ABSTRACT

Homogenous markets force producers to diversify their offerings from the competition's. Providing value added services is one of their options towards obtaining a competitive advantage, furthermore it is a very sustainable way of increasing market share.

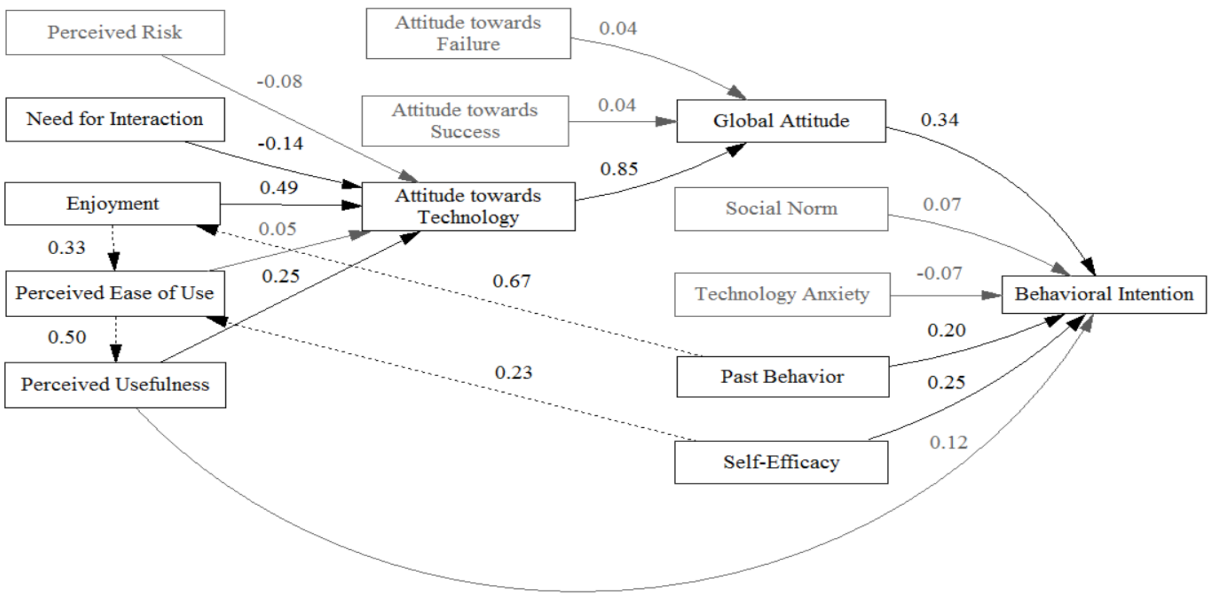
Co-production is an example of such a value added service. It translates into a business model where customers and producers work closely together towards the creation of a final product. Customers benefit from high customization levels and involvement in the production process. Producers on the other hand benefit from customer loyalty and could also face cost reductions as the customer could be seen as a "partial employee".

Self-service technologies, such as self-scanning, are a great example of co-production. Self-service technologies are technologies which enable customers to process transactions without the assistance of service employees. If implemented correctly, they could provide both customer and producer with cost-, and time-savings.

The implementation of self-service technologies however, implies quite an extensive expenditure, which makes a lot of retailers hesitant to go down this path. The only way to account for such an expenditure would be to make sure that as much customers as possible would use it. In order to make the technology as attractive as can be, it is important to know how customers form attitudes and intentions towards using the technology.

To answer this question, this master thesis used the technology acceptance model and the theory of trying as a foundation for a more elaborate model. Extra determinants of attitudes and intentions were added along the way. This model was then tested by the use of a quantitative survey. Delhaize Hasselt provided a setting in which to take these surveys. This store offers both the traditional and the self-scanning check-out method. Ultimately 191 respondents successfully completed the questionnaire.

After analyses the following model is proposed for the prediction of customers' intentions to use self-scanning.



Analyses showed how the intention to try/use self-scanning is directly predicted by three variables. Past behavior proved to be an important determinant towards a customer's intention to try self-scanning, or in this case repeated use. The more customers used self-scanning in the past, the more likely they are to use it again in the future. Another important determinant of the behavioral intention is self-efficacy. Self-efficacy narrates whether or not the customer feels confident he possesses the correct characteristics to use the technology. The better the customer perceives his capability to use, the more likely he is to try out self-scanning. Attitudes toward self-scanning are found to be the most important determinant towards the formation of an intention to try self-scanning. The better the attitude a customer has about the technology, the more likely he is to try it out.

