usefulness perception significantly predicted attitude ($p = .000$).
Usefulness perception had a mediating effect on the influence of naturalness perception on attitude. In contrast, usefulness perception did not have a mediating effect on the influence of risk perception on attitude.
Conclusion: Consumers perceive a 3D food printer as more useful when it is able to produce natural food products. Moreover, the more a consumer perceives a food printer as useful, the more likely it is that he or she has a positive attitude towards it. This positive attitude towards the printer results in a higher chance of purchasing one. Perceived usefulness acts as a mediator between perceived naturalness and attitude.

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1. Introduction

Technology has developed rapidly in the last decades. New techniques, processes and products are continuously being introduced and adapted in order to make production and life more convenient. For young people it is almost impossible to imagine a life without a smartphone that they use for texting, calling, playing games and browsing the internet. Change comes with the years and this is the case in nearly every industry. Multiple innovative techniques were developed and adopted over the years, one of them being 3D printing. Three-dimensional printing was invented by Charles W. Hull in 1986 who co-founded the company 3D Systems (3D Systems Inc., n.d., Lipson & Kurman, 2013). He used stereolithography; a style of 3D printing that uses a light source to link molecules and thereby form polymers (Lin et al., 2015). This was the first type of 3D printing that existed and was patented. According to Wegrzyn, Golding and Archer (2012) printing three-dimensional objects, also known as additive manufacturing, is a process that builds solid objects layer upon layer. This process is digitally controlled, since a system reads a template and controls the printer that constructs the object. Smelting and chemical reactions are used to fuse different layers together. Wong and Hernandez (2012) mention advantages of this new technique which include the decrease in time and cost that is needed for production. Moreover, when using a 3D printer, less human interaction is needed and the product development cycle will be shortened.

One of the aspects that distinguishes 3D printed objects from handmade objects is the possibility to be more complex (Yang, Zhang, & Bhandari, 2017). When it comes to food production, the ability to create complex shapes can be useful, for example with the production of chocolate (Laplume, Petersen & Pearce, 2016). By using molds, chocolate producers are not able to create the same complex shapes that 3D printers can provide. Therefore 3D printing allows for more possibilities and creativity in the food industry. In addition, Gray (2010) shows the potential of 3D food printing for the vegan and vegetarian market and that it may be of positive influence to help feed the ongoing growth of world population. 3D food printing has the potential to help the medical sector regarding the production of meals. Another sign that shows the potential of 3D food printing is the fact that NASA is collaborating with a company to explore whether the use of 3D printers in space is feasible. This makes it possible to provide and adapt meals for the astronauts in a different way than pre-packaging (NASA, 2013).

Overall, 3D food printing seems to be beneficial to all of us, but this does not necessarily mean that it will be a success in the future. Small customizations of food are actually one of the few processes that are currently done when it comes to 3D food printing. Nowadays, 3D printing in the food industry is not utilized on a large scale (Rayna & Striukova, 2016). It is still a niche market, but with the potential of 3D printing and the ongoing decrease in costs of manufacturing 3D printers it may be just a matter of time until printing food becomes part of our normal lives. This is likely to bring up several issues and discussions regarding ethics, food safety and the consumer's willingness to use 3D food printing. The science fiction idea of coming home after a long working day, starting your computer, choosing a meal and waiting for it to be printed seems wonderful, but consumers still need to be willing to use it. It is a radical new way of preparing a meal and if consumers do not want this change in their lives, bringing 3D food printers on the market for the general public will be useless. Since it is a radical new product and knowledge is limited in the field of 3D food printing for consumer purposes, the attitude of consumers towards this technology is unknown. To what extent will they accept 3D food printing and what are their motives to use or not use this technology? What are barriers that may prevent 3D food printers from being brought on the market?

The aim of this research is to find out which factors influence the consumer acceptance of 3D food printing.

2. Literature review

2.0 Introduction

Nowadays advanced technologies are important in daily lives. Research has shown several implications of 3D food printing, but these were mostly on an industrial level. The market for 'regular' consumers of 3D food printing is expected to grow in the upcoming decades, but adoption by the general public is not certain. In this chapter an overview is given of factors that could potentially be important in the acceptance of 3D food printing by consumers. Theories and models that are discussed and elaborated include the Theory of Planned Behavior, the Technology Acceptance Model, risk and benefit, Diffusion of Innovations, and other factors are mentioned.

2.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) is a model by Ajzen (1991) which is a follow-up of the Theory of Reasoned Action (TRA) that was proposed by Fishbein and Ajzen in 1980. Both theories try to predict behavior, but there is a difference between the two. The TRA was adapted, because this model did not deal with behaviors over which people did not have complete deliberate control. That is the reason the concept of perceived behavioral control was added and included in the TPB, which is elaborated in more detail later. Figure 1 shows an overview of the TPB that was proposed by Ajzen.

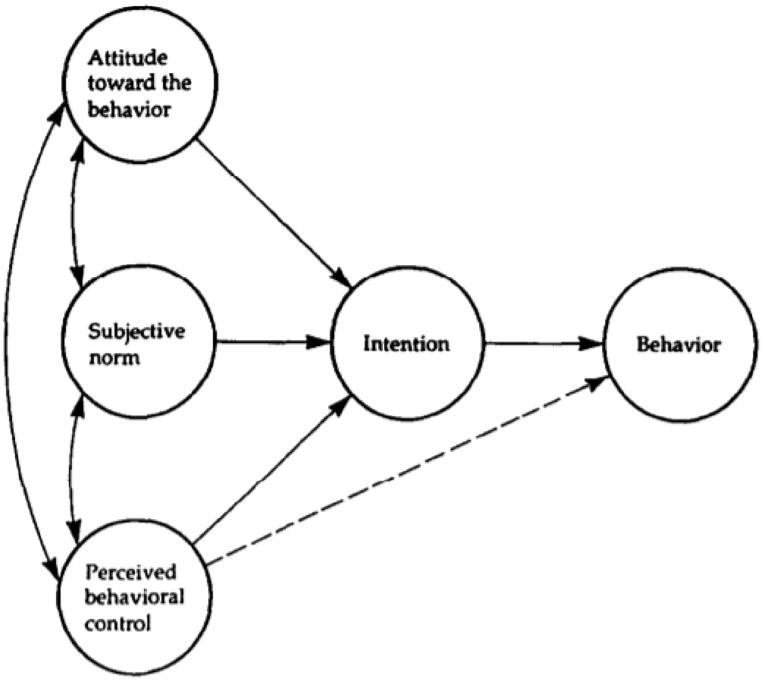

Figure 1. Theory of Planned Behavior (Ajzen, 1991).

2.1.1 Intention and Perceived Behavioral Control

Intention is a concept that consists of motivational factors that influence behavior. The stronger the intention, the more likely it is that a person actually performs the behavior. Intentions can be seen as something that tells us how much a person is willing to perform a behavior. Intentions are predicted by combining attitudes, subjective norms and perceived behavioral control. The first predictor, attitude, refers to "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question (Ajzen, 1991, p. 188)." The second predictor, subjective norms, is a social factor that can be explained by the social pressure a person feels to perform or not perform the behavior. The third predictor is perceived behavioral control, which differs from actual behavioral control. Actual behavioral control include the possibilities of a person to be able to engage in a certain behavior. Think about resources and opportunities that are needed to perform behavior. On the other hand, perceived behavioral control, which is the third predictor of intentions, is a bit more complex. It can be explained by a person's perception of the ease or difficulty to perform a specific behavior. People make judgments of how well they are able to engage in the behavior of interest. Therefore perceived behavioral control partly depends on the characteristics of an individual, such as self-efficacy and the degree of confidence.

Intention and perceived behavioral control jointly predict behavior, but there are several conditions that have to be met in order to predict the behavior accurately. First of all, "the measures of intention and of perceived behavioral control must correspond to or be compatible with the behavior that is to be predicted (Ajzen, 1991, p. 185)." For example, if we would like to predict the behavior 'purchasing a 3D food printer', we have to assess intentions and perceived behavioral control that correspond to this behavior. Therefore intentions should not be 'to purchase a food processing system' as this is too general. 'To purchase a 3D food printer' would be the correct intention to assess. The second condition that has to be met is that intentions and perceived behavioral control have to remain stable. Events can occur between the assessment and observation of the behavior that change intentions or perception of behavioral control. If this happens, prediction of behavior might not be accurate. The third condition is about the accuracy of perceived behavioral control. Perceived behavioral control has to be realistic in a way that it contributes to the accuracy of the prediction. Reasons that perceived behavioral control is not realistic include a situation in which "a person has little information about the behavior, when requirements or available resources have changed, or when new or unfamiliar elements have entered into the situation (Ajzen, 1991, p. 184-185). These are situations in which perceived behavioral control is not realistic; a measure of perceived behavioral control cannot be substituted for a measure of actual behavioral control. In this way, the accuracy of behavioral prediction is lowered. When all conditions are met, prediction of behavior is expected to be valid. A general rule for the TPB is as follows; the more favorable the attitude and subjective norm towards a behavior and the greater the perceived behavioral control, the stronger the intention to perform the behavior. Therefore it is more likely that a person engages in the desired behavior. The extent to which the predictors have a significant effect on the outcome depends on the situation. Sometimes all predictors significantly influence the outcome, while in other situations it could be that, for example, attitudes and perceived behavioral control have significant effect but subjective norms do not.