Attitudes are quite abstract and there can be many variables contributing to it. For the case of self-scanning need for interaction, perceived usefulness and the level of enjoyment were found to have an important influence. Significant support was found for a negative relation between the need for interaction and the attitude consumers have about self-scanning, implying that customers with a higher need for human contact have a lower esteem of the technology. The perceived usefulness however is found to have a significantly positive effect. The more useful the technology is considered, the better the attitude. In this master thesis usefulness was measured in time and control benefits, however there are many more determinants of perceived usefulness that should be considered. Enjoyment was found to be the most important determinant of attitudes toward self-scanning. The more people enjoy using the technology, the higher their attitude-estimates. This is a very important lesson and should surely be taken into account when designing the self-scan technology.

Ultimately the age of customers proved to significantly influence their attitude towards adopting self-service technologies, such a self-scanning. As, amongst others, the perceived usefulness and the level of enjoyment decrease considerably and the need for interaction increases drastically, older peoples' attitudes towards technology are considerably lower. This should also be taken into consideration when deciding whether or not to activate elder people to start using the technology.

ACKNOWLEDGEMENTS

"He has a right to criticize, who has a heart to help."

-Abraham Lincoln-

With these wise words I would like to thank some people without whose support and valuable contributions this master thesis wouldn't be what it has become.

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Furthermore I would like to thank Benny Boons for giving me the possibility to use his store as a setting for the survey and all the employees from Delhaize Hasselt for the support and kindness during my presence in their store. Within this context I would also like to thank my mother for taking a day off and sacrificing her weekend in order to help me gather as much respondents as possible.

I also wish to express my sincere gratitude to Walter Simons, business solutions IT director at Carrefour Belgium N.V., and Johan Duchateau, manager merchandising center store, space management & commercial plan at Delhaize Belgium, for providing me with the necessary information to relate the theory to the practical case of self-scanning in Belgium.

Lastly I would like to thank my family for the mental and financial support during the course of my education and my friends for their support while I was writing this master thesis. Of course all the professors who attributed to the knowledge I have today should be given credit too.

"Coming together is a beginning,
keeping together is a progress,
working together is success."

-Henry Ford

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1. INTRODUCTION

In developed countries, such as most Western European and Northern American countries, a lot of markets have become mature and are therefore likely to be saturated (O'Kelly, 2001). Amongst others, this saturation translates into competitors producing very similar products. Because of this, the idea might occur with some producers that price-competition is the only way to convince customers to choose their products over those of competitors. However, as can be learned from the recent drop in UK milk prices[1] or the 2003-2006 price war between Dutch retailers[2], these so-called price wars can have disastrous effects on both the company and its suppliers (Van Heerde, Gijsbrechts, & Pauwels, 2008). Therefore, it is important to convince companies to look for other, more sustainable, ways to differentiate. Luckily companies are increasingly providing their customers with extra services as a way to distance themselves from the competition (Tsay & Agrawal, 2000; Homburg, Hoyer, & Fassnacht, 2002; Prahalad & Ramaswamy, 2004).

Services are defined by Grönroos (2000, pp. 52) as "processes consisting of more or less intangible activities that normally, but not necessarily always, take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems". They are only useful if customers perceive them as adding value to the initial offering.

One of those services that might differentiate a company from its competitors, is to offer customers the opportunity to become part of the production process. In recent academic literature, this phenomenon has been labelled co-production, as consumers and producers work together on the final product (Lush & Vargo, 2006; Lush, Vargo, & O'Brien, 2007; Etgar, 2008), or prosumtion (Xie, Bagozzi, & Troye, 2008) which is a compound word derived from production and consumption and translates in the customer not only consuming the good but also partially producing it himself. Co-production concerns customer participation in the core offering itself, therefore it happens before the consumption stage (Lush & Vargo, 2006).

The most obvious way to interact with the customer is by allowing him to design the final product to his own specifications. This is what Nike[3] does when they allow their customers to choose the materials and prints used for their sneakers and what Citroën, amongst other car brands, allows with their car-configurator[4]. Whilst these are all valid manifestations of co-production, the co-production encounter could go much further (Etgar, 2008). Once the customer starts to engage in more labor/time-intensive stages of the production process, the benefits of co-production aren't only limited to differentiation anymore. At this point co-production could also bring along cost reductions for the producer as customers actually become free partial employees. A schoolbook example of this advanced co-production is furniture-manufacturer Ikea[5] who can sell modern furniture at low prices because they require the customers to vouch for the transportation and assembly of the pieces.