2.2 Technology Acceptance Model

The Technology Acceptance Model was introduced by Davis in the 80s and illustrates consumer acceptance of computer-related technology. The model was developed with two objectives in mind. First of all, Davis wanted to provide new theoretical insights in order to better understand the processes that play a role in user acceptance. Second of all, Davis aimed to create the model from a practical viewpoint. By using this model, designers and implementers have a chance to evaluate their computer-related systems before actually implementing them.

2.2.1 Perceived usefulness and perceived ease of use

This model, which is depicted in figure 2, includes two core aspects; perceived usefulness and perceived ease of use. These perceptions are responsible for the consumer acceptance of computer-related technology and are a result of external variables (X_1, X_2, X_3 etc.). "Perceived usefulness is defined as the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context (Davis, Bagozzi & Warshaw, 1989, p. 985)." So perceived usefulness tells us to what extent a person thinks the technology will positively contribute to their life. On the other hand, perceived ease of use "refers to the degree to which the prospective user expects the target system to be free of effort (Davis et al., 1989, p. 985)." Consumers expect a technology to be easy to use to a certain extent, which is measured by perceived ease of use. Perceived usefulness and perceived ease of use jointly form a certain attitude toward using the technology. This attitude may result in the behavioral intention to use the technology. The final step is the actual use of the technology. Perceived usefulness and perceived ease of use ultimately result in the use of the technology, so these factors are expected to be of influence on the acceptance of 3D food printing as well.

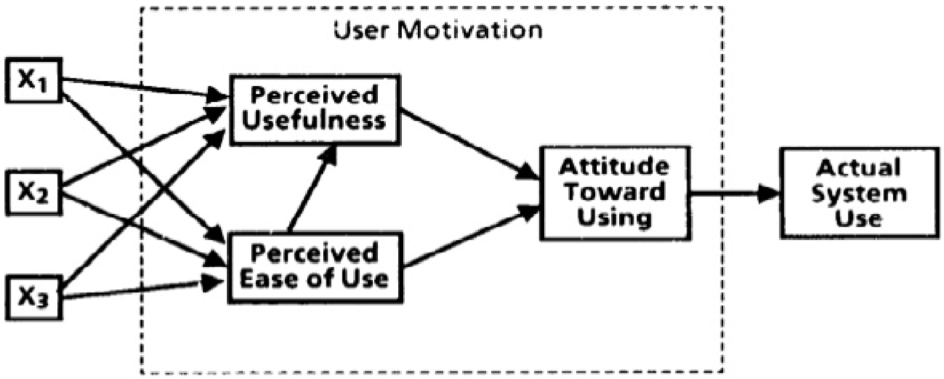

Figure 2. Technology Acceptance Model (Davis, 1989).

2.3 Risk & benefit, perceived naturalness and trust

By examining the Theory of Planned Behavior and the Technology Acceptance Model, we went through models that try to predict behavior and that may contribute to the understanding of whether consumers would accept 3D food printing. To further grasp the mind of the consumer, we look at risks and benefits as this is a consequence that the arrival of 3D food printers on the regular market would provoke. Moreover, we look at perceived naturalness and trust.

2.3.1 Risk and benefit

In situations that involve risk, people make decisions that are not in line with the rational way of thinking. Therefore, decision making under risk is important to take into consideration, since the utility theory might not always realistically reflect the actual decisions. Kahneman and Tversky (1979) introduced the prospect theory, which is a descriptive model that shows that people prefer certain gains rather than larger gains that include risk. Kahneman and Tversky (1979) illustrated this with an example; people would rather choose 450 dollars instantly than a 50 percent possibility of receiving 1000 dollars. Although the expected utility is higher when choosing the second option, generally speaking, people prefer the first option. This example is in line with the idea the prospect theory describes.

Alhakami and Slovic (1994) found that people perceive risk and benefit to be inversely related. This means that people think an activity with a *high* risk has a *low* benefit and an activity with a *low* risk has a *high* benefit. A similar founding was observed by Brown and Ping (2003). Their study showed that participants perceived lower risks when they were informed about a GM application with consumer benefit and participants perceived higher risks when they were informed about the same GM application without consumer benefit. In the field of GM, tangible benefits are important for people that are willing to try genetically modified products (Magnusson & Hursti, 2002). These findings create some controversy, because this is completely the opposite of what research has found to be true in a real world situation. In normal situations risk and benefit correlate positively; high risk results in high benefits and low risk results in low benefits (Slovic & Peters, 2006).

Additionally, Slovic and Peters (2006) imply that people do not only judge a risk by their thoughts, but also by their feelings. Therefore the affect heuristic plays a role in decision

making, since affect has an effect on the perceived benefits and perceived risks (Slovic, Finucane, Peters & MacGregor, 2004).
In the same way as GM foods, nanotechnology foods are easier accepted when they have an obvious consumer benefit than when their benefit is not clear (Siegrist, Cousin, Kastenholz & Wiek, 2007). Siegrist et al. studied the acceptance of nanotechnology foods using the model as depicted in figure 3. They took feelings of people into account when researching this issue. Their results showed that nanotechnology packaging is more accepted than nanotechnology foods. Moreover, people perceived the benefits as a result from nanotechnology as not enough value-adding in order for them to buy those products. Perceived benefits have an impact on the way nanotechnology foods and packaging are evaluated, but it is not the one and only factor of nanotechnology acceptance. This was reflected in willingness to buy and perceived benefits of nanotechnology packaging. The willingness to buy was much lower than the perceived benefits. This shows that there could be high benefits involved without being reflected in the willingness to buy. Therefore, additional factors, apart from perceived benefits, have an impact on the willingness to buy nanotechnology applications. Moreover, Siegrist et al. emphasize that consumers perceive benefits in a different way, since they are not a homogenous group.

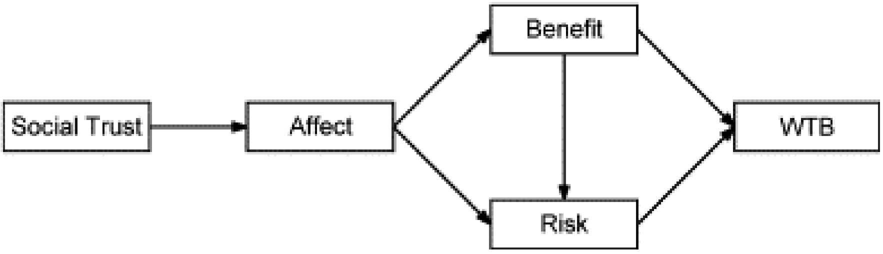

Figure 3. Model explaining willingness to buy (WTB) nanotechnology foods (Siegrist et al., 2007).

In conclusion, many studies have shown that perceived risks and perceived benefits influence the willingness to buy and accept a new (food) technology and that these risks and benefits are affected by the affect heuristic.

2.3.2 Perceived naturalness and trust

Siegrist (2008) examines factors that influence consumer acceptance of new food technologies and states that one of the most important factors seems to be the personal importance of naturalness. For example, people who strongly prefer organic food and a natural way of food preparation evaluate new food technologies more negatively than others. Therefore, it is important to know to what extent a new way of food preparation is perceived as natural. A technology that is perceived to be creating natural products has a higher chance to be accepted by people who believe naturalness is important. In addition, in general, people are suspicious of new foods and technologies and have bigger trust in natural food and production (Huotilainen & Tuorila, 2005). This finding is in line with the paper of Rozin et al. (2004), in which they found that there is a strong desire for naturalness of food production.
Consumers have limited knowledge when it comes to new technologies and rely on the information provided by the industry. The trustworthiness of this information is crucial. Trust plays a vital role for consumers, since it reduces the cognitive complexity of their decisions (Earle & Cvetkovich, 1995). On the other hand, suspicion, or distrust, can be seen as the opposite of trust. Creating trust, or diminishing suspicion, is important for the industry to maximize the chance of success of the new technology. Perceived naturalness, trust, risks and benefits are closely related and the effects of these factors should not be neglected.

2.4 Diffusion of Innovations

Diffusion of innovations is a theory by Rogers (1962) that explains how and at what rate innovations are spread. The four key elements in the diffusion of innovations include the innovation itself, communication channels, time and a social system. "An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption (Rogers, 1962, p. 11)." The newness of an object is a matter of perception. Something can exist for a long time before a person discovers it. In this case the object is perceived as new, so it is seen as an innovation. Venkatesh, Morris, G. Davis and F. Davis (2003) combined the Diffusion of Innovations theory and the Technology Acceptance Model, which resulted in a model that was even more complicated. In the following paragraph I will not go into further detail of the model of Venkatesh et al (2003), but solely elaborate the Diffusion of Innovations theory of Rogers.

2.4.1 Innovation characteristics

The rate of adoption depends on potential adopters' perceived characteristics of the innovation. Five characteristics are distinguished by Rogers. The first characteristic that is mentioned is (1) *relative advantage*. This can be explained by the degree to which an innovation is perceived better than a similar product it can replace. Rogers argues that this can be measured not only by economic factors, but additionally by social prestige, convenience and satisfaction. The higher the relative advantage, the higher and faster the rate of adoption of the innovation will be. The second characteristic is (2) *compatibility*, which is "the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters (Rogers, 1962, p. 15). The higher the compatibility, the faster its rate of adoption will be. Therefore it is expected that the rate of adoption of innovations that do not match people's values or needs will be slower. The third characteristic is (3) *complexity*. When an individual perceives an innovation as difficult to understand, it is seen as an innovation with a high degree of complexity and vice versa. The higher the perceived complexity of an innovation, the slower the rate of adoption will be. It goes without saying that the rate of adoption will be quicker when the degree of complexity of an innovation is perceived as low. The fourth characteristic is (4) trialability, which is referred to as "the degree to which an innovation may be experimented with on a limited basis (Rogers, 1962, p. 16)". When an individual has the opportunity to try an innovation, it is more likely that the innovation will be adopted by this person. The opportunity to experiment with it makes the person who may possibly adopt the innovation feel less uncertain about it, which makes it more likely that this person will adopt the innovation. The fifth and final characteristic is (5) *observability*. This is explained by "the degree to which the results of an innovation are visible to others (Rogers, 1962, p. 16)". When it is easy for someone to see the result of an innovation, it is more likely that this person will adopt it. When results of innovations are more difficult to observe, the rate of adoption will most likely be slower. Thus, we can say that innovations that have a high degree of relative advantage, compatibility, trialability, observability and a low degree of complexity will be adopted more quickly compared to other innovations.

2.4.2 Communication channels and time

Now that we are aware of the characteristics potential adopters perceive and the effects of these characteristics, it is time to look at communication channels as they are important for innovation diffusion. Communication channels can be seen as a tool to send information from one party to another. To relate this to the diffusion of innovations, an individual or group can send information about an innovation to another individual or group through a communication channel. These channels can be mass media, but also two individuals having a face-to-face conversation, also known as interpersonal channels. Research shows that people usually evaluate an innovation based on subjective evaluations of other people, instead of scientific studies. This shows that communication channels and the presence of peers are important for the diffusion process (Rogers, 1962).

Besides communication channels, time is a key factor in the diffusion process. Rogers (1962) brings up the fact that time is completely ignored in other behavioral researches, and argues that it is a vital variable in the diffusion of innovations. Time provides a dimension for the process between the first encounter and the adoption of an innovation. Furthermore, by having a time dimension it is possible to see whether a person is an early or late adopter compared to others. Besides that, time is crucial when it comes to measuring the rate of adoption. The number of people that adopt a certain innovation has to be plotted versus a time period, or else the rate of adoption will not be possible to measure.

2.4.3 Adopter categories

Rogers (1962) defines five categories of adopters within a social system that individuals can be assigned to. These categories are based on the degree to which a person is relatively earlier in adopting innovations compared to others, also called innovativeness. The adopter categories include (1) *Innovators*, (2) *Early Adopters*, (3) *Early Majority*, (4) *Late Majority* and (5) *Laggards*. These categories are depicted in figure 4. The more a category is depicted on the left, the higher the innovativeness of the people that belong to the category. People that belong to the category ‘Innovators’ are the earliest when it comes to adopting an innovation, while laggards adopt the innovation relatively the latest. In between these two the early adopters, early majority and late majority can be found.

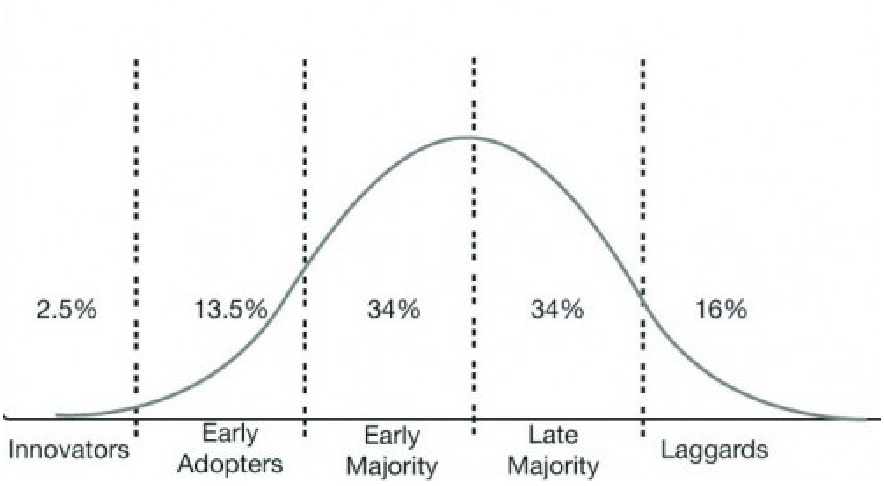

Figure 4. Adopter categories based on innovativeness.

2.5 Other factors

Demographics and characteristics of people may influence their acceptance towards a new technology. In this paragraph an overview of other factors is given that may or may not be important when it comes to consumer acceptance of innovative technologies.

2.5.1 Neophobia

According to Raudenbusch and Frank (1999), neophobics, people who are averse to something new, react more negatively when they are confronted with new food technologies compared to neophilics. However, Siegrist (2008) states that research has shown that neophobia appears to have either no effect or a weak effect on the acceptance of new technologies. Grunert, Bredahl, Scholderer (2003) found that the willingness to try unfamiliar food was weakly related to risk perception. In addition, no significant effects of food neophobia and attitudes towards or willingness to try genetically modified foods were found (Lähteenmäki et al., 2002; Backstrom, Pirttila-Backman & Tuorila, 2004). There are several results that contradict each other and therefore give no clear indication of whether neophobia has an effect on the consumer’s acceptance of new technologies. Siegrist (2008) claims that

2.5.2 Gender

Differences between men and women may influence the acceptance of a new technology. Gefen and Straub (1997) used the Technology Acceptance Model of Davis and found that men considered perceived usefulness of the technology more when assessing a new technology compared to women. On the other hand, perceived ease of use was a more meaningful factor for women than for men. Men perceive the easiness to use to be increasing when time passes and experience grows. On the other hand, the perceptions of ease of use of women declined, so ease of use became more of an issue for them. This resulted in a higher salience of the ease of use construct for women than for men. Concerning subjective norms, men's decisions were not influenced by this at any point of time. On the other hand, women were influenced by subjective norms at the initial stage and after one month of experience. After three months, the influence of subjective norms on the acceptance of the new technology disappeared. This study showed that there is a difference between men and women when it comes to the acceptance of a new technology.

2.5.3 Age

Morris and Venkatesh (2000) researched the adoption and usage of new technologies in a workspace environment concerning age differences. Their results showed that there is a clear difference between young and older workers. Young workers' attitude towards the new technology was more meaningful compared to older workers in the initial phase of technology acceptance. Moreover, in determining usage of the technology in the short term, older workers found subjective norms and perceived behavioral control to be more important than young workers. Thus, younger workers are more driven by their attitude and older workers are more driven by social and process factors. These results show that age influences the way new technologies are adopted and used in a workspace environment.

3. Theoretical framework

3.0 Introduction

Now that we have seen an overview of different factors that might influence the acceptance of computer-related innovations, it is time to relate this to 3D food printing in particular. The most important theories will be used to find out more about the consumer's willingness to adopt this technology. In the literature overview, these theories were discussed in more detail. Therefore, these theories are mentioned shortly in this chapter and details are left out.