[1] http://www.yorkshirepost.co.uk/news/rural/farming/price-war-danger-as-milk-shelf-price-falls-1-6485440
[2] http://financieel.infonu.nl/geld/119532-supermarktoorlog-of-prijzenoorlog.html
[3] http://www.nike.com/be/en_gb/c/gifts/nikeid-custom
[4] http://www.car-configurator.citroen.co.uk/
[5] http://www.ikea.com/

While co-production clearly has a lot to offer for companies, it will only be successful if the customer decides to sail the same boat. Etgar (2008) researched the stages consumers would have to go through when considering co-production.

Stage 1: To lay a foundation for co-production, macro environmental, consumer linked, product linked and situational factors will all scape an environment in which the consumer will or will not be willing to engage in the co-production process.

Stage 2: The customer must then be motivated to adopt the new offering. It speaks for itself that consumers will engage in co-production to achieve preset goals that reflect their values and serve as motivational forces.

Stage 3: Once the customer has been motivated, the customers will engage in a cost vs benefits analysis, these can be both economical and non-economical.

Stage 4: After making this assessment the customer will make his decision. If he approves, the customer can choose in which activities he would like to participate and on which scale. Companies can give their customers the possibility to participate in all activities ranging from initiation through design, manufacturing or assembly and ending with distribution and consumption.

Stage 5: The last stage of the co-production process comprises evaluation. Customers need to evaluate the received benefits with the goals they set up in stage 2. This stage will influence future participations.

Toffler (1980) describes how several modern day factors are acting in favor of co-production:

- A shrinking workweek provides time for other activities like leisure activities or co-production.
- Higher education stimulates innovation. These new/more advanced technologies (e.g. Self-Service Technologies) sometimes require consumers to self/co-produce.
- Due to the rise in labor costs, people start preferring to do things themselves hereby avoiding the costs.
- Physical work became a necessity as an outlet for the mental work performed during the working hours.
- Some people feel confident they would produce higher quality than what's on the market.
- Marketing practices started to offer co-production as an added service.
- The need to stick out of the crowd fuels the will to produce own products.

This sheds a new light on co-production. Not only do companies want their customers to engage in co-production, but also the customers themselves demand to become part of the production process (Firat & Venkatesh, 1993). Clearly co-production can be beneficial to both the consumer and the company.

This makes that co-production emerges everywhere nowadays. It doesn't have to be as obvious as the Ikea example, where customers get the opportunity to participate in every step of the production process. Companies like Nike or Dell[6] give their customers the opportunity to design the product to their own specifications, big retailers like Carrefour, Decathlon and Delhaize provide the opportunity to use self-checkout systems and food producers offer dishes that simplify cooking but still allow consumers to have some influence over the final meal. Banks provide ATM's and you need to fill your own tank at petrol stations. The list is endless. Being an umbrella for different practices (Löffler, Parrado, Boviard, & Van Ryzin, 2008), costs and benefits will vary along the kind of co-production. This paper will focus on one particular form of co-production namely Self-Service Technology, self-scanning in particular.

The uprising and fast development of information technology[7] during and after World War II enabled companies, for example retailers, to introduce self-service technologies (Hilton & Hughes, 2008, Lusch et al. 2007). These self-service technologies consist of a wide range of tools that allow customers to produce a service, independent of direct service employee involvement (Meuter, Ostrom, Roundtree, & Bitner, 2000) and can therefore be seen as a way for companies to reduce their costs. It could however also be a response to customer demand or a way to harvest new segments. The increasing use of Self-Service Technologies has been seen as a fundamental shift in the nature of services (Parasuraman, 1996).

Research has shown self-service customers to have higher repurchase ratios than traditional customers (Buell, Campbell, & Frei, 2010), they are more efficient and are more satisfied about their purchases (Xue & Harker, 2002). In his correspondence Mr. Simons, Business Solutions Director for Carrefour Belgium, formulates it as self-scanning customers being the "better" customers. Customers face time-, and cost savings and perceive greater control and customization levels (Meuter & Bitner, 1998). In addition, some customers just seem to enjoy using the technology (Dabholkar, 1996).