3.1 Risk and naturalness

Perceived risks and perceived naturalness influence the perceived usefulness. The way consumers perceive risks, such as product failure, and the degree of naturalness of the product contributes to the way they perceive the product to be useful for them. According to Huotilainen and Tuorila (2005) people are suspicious of new foods and technologies and have bigger trust in natural food and production. This finding is in line with the paper of Rozin et al. (2004), in which they found that the desire for naturalness of food production is strong among people. Furthermore, according to Siegrist et al. (2007), perceived risk has a negative correlation with willingness to buy a product. This means that the higher the risk, the lower the acceptance. This has to do with the usefulness of the technology people experience. It is expected that consumers perceive the food printer as useful whenever the involved risk is lower. In other words, the higher the perceived risks, the lower the perceived usefulness. Moreover, the higher the perceived naturalness of products produced by the food printer, the higher the perceived usefulness. This results in the following hypotheses, which are depicted in figure 5:

"The higher the perceived risks, the lower the perceived usefulness (H1)."
"The higher the perceived naturalness, the higher the perceived usefulness (H2)."

3.2 Technology Acceptance Model

By following the Technology Acceptance Model of Davis, we learned that perceived usefulness and perceived ease of use jointly predict consumer behavior. They form a certain attitude towards using a technology, which results in the intention to use that certain technology. The final step is the actual use. This model by Davis (1989) can be applied to the acceptance of 3D food printing. Therefore I expect that perceived usefulness and perceived ease of use influence the acceptance of 3D food printing by consumers. According to the Technology Acceptance Model, these two variables positively predict consumer behavior. The higher the perceived usefulness and perceived ease of use, the more positive the attitude. This positive attitude results in a higher intention to use 3D food printing. This theory of perceived usefulness and perceived ease of use and their contribution to consumer acceptance is depicted in figure 5 and results in the following hypotheses:

"The higher the perceived usefulness, the higher the acceptance of 3D food printing (H3)."
"The higher the perceived ease of use, the higher the acceptance of 3D food printing (H4)."

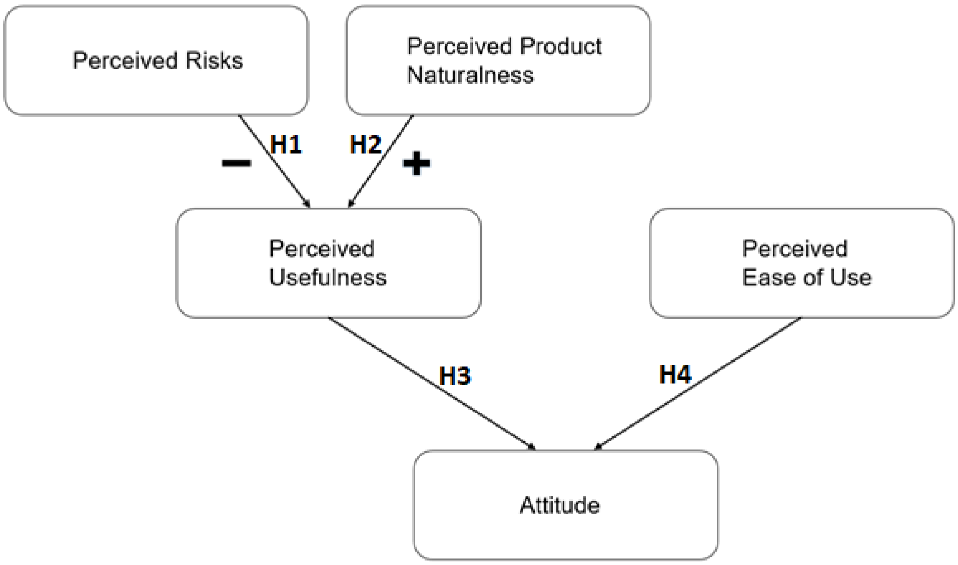

Figure 5. Theoretical model.

4. Research method

4.0 Introduction

The objective of this research was to examine to what extent perceived naturalness and perceived risks influenced perceived usefulness and to what extent perceived usefulness and perceived ease of use influenced the acceptance of 3D food printing by consumers. The theoretical model, depicted in figure 5, reflects this concept.

4.1 Study population

The target population of this study were consumers of at least 18 years old. Therefore, in order to be eligible to participate in this study, a participant had to be at least 18 years old. There were no exclusion criteria.

In total, 154 participants took part in the experiment, of which 65 partially completed the survey. Out of all participants, 89 completed the entire survey, of which 25 male, 63 female and 1 other. They were between 18 and 66 years old.

For the recruitment of the participants, social media (Facebook and WhatsApp) was used. In addition, participants were asked to spread the survey to other possible participants.

4.2 Study design

During this study, an online experiment was conducted in the form of a quantitative research. It was arranged in English and set up using Qualtrics software. The length of the study was 3 weeks, in which the participants could fill in the survey. Gathered data was analyzed using IBM SPSS software.

4.3 Stimuli

The research included a 2x2x2 design. Perceived naturalness, risk and ease of use were the factors (stimuli in the form of pictures that should provoke corresponding perceptions), which al contained a high and low counterpart. This resulted in eight different conditions, as shown in table 1. For example, flyer 1 contained three pictures: 1 to stimulate high perceived naturalness, 1 to stimulate high perceived risks and 1 to stimulate high perceived ease of use.

		Perceived Ease of Use	
Perceived Naturalness	Perceived Risk	High	Low
High	High	Flyer 1	Flyer 2
	Low	Flyer 3	Flyer 4
Low	High	Flyer 5	Flyer 6
	Low	Flyer 7	Flyer 8

Table 1. Manipulation design.

4.4 Measures

Perceived risk was measured with three items on a 7 point scale (1 = no risk at all… 7 = very high risk). These three items included the extent to which a respondent thought that 3D food printing resulted in printer failure, a failed food product and an unsafe food product.

Perceived naturalness was measured with one item on a 7 point scale (1 = extremely unnatural… 7 = extremely natural). Respondents were asked to what extent they thought the food produced by the 3D food printer was natural.

Perceived ease of use was measured with fourteen items on a 7 point scale (1 = strongly disagree… 7 = strongly agree) and perceived usefulness was measured with thirteen items on the same scale. The items of perceived ease of use and perceived usefulness were adapted from Davis (1989) and changed in order to make them relevant for this research. Davis' research was about electronic mail and this was changed to 3D food printing for this research. The item 'My job would be difficult to perform without electronic mail.', which was used to measure perceived usefulness, was left out in this research, since it could not be changed in a way that it would be relevant for 3D food printing for regular consumers.

Lastly, attitude was measured with one item on a 7 point scale (1 = extremely unlikely… 7 = extremely likely). Respondents were asked to what extent they were willing to use the 3D food printer of the flyer they saw earlier.

4.5 Procedure

A pilot test prior to the actual survey was held in order to find six appropriate pictures to manipulate the variables 'perceived risks', 'perceived naturalness' and 'perceived ease of use'. The pilot test was completed by fourteen respondents and can be found in Appendix I. For the actual survey, the participants were first introduced to the experiment with a page of prior information. Furthermore, they were told about the anonymity and expected completion time of the questionnaire. After proceeding, participants were shown a flyer with an advertisement of the 3D food printer. A situation was given in which pictures of different food products and operation panels were shown. Every flyer consisted of three pictures; one to manipulate perceived risks, one to manipulate perceived naturalness and one to manipulate perceived ease of use. Every variable had two pictures that could potentially be shown, a high and low counterpart. For example, the variable perceived naturalness had a picture that corresponded to a low perception of naturalness and a picture that corresponded with a high perception of naturalness. The same holds for the other two variables. The participants were told that the food products that they saw in the flyer were produced by the 3D printer with corresponding operation panel. The pictures that are used in the flyer can be found in Appendix II. The combination of pictures could be altered. In this way, manipulation and measurements of perceived ease of use and perceived usefulness were possible. In total, eight different flyers could potentially show up. This was randomized, but all elements were evenly presented. This means that every flyer showed up around the same number of times. After seeing the flyer for at least ten seconds, another information panel showed up that told the respondents to imagine that they own the 3D printer of the flyer they just saw. Furthermore, they were told that the next set of questions gave them an opportunity to tell how they feel about the 3D food printer. The participants received questions about perceived risks, perceived naturalness, perceived ease of use, perceived usefulness and their willingness to use the 3D food printer of the flyer. The final set of questions were about the gender and age of the respondents. Furthermore, the respondents were given the possibility to give feedback or suggestions and could leave their email address in order to receive a summary of this research when the results are known. The full questionnaire can be found in Appendix III.

5. Results

5.1 Preparations

Before the actual testing of the hypotheses, some variables had to be computed to make the data usable. Moreover, some checks had to be made in order to find out if the data was feasible and correct.

5.1.1 Variable adaptations

First of all, the flyers were computed into a separate variable ‘Flyer Number’ to make the difference between the flyers clearer. Flyer 1 received a value of 1, flyer 2 received a value of 2, etc. After this, the variable ‘Flyer Number’ was recoded into three new variables: ‘Risk’, ‘Naturalness’ and ‘Ease of Use’. These variables were now correctly linked with the flyers in which their corresponding picture is shown. For example, the variable ‘Naturalness’ had a high-level picture in flyers 1, 2, 3 and 4 and its low counterpart in flyers 5, 6, 7 and 8. Therefore, for the variable ‘Naturalness’, ‘Flyer Number’ was recoded in a way that the first four flyers received a value of ‘1’ (corresponding with high) and the final four flyers received a value of ‘0’ (corresponding with low). The same was done for the variables ‘Risk’ and ‘Ease of Use’. Moreover, some questions to measure the ease of use construct were framed negatively in the survey. These negatively framed answers were reversed in order to be able to use these questions correctly in further analyses.

5.1.2 Construct reliabilities

After that, several reliability analyses were run to check whether the constructs risk perception, usefulness perception and ease of use perception were reliable. The reliability of the risk perception construct was not great (Cronbach’s Alpha = .687), but there was no clear indication to remove one of the three items. Therefore, the risk perception construct will still be used as it is. In addition, the reliability of the constructs usefulness and ease of use were excellent, since they had a Cronbach’s Alpha of .956 and .932 respectively. There was no indication to remove any items of these constructs either, as it would barely increase the reliability or even decrease it. Consequently, three new variables were computed. ‘Risk Perception’ was computed by taking the averages of the outcomes of the three questions for perceived risks. ‘Usefulness Perception’ was computed by taking the averages of the outcomes of the thirteen questions for perceived usefulness and ‘Ease of Use Perception’ was computed by taking the averages of the outcomes of the fourteen questions for perceived ease of use. Moreover, ‘Naturalness Perception’ was computed, in order to have a high degree of perceived naturalness corresponding with a high score. At first, this was reversed, but the chance for mistakes was higher because of this.

5.1.3 Manipulation check

After that, three univariate analyses of variance with an alpha of .05 were run to see whether the flyers, and therefore the manipulations, actually worked. On their own, the manipulations for risk, naturalness and ease of use had no significant effect on the dependent variables Risk Perception and Ease of Use Perception. Combinations of these manipulations (two-way and three-way) had no significant effect on Risk Perception and Ease of Use Perception either. On the other hand, the manipulation for risk had a significant effect on Naturalness Perception, $F(1, 119) = 9.12$, $p = .003$. In contrast, the manipulations for naturalness and ease of use, and the combinations of all three manipulations, did not have a significant effect.

5.1.4 Descriptive statistics

To make clear what the averages and standard deviations of all measures in every condition were, a general linear model analysis was run to retrieve these descriptive statistics. The overview of these outcome values can be found in table 2.

Manipulations			Mean (Standard deviation)				
Naturalness	Risk	EoU	Perceived Risk	Perceived Naturalness	Perceived EoU	Perceived Usefulness	Attitude
Low	Low	Low	4.42 (0.88)	2.64 (1.43)	4.32 (0.95)	3.98 (0.99)	4.27 (1.35)
		High	4.45 (1.17)	2.08 (1.04)	3.61 (0.68)	4.09 (1.19)	5.08 (1.80)
	High	Low	4.56 (1.51)	3.54 (1.85)	4.33 (1.23)	4.43 (1.29)	4.00 (1.47)
		High	4.17 (1.25)	3.17 (1.99)	3.89 (1.21)	3.69 (1.16)	4.17 (1.95)
High	Low	Low	4.75 (0.99)	2.25 (1.58)	3.79 (1.15)	4.61 (1.50)	3.88 (1.46)
		High	4.15 (1.11)	2.91 (1.81)	3.92 (1.05)	4.17 (1.61)	3.73 (1.85)
	High	Low	4.27 (0.83)	3.70 (1.49)	4.19 (0.84)	4.91 (0.60)	3.40 (0.97)
		High	4.72 (1.12)	3.17 (1.90)	3.67 (1.06)	4.08 (1.18)	5.00 (2.13)

Table 2. Overview of means and standard deviations across all measures in every condition.

Furthermore, a bivariate Pearson correlation analysis was run to see the correlation between all variables (see table 3 below).

	Perceived Risk	Perceived Naturalness	Perceived EoU	Perceived Usefulness	Attitude
Perceived Risk	1				
Perceived Naturalness	-.449**	1			
Perceived EoU	-.359**	.248*	1		
Perceived Usefulness	-.187	.317**	.268*	1	
Attitude	.213*	-.411**	-.311**	-.559**	1

Table 3. Bivariate correlation matrix.
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

5.2 Hypothesis testing

After the pre-hypothesis preparations and with the theoretical model in mind, the four hypotheses were tested by using multiple regression analyses. This analysis was conducted two times: one analysis to test hypothesis 1 and 2, and one analysis to test hypothesis 3 and 4.

To test hypothesis 1 and 2, a multiple regression analysis was run to predict Usefulness Perception from Risk Perception and Naturalness Perception, $F(2, 87) = 5.047$, $R^2 = .104$, $p = .008$. The variable Risk Perception did not significantly predict Usefulness Perception, $t(87) = -0.574$; $B = -0.70$; $p = .567$. In contrast, the variable Naturalness Perception statistically significantly predicted Usefulness Perception, $t(87) = 2{,}587$; $B = .209$; $p = .011$.

Furthermore, a multiple regression analysis was run to predict Attitude from Usefulness Perception and Ease of Use Perception, F (2, 87) = 22.411, R^2 = .340, p < .001. The variable Ease of Use Perception did not significantly predict Attitude, t (87) = -1.922; B = -.288; p = .058. In contrast, the variable Usefulness Perception statistically significantly predicted Attitude, t (87) = -5.664; B = -.717; p < .001). The p-values can be found in figure 6.

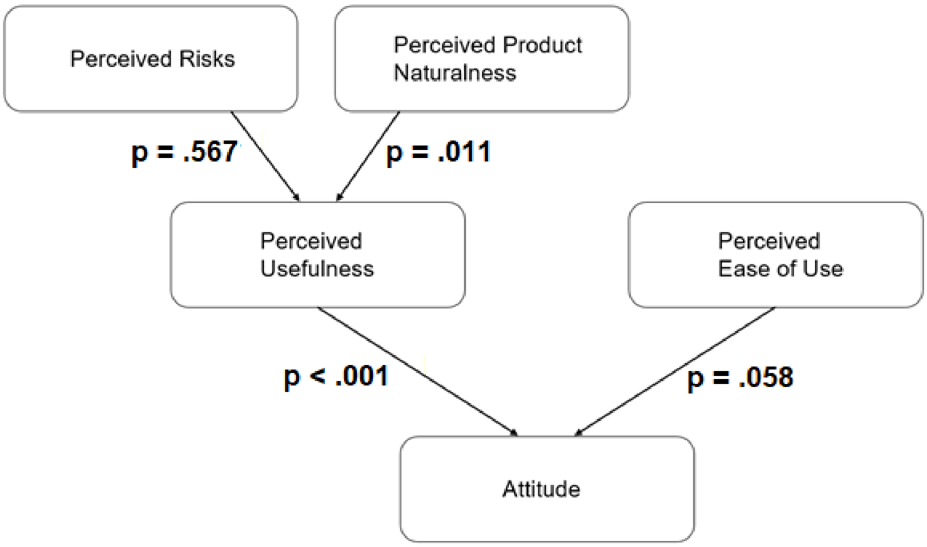

Figure 6. P-values as a result of the multiple regression analyses.

5.3 Mediation

Using the Process Macro (Hayes, 2017), a mediation analysis was run to test whether the influence of the independent variable Risk Perception (X) on the dependent variable Attitude (Y) was carried over by the mediator Usefulness Perception (M). The indirect effect of X on Y was not significant, since the value 'zero' was within the 95% confidence interval (-.0349, .3587). This effect is reflected by pathways a and b in figure 7. There was no significant mediating effect of Usefulness Perception on the influence of Risk Perception on Attitude. This is not surprising, because the multiple regression analyses showed that Risk Perception did not have a significant effect on Usefulness Perception.