Companies benefit from increased delivery speeds, precision and customization (Berry, 1999). Furthermore they can reduce costs (e.g. labor cost) and increase productivity (Dabholkar, 1996), improving competiveness and witnessing an increase in market share along the way (Kauffman & Lally, 1994).

Clearly Self-Service Technologies have a lot of benefits to offer, it speaks for itself that this comes at a price. First of all, competing through added services requires the whole organization to support the offering (Vargo & Lusch, 2004). An offering can only be successful if every process in the organization is adapted to support it (Lusch et al., 2007). In the case of self-scanning for example, it's not enough to invest in self-checkout systems. Personnel has to be trained, management must be motivated to reach out to customers, and product packages have to be adapted. This could be a big start-up cost for retailers.

Secondly, the limitation of personal contacts can lead to the inability to recover from service failure or to create social bonds with customers in order to retain them (Meuter & Bitner, 1998).

[6] http://www.dell.com/
[7] Set of tools, processes, and methodologies and associated equipment employed to collect, process, and present information (http://www.businessdictionary.com).

Lastly, the organization has to keep in mind that the implementation of self-service technologies could create anxiety and stress for customers (Mick & Fournier, 1998; Curran, Meuter, & Surprenant, 2003). Furthermore customers might highly value the social factor of shopping and therefore be reluctant to use self-service technologies (Zeithaml & Gilly, 1987), or they will not use self-service technologies because they consider the learning costs to be too high (Gatignon & Robertson, 1991). As customers participate actively and freely in the process, forcing them to use self-service technologies might make them leave the organization and switch to a competitor (Curran et al., 2003).

To make it worthwhile for companies to invest in self-service technologies it's very important to attract as many users as possible as this would allow for the initial investment to be spread, reducing the cost per customer. Only when the benefit of adopting self-service technologies exceeds the cost per customer, companies will find incentives to take on the journey (Curran & Meuter, 2005).

For customers, adopting a new way of doing things means they have to get familiar with the new technology. This learning creates switching costs for customers (Buell, Campbell, & Frei, 2010) and they will only participate if they foresee future (economic or non-economic) benefits in learning (Ennew & Binks, 1999). This illustrates the importance for companies to learn about the motivations of their customers to adopt self-scanning technologies. A good evaluation of customer motivations could enable retailers to approach different segments the correct way by using different aspects of self-service technologies to convince their customers to try it out.

Even though there has been extensive research about motivations to use self-service technologies (Curran, Meuter, & Surprenant, 2003; Meuter, Ostrom, Roundtree, & Bitner, 2003; Meuter, Bitner, Ostrom, & Brown, 2005; Yen, 2005; Elliott, Meng, & Hall, 2008; Jahangir & Begum, 2008; Elliott & Meng, 2009; Buell, Campbell, & Frei, 2010; Schliewe & Pezoldt, 2010;…), the literature concerning self-scanning in particular is limited. According to Curran and Meuter (2005) it's important not to generalize self-service technologies as there exist many differences between them. This means conclusions drawn in the past may not hold up for the specific case of self-scanning. New testing will have to be done to confirm whether previous findings hold up for this case. In addition, research has shown the importance of cultural differences with respect to the adoption of self-service technologies and self-scanning (Meng & Hall, 2008; Elliott & Meng, 2009; Schliewe & Pezoldt, 2010; Elliott; Chan, Yim, & Lam, 2010). Hofstede's[8] assessment of different cultures explains how Belgian culture is very different from cultures which, at first sight, are very resembling. As all research has been done in other countries the possibility exists that this "Flemish" research will have different results. Lastly, in contrast to some other markets, self-scanning is a relatively new technology in Belgium (full roll-out starting as of 2008[9]), only now starting to break through. This might also affect the way customers view the technology.

[8] Professor Geert Hofstede conducted one of the most comprehensive studies of how values in the workplace are influenced by culture (http://geert-hofstede.com/).
[9] N.F. (2008, December 10). Le self-scan appelé à s'étendre. La Dernière Heure. Consulted on August 28, 2014 through dhnet.be.

The purpose of this master's thesis is to get a better understanding of what motivates Belgian customers to use self-checkout systems in supermarkets. As a result, this study provides retailers with a better knowledge of how to attract customers to use the service. The main research question is:

What factors influence customers' intention to use self-scanning?

To answer this question, a clear foundation should be laid about:

→ What is co-production?

Once co-production has been elaborated, it is important to get a deeper understanding of:

→ What are self-service technologies?

While not the only determinant of customers' intention to use self-service technologies, previous research has repeatedly shown the importance of attitudes. Concerning this topic multiple questions should be answered in order to provide enough background to create a useful model.

→ What are attitudes?
→ How are attitudes formed?
→ What is the effect of attitudes on intention?

While not the main goal of this research, the survey will be written in such a way that it should be possible to sketch technology adoption profiles for different types of customers based upon their demographic characteristics.

“Alone we can do so little,

together we can do so much.”

-Helen Keller

2. LITERATURE REVIEW

The literature review in this master thesis will be divided in four subchapters. The first subchapter will briefly create a foundation for the rest of the literature by explaining how businesses shifted from a goods dominant, to a more service dominant view. In the second subchapter, the concept of co-production will be elaborated. Self-service technologies and self-scanning in particular will be addressed in the third subchapter. What it is, what it's not and the implications for customers and businesses. Lastly subchapter four will take a closer look on the different behavioral theories that will eventually lead to conceptual model proposed in the third chapter of this master's thesis.

2.1. A New View on Business

Over the years, the delivery of services has started gaining importance over the manufacturing of goods. Research done by the New York Times shows how the services industry accounted for 86% of the American employment in 2010, gaining more than 20% over manufacturing since 1960. (Amanda, Duhigg, Xaquin, Grondahl, Park, Roberts, & Russel, 2012).

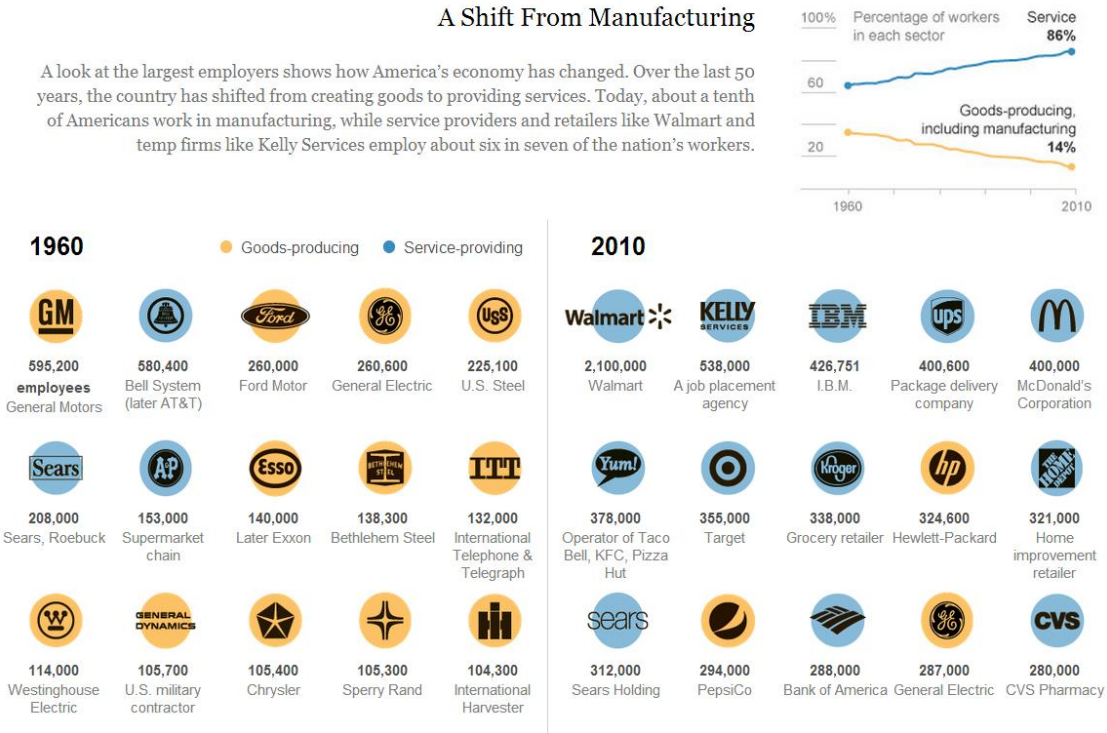


Figure 1: Change in the American economy - Source: NYT

In developed countries, many producers face mature markets saturated with homogenous products (O'Kelly, 2001). Homburg et al. (2002) describe how companies struggle to gain some kind of competitive advantage over their competitors. As products become more and more standardized and in order to avoid costly and harmful price-wars, they try to add value to their offering by including a wide variety of services (Van Heerde, Gijsbrechts, & Pauwels, 2008). As product, price, place and promotion, the four P's of marketing, are highly standardized (Hummel & Savitt, 1988), several authors argue that companies increasingly use a service-oriented business strategy to differentiate