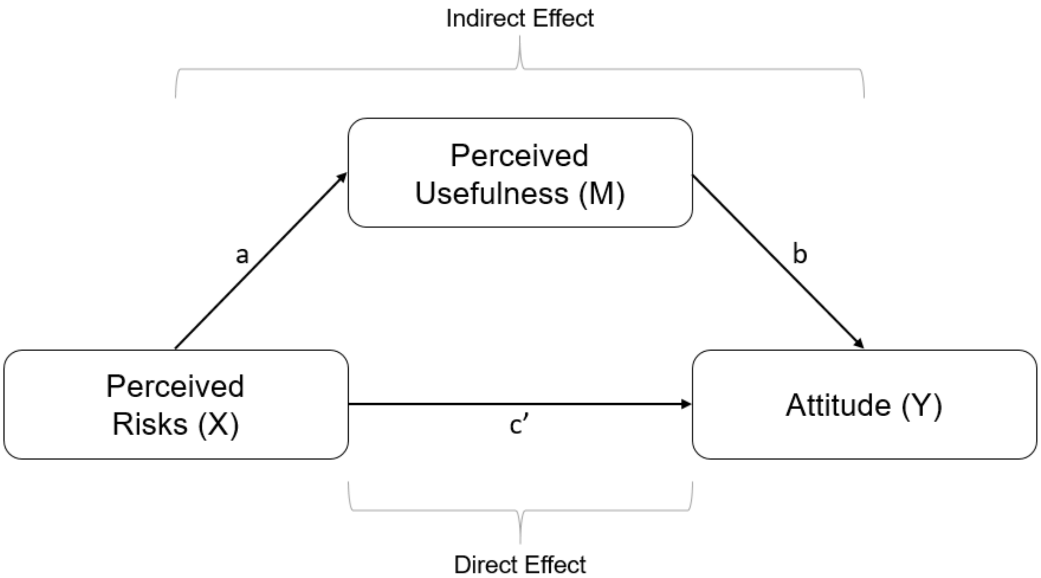

Figure 7. Mediating effect of Perceived Usefulness on the influence of Perceived Risks on Attitude.

Furthermore, the same analysis was conducted with the independent variable Naturalness Perception. A mediation test was run to see whether the influence of Naturalness Perception (X) on Attitude (Y) was carried over by Usefulness Perception (M). The indirect effect of X on Y (pathways a and b in figure 8) was significant, since the value 'zero' was outside the 95% confidence interval (.0546, .2667). Therefore, there was a significant mediating effect of Usefulness Perception on the influence of Naturalness Perception on Attitude. The indirect effect (pathways a and b) of X on Y contained a value of 0.15 and the direct effect (pathway c') contained a value of 0.26.

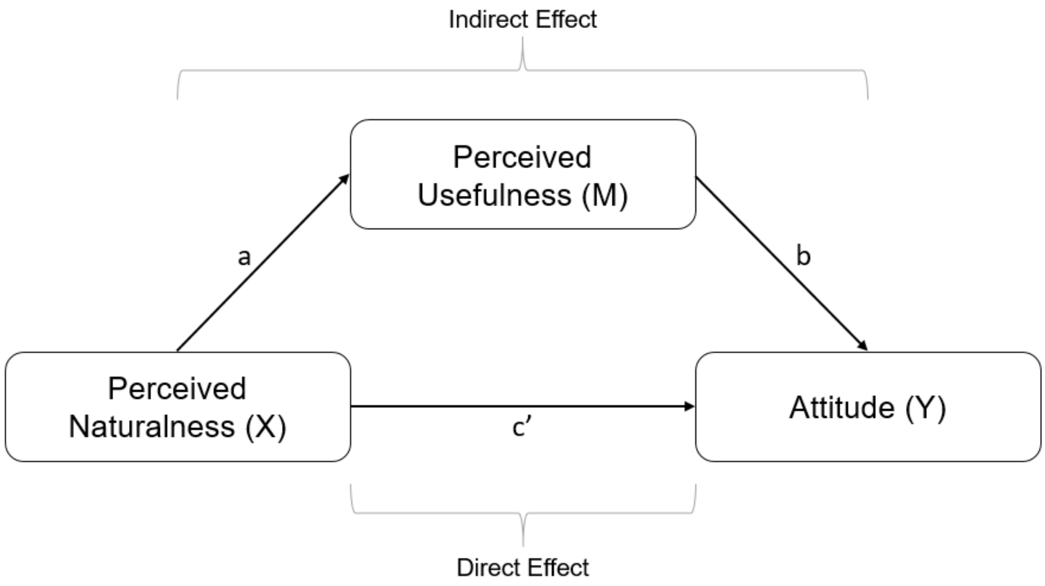

Figure 8. Mediating effect of Perceived Usefulness on the influence of Perceived Naturalness on Attitude.

6. Discussion

6.1 General findings

The aim of this research was to find out which factors influence the consumer acceptance of 3D food printing. Existing literature was used to construct a theoretical model and this resulted in the following hypotheses:

"The higher the perceived risks, the lower the perceived usefulness (H1)."
"The higher the perceived naturalness, the higher the perceived usefulness (H2)."
"The higher the perceived usefulness, the higher the acceptance of 3D food printing (H3)."
"The higher the perceived ease of use, the higher the acceptance of 3D food printing (H4)."

Results showed that a consumer's perceived naturalness of the food produced by a 3D food printer influences their perceived usefulness of the printer. In other words, consumers perceive the printer as more useful when it is able to produce natural food products. Therefore, hypothesis 2 is accepted. Moreover, the usefulness perception influences the consumer's willingness to use the food printer. Therefore, the more someone perceives a food printer as useful, the more likely it is that he or she has a positive attitude towards it. This results in a higher chance of purchasing a food printer. Thus, hypothesis 3 is accepted. The effect of perceived naturalness of consumers on their attitude is carried over by their perceived usefulness. So, perceived usefulness acts as a mediator between perceived naturalness and attitude. In contrast, perceived risks have no significant effect on the perceived usefulness and perceived ease of use has no significant effect on the willingness to use the food printer. Therefore, hypothesis 1 and 4 are rejected.

6.2 Limitations

First of all, the manipulations did not work the way they were supposed to. The manipulations for naturalness and ease of use did not work at all. Moreover, the manipulation for risk, which was supposed to provoke a higher risk perception, influenced people's naturalness perception. This may have influenced the outcome of the study, since the validity of the finding of perceived naturalness influencing perceived usefulness is questionable. The manipulation check showed that people perceived something as (un)natural when they were confronted with a picture that they were actually supposed to be perceiving as risky. Therefore, one could argue that perceived risks actually influences perceived usefulness and perceived naturalness does not. Whether this is true remains unknown and needs a follow-up research in order to find out.

Furthermore, in hindsight, the dropout rate of respondents could have been constrained. After manually examining the cause of the dropouts, it appeared that many respondents quit the survey when they saw the relatively large question of ease of use and usefulness. The number of sub statements could have been narrowed down. Although this may have resulted in a lower dropout rate, there is a chance that this decision would affect the reliability of the constructs 'ease of use perception' and 'usefulness perception'. Furthermore, the reliability of the constructs 'naturalness perception', 'risk perception' and 'attitude' are questionable. However, these boundaries were set through conscious considerations. The length of the questionnaire was the main reason that these boundaries were set, in contrast to the other two constructs. For future researches, the number of questions of all constructs needs to be balanced out in order to attain a high reliability and a low dropout rate.

Moreover, the length of the data collection was set to a finite period of time. This time constraint resulted in a lower number of respondents than desired. This research included eight different conditions and it would have been optimal to have around five additional respondents per condition to have more reliable results. The smaller the sample size, the fewer the chance for significance, maybe even for relevant effect estimates. Therefore, there would be a higher chance for significance when more participants were recruited.

In addition, it was hard to explain the aim of the questionnaire to the respondents via text. Some participants were confused about the questions, since they thought they were not able to answer it when they had never used a 3D food printer before. They were asked to imagine that they were the owner of the printer, but sometimes this caused confusion. In hindsight, more information should have been given in order to prevent this.

6.3 Contributions and implications

6.3.1 Scientific relevance

This study contributes to the understanding of the reasons for consumers to either accept or not accept the concept of 3D food printing with regards to naturalness of products, involved risks, usefulness of the printer and easiness to use it. The main findings of this study are 1) the influence of perceived naturalness on perceived usefulness and 2) the influence of perceived usefulness on attitude. Both findings resonate with existing literature. The first finding confirms what Siegrist (2008) and Rozin et al. (2004) found: consumers' perception of and desire for naturalness is important when evaluating a new food technology. The second finding is in line with the model of Davis (1989), in which perceived usefulness is expected to positively influence the attitude towards a computer-related technology and therefore the actual use of that technology. Thus, this study provides confirmation of existing literature while relating it to a relatively new technology of 3D food printing. Moreover, based on theoretical considerations, I believe that the proposed theoretical model was not the most meaningful model to use at the start of the research. With today's knowledge, risk perception appeared to have no influence on usefulness perception. Therefore, risk perception could have been left out of the theoretical model. It could be that alternative models would be better fitting. For example, there may be a substitutional factor for risk perception that has an effect on usefulness perception.

6.3.2 Practical relevance

The results of this study provide a guideline for the upcoming industry of 3D food printers for general consumers. Companies specialized in these new technologies should market their printers in a 'green' way. By creating a natural vibe around the food printers, companies can anticipate the consumers' preference of using a technology that prepares natural products. The chance of success will increase when this is idea is pursued. Furthermore, companies should take in consideration that their printers should be perceived as value-adding. If consumers do not consider food printers as useful, adoption by the general public is less likely to take place.