their product and therefore gain some competitive advantage (Ellis & Kelley, 1993; Tsay & Agrawal, 2000; Homburg et al., 2002, Prahalad & Ramaswamy, 2004).

Clearly service-offerings are the future. Businesses acknowledge this trend and start offering services instead of physical goods as their core product. They start to become more customer driven.

2.2. Co-Production

2.2.1. What it is

Co-production refers to customer involvement prior to the consumption stage, or how Lusch and Vargo (2006) describe it: in the core offering itself. While co-producing, customers reflect their personal preferences into their decision making process (Etgar, 2008). Therefor co-production and customization are tightly related. As co-production is more individual-driven, each person's uniqueness affects the process (Prahalad & Ramaswamy, 2004).

Today customers are more involved in the (co-)production of the service they enjoy (Bendapudi & Leone, 2003). The illustration of a grocery store fits in well with the goal of this paper. Barely hundred years ago, a customer would go to a grocery store and list the things he needed. The shop-owner would take them from the shelf, put them in a bag and proceed with the checkout. Nowadays, customers enter the store with their personal shopping cart, pick the goods from the shelves themselves, weighing their fruit and vegetables and putting everything onto a conveyer, finishing by bagging the goods themselves. This form of co-production can be further exploited by the introduction of self-service technologies like the one brought forward in this master thesis.

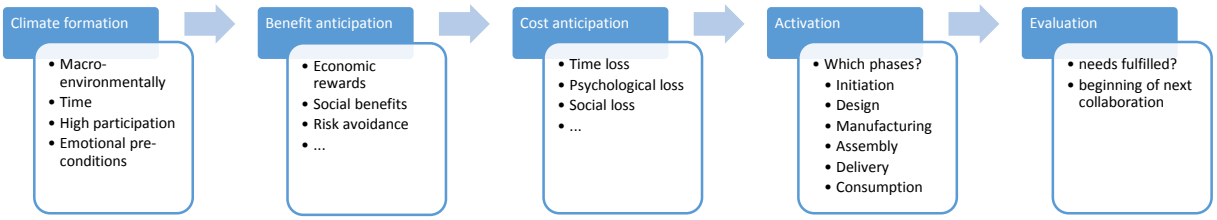
Figure 2: 1900's grocery store
source: old-photos.blogspot.be

Figure 3: 2000 grocery store
source: liberate.org

Lush et al. (2007) are convinced that the scale in which a consumer is prepared to participate in the production process depends on six items.

1. Expertise: more experienced people will be more likely to participate in co-production
2. Control: people that want to exercise control over the process or outcome of the service will be stimulated to participate in the production process.
3. Physical capital: with the right tools in hand, customers will be more willing to participate. These tools can range from a pencil to a plane and everything in between.
4. Risk taking: co-producing involves psychical, psychological and social risks. People that are prepared to take some risks are more likely to participate in co-production.
5. Psychical benefits: some people participate in co-production solely for their personal enjoyment.
6. Economic benefits: co-production is lucrative, economic benefits play an important role in co-production.

In the highly competitive environment sketched before, producers should make sure not to lose customers by imposing them to co-production. Academics stress that customers should be given the choice whether or not to participate in the co-production process (Etgar, 2008; Curran & Meuter, 2005,…). Etgar (2008) analyzed the stages the customer would go through when considering to co-produce.



Stage 1: Climate formation

To give customers a reason to co-produce, there should be a climate stimulating this use. This climate includes macro-environmental, consumer-linked, product-linked and situationally linked conditions (Etgar, 2008).

- Macro-environmentally the stage of economic development is very important. Mature markets are more likely to persuade their customers to engage in co-production (Johansson, 2006 in Etgar, 2008). In the stages before maturity, consumers mainly focus on improving their standard of living by producing a lot of goods. Only when their basic needs are satisfied, consumers will engage in co-production. The market's culture is also an important macro-environmental factor influencing the likelihood to co-produce. E.g. markets stimulating creativity and interpersonal relationships encourage customers to become part of the production process. Lastly technological improvements affect the way customers and producers can communicate therefor it is also creating a stimulating macro-environment (Etgar, 2008).

- In most cases co-production only works when customers are prepared to invest some of their precious time towards the process. As this will always be a scarce resource, customers with more free time will be more likely to engage in co-production. Furthermore co-production requires a level of skill that can only be obtained by practice and therefore will be different for every consumer. Co-production that enables customers to benefit from time savings however, as will be the case with the form of co-production studied in this master thesis, will probably also appeal to those with little time to spare.

- Co-production will mainly arise with high participation products. Producers use it to develop brand personalities to convince customers their brand fits their needs best.

- Participation can be encouraged by the nature of the consumer-partner interactions and consumers will also engage more in co-production if emotional pre-conditions, like trust, lack of opportunistic behavior or evidence of long-run commitment, are realized.

Stage 2: Benefit-anticipation

During the second stage, customers weigh the drivers that motivate them to co-produce (Etgar, 2008). First of all, customers value economic drivers like the economic rewards (Lusch et al., 1992) or cost-reductions of performing a given activity (Etgar, 2008). Furthermore social benefits, like the gain of social status/esteem and the desire for control can be important motivational factors to opt for co-production. Meanwhile they overlook the risks they avoid by co-producing. These risks can be physical (harm the body due to limited knowledge), financial (loss of money), social (consumption can harm self-esteem), performance (the product doesn't do what it's expected to) or time driven (waiting too long). Co-production reduces these risks because they enable the customer to have direct control over the production process, on the other hand co-production brings along some risks on its own (more difficult recovery from failure etc…).

In other words, customers will at this point consider what additional value co-production could bring to the table. This relates tightly to the typology of customer value, proposed by Holbrook (1996). Holbrook stresses the importance of knowledge about how the customer interprets the value delivered by a good or process. Only when aware of the origin of the perceived consumer value, good management decisions can be taken. To help determine the type of customer value, Holbrook proposed a framework, based upon three dichotomies.

- Intrinsic vs. extrinsic value, or the value something has in itself vs. the value it has as a means to achieve something else.
- Self-, vs. other-oriented, or how the consumption of something has value mainly because what it means to oneself vs. the aspect of consumption mainly because of how others will respond.
- Active vs. reactive relates to whether or not the consumer has to interact with the product to get some value of it.

These dimensions form the current typology of consumer value as can be found on the next page. In red the examples have been given about how this typology can be applied to co-production.

Table 1: Holbrook's typology of Customer Value

		Extrinsic	Intrinsic
Self-oriented	Active	Efficiency (Faster, cheaper)	Play (Fun to be involved)
	Reactive	Excellence (Quality, control)	Aesthetics (Less applicable)
Other-oriented	Active	Status (Impression)	Ethics (Pride)
	Reactive	Esteem (Reputation)	Spirituality (Less applicable)

Stage 3: Cost-anticipation

In the third stage customers will weigh all the benefits mentioned before against the cost of co-production (Etgar, 2008). Frequently, customer will have to invest some time in co-production and, as being said, time equals money. They also evaluate psychological and social losses that might occur while co-producing like the loss of freedom of choice, risk of misperformance or social stigma's.

Stage 4: Activation

Once they added up the plusses and the minuses, customers are ready to be activated (Etgar, 2008). Once the producer has determined the stages in which customer participation is possible, the customer will make up his own mind about the stages in which he would like to participate.

- Everything starts in the initiating phase. In this phase companies define customer needs and how these should be addressed. Traditionally, companies were the only ones to initiate such a process, technology however made it possible for customers to contact companies with their specific needs.

- Next up is the design phase. In this phase ideas are further specified. Co-production in this stage enables customers to include certain product features the manufacturer would never think of or improve ergonomics because of past experience.

- During the manufacturing stage, raw materials are transformed into usable items, customers can be seen as partial-employees in this stage (Etgar, 2008; Kelley, Donnelly, & Skinner, 1990).

- During the assembly phase, customers can create value by picking those items they need the product to contain.

- Once the product is assembled, it has to be delivered. Companies can offer their customer the option to be responsible for the delivery of their own goods. This is especially convenient in the B2B context, where most businesses own a truck and therefore can pick up their purchases by themselves, but the same principle applies to B2C-markets.