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8. Appendices

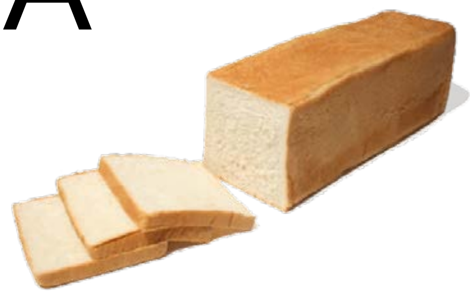
Appendix I
Pilot test

This test consists of ***3*** small parts. When you are finished, please send your file to sander.groot@wur.nl.

Naturalness
How natural do you think these products are? Please rank these pictures (A, B, C, D & E) in terms of product naturalness. 1 = least natural, 5 = most natural. Write your answers on the dots.

5. …
4 …
3. …
2. …
1. …

A



B

C

D

E

Risks/Product failure

To what extent do you think these pictures include product failure? Please rank these pictures (A, B, C, D & E) in terms of product failure. 1 = lowest degree of failure, 5 = highest degree of failure. Write your answers on the dots.

5. …
4 …
3. …
2. …
1. …

A

B

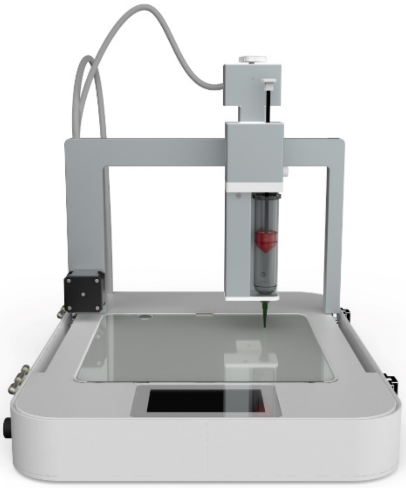
C

D

E

Ease of use
To what extent do you think these technologies are easy to use? Please rank these pictures (A, B, C, D & E) in terms of 'ease of use'. 1 = most difficult (least easy) to use, 5 = easiest to use. Write your answers on the dots.

5. …
4 …
3. …
2. …
1. …

A


B


C


D


E


Appendix II

Pictures that were used to measure perceived naturalness

The left picture corresponded with a high degree of perceived naturalness, while the right picture corresponded with a low degree of perceived naturalness.

Pictures that were used to measure perceived risks

The left picture corresponded with a high degree of perceived risks, while the right picture corresponded with a low degree of perceived risks.

Pictures that were used to measure perceived ease of use

The left picture corresponded with a high degree of perceived ease of use, while the right picture corresponded with a low degree of perceived ease of use.

Appendix III
Questionnaire

Consumer Acceptance of 3D Food Printing

Start of Block: Introduction

Q1 **Introduction**

Thank you for participating in this research. My name is Sander Groot and I am a third year student at Wageningen University. Currently, I am writing my bachelor thesis about the consumer acceptance of 3D food printing. All the answers that you provide will be processed fully anonymously and confidentially, and will only be used for this research. This survey will take approximately 5 minutes to complete.

Remember: no right or wrong answers exist. I am only interested in your opinion. It does NOT matter if you have no knowledge about 3D food printing whatsoever.

Please read the instructions carefully.

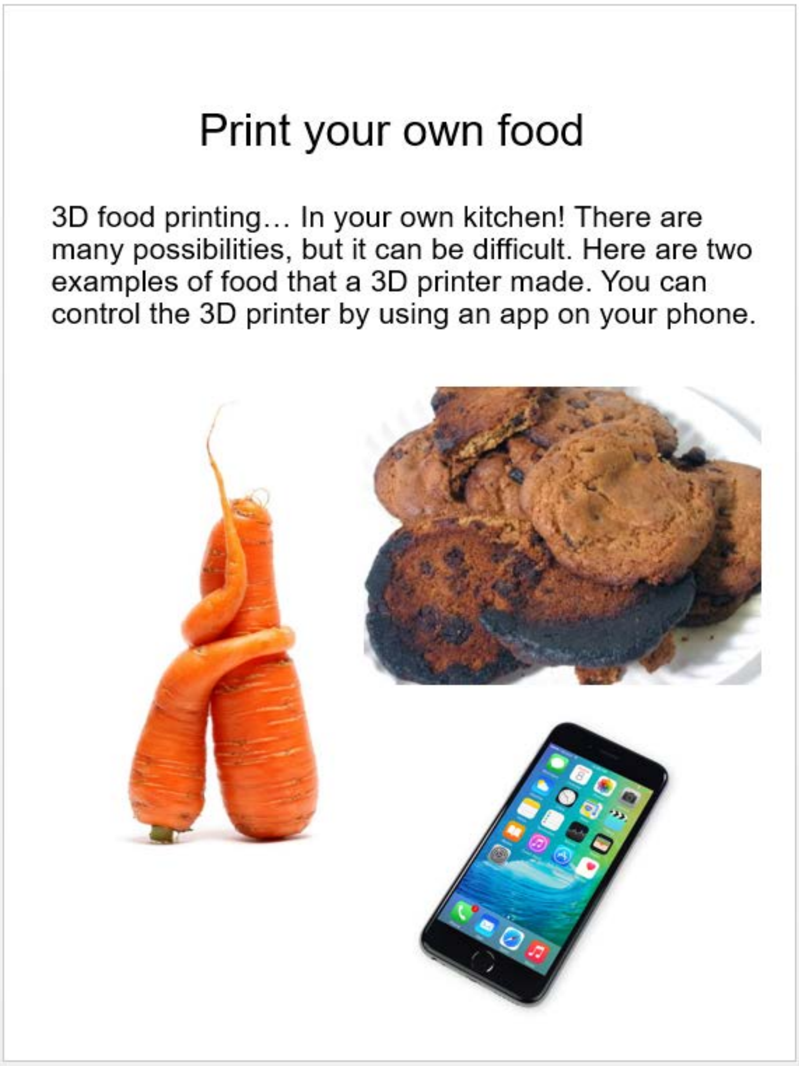
Instructions

After you have clicked 'next' you will see a flyer with **three** pictures and some text. Read it carefully and take a look at the pictures. After seeing the flyer (you can proceed after at least 10 seconds), you will receive some questions about it.

End of Block: Introduction

Start of Block: Flyer 1

Q5



Q30 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 1

Start of Block: Flyer 2

Q13

Print your own food

3D food printing… In your own kitchen! There are many possibilities, but it can be difficult. Here are two examples of food that a 3D printer made. You can control the 3D printer by using the device displayed below.

Q31 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 2

Start of Block: Flyer 3

Q14

Print your own food

3D food printing… In your own kitchen! There are many possibilities, but it can be difficult. Here are two examples of food that a 3D printer made. You can control the 3D printer by using an app on your phone.

Q32 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 3

Start of Block: Flyer 4

Q15

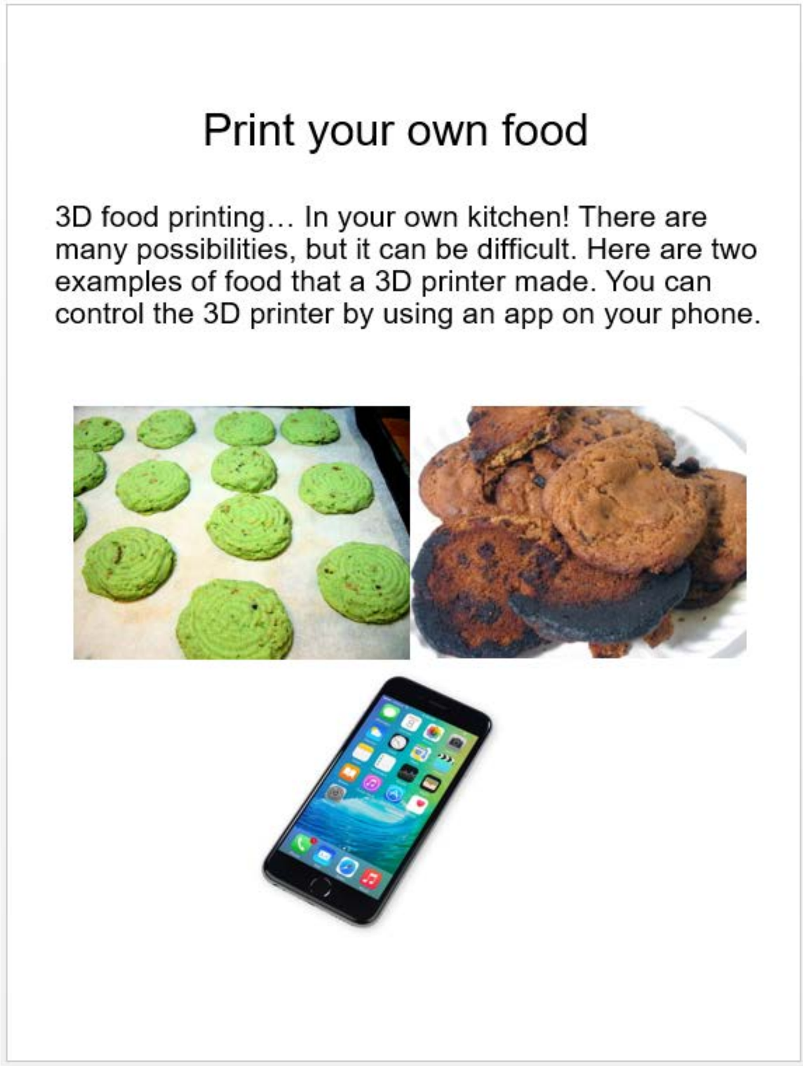
Q33 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 4

Start of Block: Flyer 5

Q16



Q34 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 5

Start of Block: Flyer 6

Q17

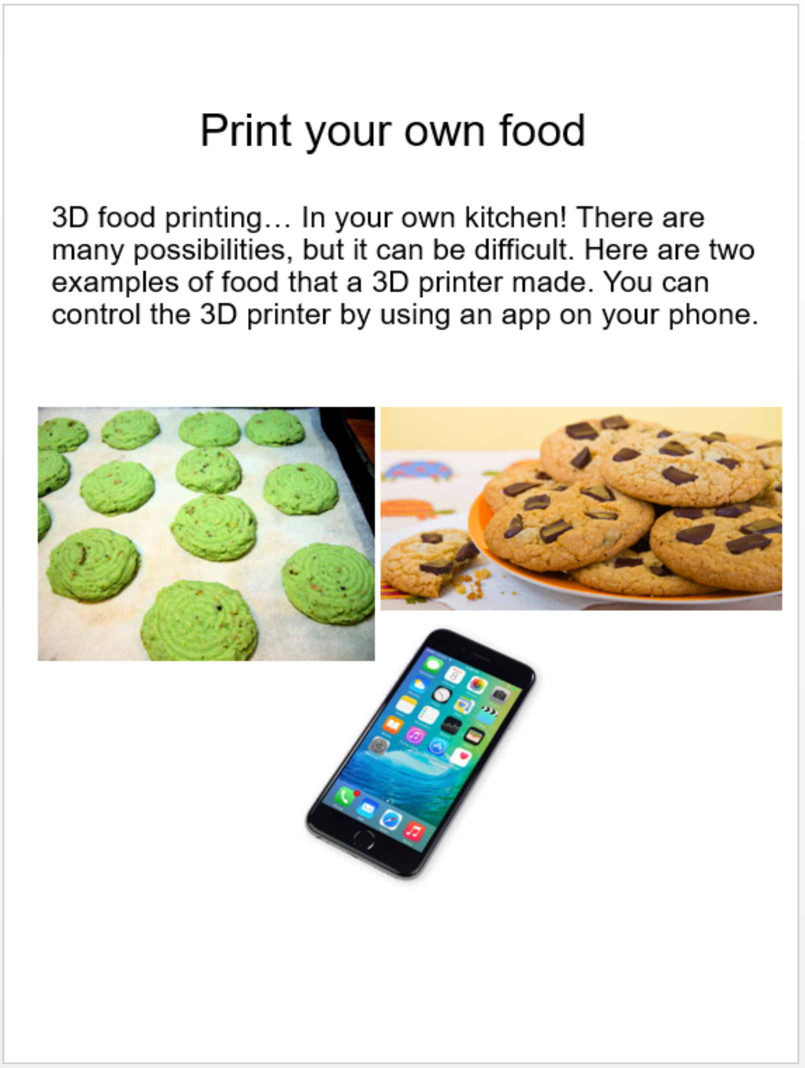
Q35 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 6

Start of Block: Flyer 7

Q18



Q36 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 7

Start of Block: Flyer 8

Q19

Print your own food

3D food printing… In your own kitchen! There are many possibilities, but it can be difficult. Here are two examples of food that a 3D printer made. You can control the 3D printer by using the device displayed below.

Q37 Timing

First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Flyer 8

Start of Block: Information

Q25 IMAGINE you own the 3D food printer of the flyer you just saw. The following questions will give you an opportunity to tell me how you feel about this printer.

End of Block: Information

Start of Block: Risk & Naturalness

Q28 To what extent do you think that 3D printing of food results in a ...

	No risk at all (1)	Very low risk (2)	Low risk (3)	Medium risk (4)	Slight risk (5)	High risk (6)	Very high risk (7)
Printer failure (1)	o	o	o	o	o	o	o
Failed food product (2)	o	o	o	o	o	o	o
Unsafe food product (3)	o	o	o	o	o	o	o

Page Break

Q27 How natural do you think the food produced by the 3D food printer is?

- Extremely natural (1)
- Moderately natural (2)
- Slightly natural (3)
- Neither natural nor unnatural (4)
- Slightly unnatural (5)
- Moderately unnatural (6)
- Extremely unnatural (7)

End of Block: Risk & Naturalness

Start of Block: Ease of Use & Usefulness

Q23 Please state to what extent you agree or disagree with the statement. Remember: the questions imply that you use have used this printer, so IMAGINE you own and use it.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
I often become confused when I use the 3D food printer. (1)	O	O	O	O	O	O	O
I make errors frequently when using the 3D food printer. (2)	O	O	O	O	O	O	O
Interacting with the 3D food printer is often frustrating. (3)	O	O	O	O	O	O	O
I need to consult the user manual often when using the 3D food printer. (4)	O	O	O	O	O	O	O
Interacting with the 3D food printer requires a lot of my mental effort. (5)	O	O	O	O	O	O	O
I find it easy to recover from errors encountered while using the 3D food printer. (6)	O	O	O	O	O	O	O
The 3D food printer is rigid and inflexible to interact with. (7)	O	O	O	O	O	O	O

I find it easy to get the 3D food printer to do what I want it to do. (8)	o	o	o	o	o	o	o
The 3D food printer often behaves in unexpected ways. (9)	o	o	o	o	o	o	o
I find it cumbersome (complicated) to use the 3D food printer. (10)	o	o	o	o	o	o	o
My interaction with the 3D food printer is easy for me to understand. (11)	o	o	o	o	o	o	o
It is easy for me to remember how to perform tasks under the 3D food printer. (12)	o	o	o	o	o	o	o
The 3D food printer provides helpful guidance in performing tasks. (13)	o	o	o	o	o	o	o
Overall, I find the 3D food printer easy to use. (14)	o	o	o	o	o	o	o

Page Break

Q24 Please state to what extent you agree or disagree with the statement.

Note: with 'job' and 'work', food preparation / kitchen tasks are meant.

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
Using a 3D food printer gives me greater control over preparing food. (1)	O	O	O	O	O	O	O
Using a 3D food printer improves my job performance. (2)	O	O	O	O	O	O	O
The 3D food printer addresses my job-related needs. (3)	O	O	O	O	O	O	O
Using a 3D food printer saves me time. (4)	O	O	O	O	O	O	O
A 3D food printer enables me to accomplish cooking tasks more quickly. (5)	O	O	O	O	O	O	O
A 3D food printer supports critical aspects of my job. (6)	O	O	O	O	O	O	O
Using a 3D food printer allows me to accomplish more work than would otherwise be possible. (7)	O	O	O	O	O	O	O

A 3D food printer reduces the time I spend on unproductive activities. (8)	O	O	O	O	O	O	O
Using a 3D food printer enhances my effectiveness on the job. (9)	O	O	O	O	O	O	O
Using a 3D food printer improves the quality of the work I do. (10)	O	O	O	O	O	O	O
Using a 3D food printer increases my productivity. (11)	O	O	O	O	O	O	O
Using a 3D food printer makes it easier to do my job. (12)	O	O	O	O	O	O	O
Overall, I find the 3D food printer useful in my job. (13)	O	O	O	O	O	O	O

End of Block: Ease of Use & Usefulness

Start of Block: Attitude

Q29 To what extent are you willing to use the 3D food printer of the flyer?

- Extremely likely (1)
- Moderately likely (2)
- Slightly likely (3)
- Neither likely nor unlikely (4)
- Slightly unlikely (5)
- Moderately unlikely (6)
- Extremely unlikely (7)

End of Block: Attitude

Start of Block: Background

Q20 What is your gender?

- Male (1)
- Female (2)
- Other (3)

Q21 What is your age?

____

Q26 If you have any comments, suggestions or feedback, please leave them here (optional).

____

Q22 If you would like to receive a summary of this research after it is finished, please write down your email address below and I will contact you (optional).

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End of Block: Background