- Last but not least the consumer has to consume the product. According to Berry, Seiders and Greval (2002), the consumption stage can be further divided in before use, during use and after use.

Some companies, like Ikea, enable their customers to become part of (almost) every stage in this production process. Customers at Ikea have the option to design their own wardrobes and kitchens, they have to pick the packages out of the warehouse, process them through self-checkout tills, and transport them home before finally assembling and enjoying the furniture. Other companies, like Nike and Dell, offer their customers a range of processes in which they can collaborate.

Stage 5: Evaluation

The last stage in the co-production process will be the evaluation stage (Etgar, 2008). In this stage the consumer has to evaluate whether the outputs from the activation stage fulfilled his or her needs expressed in stages 1-3. While this stage is frequently overlooked, it is a very important stage as it marks the beginning of the next collaboration (Etgar, 2008).

2.2.2. How it evolved

Most literature about co-production only dates back to the year 2000. The term customer participation, which is the degree to which the consumer is involved in producing and delivering service (Dabholkar, 1990), dates back to the eighties (e.g. Lovelock & Young, 1979; Bateson, 1985; Mills & Morris, 1986; Goodwin, 1988; Dabholkar, 1990). The first stage in Etgar's (2008) model could explain why the potential from customer participation was only recently discovered. As Etgar proposes, the environment should be ready for co-production. By the end of the 20th century, when the scars of war healed and the 1970's oil-crisis was nothing more than a memory, the climate became favorable for customer participation: economic growth made the people feel richer and gave them more spare time, the liberal idea promoted individuality and the birth of modern internet stimulated communication between buyers, sellers and producers.

While Toffler (1980) claims to have found evidence of co-production in all three his waves of social and economic development[10], he made an extensive elaboration of factors that might have

[10] 1. The agrarian-hunter era, where people were co-producers by necessity. Apart from some individuals everybody had to grow/make his own food, clothes etc.

2.The beginning of the industrial revolution, where people produced mainly to have exchangeable goods.

3. The post-industrial age, characterized by people shifting time from work and traditional exchanges to co-producing their goods, mainly because of the progression of information technology (Xie et al., 2008).

contributed to what he calls "the revival of co-production" in the last wave, the wave in the aftermath of which we live today. According to Toffler co-production rose out of its ashes in the post-industrial era because:

- Better education enabled more complex technologies to be developed. These technologies, for example self-service technologies, sometimes required consumers to self/co-produce.

- This advance in technology decreased the amount of physical work needed and the workweek shrunk. This provided people with extra time to engage in other things, like leisure activities or co-production.

- While the physical work declined, more mental work became required. To have an outlet for a day full of thinking, people felt the need to engage in more labor intensive activities after work.

- A shrinking workweek and a higher standard of living increased the cost of labor. Some people wanted to bypass these costs by producing things themselves.

- Standardization and mass-production left some other people with the feeling they could produce higher quality goods than market standards themselves.

- In reaction to this standardization, people who wanted to stick out of the crowd started producing their own products and took pride for what they created.

- Marketers saw this need for self-expression and started to offer co-production as a service.

Just like Etgar (2008) explained as phase 1, all these different factors created a solid foundation for customers to be willing to engage in co-production.

2.2.3. To whom it may concern

Nowadays many companies offer some kind of co-production as a service to their customers. Before we mentioned the examples of Ikea and Nike but there are many more like them. Co-production is present for all kind of products, ranging from fast moving consumer goods (like the Betty Crocker cake mixes[11] that need some limited input from consumers) to high-end sports cars (like the limited edition Chevrolet Copo Camaro[12] that can be built-to-order and where the client can even assemble parts himself) and in all sorts of sectors, from retailing (Carrefour, Decathlon and Delhaize all offer their customers the possibility to check out via self-checkout tills) to the financial sector (Banks provide ATM's and E-banking services to handle your own transactions).

As stated before offering value-added services require the whole organization to support this way of thinking, and it's not cheap. Companies would, however, not by masses engage in co-production if it wouldn't be possibly lucrative. Co-production mainly gives the company a competitive advantage

[11] http://www.bettycrocker.com/products/supermoist-cakes
[12] https://www.chevrolet.com/performance/copo-camaro.html

(Homburg et al., 2002; Prahalad & Ramaswamy, 2004). Because of its customizable offering it is better than the competition, therefore it will attract a lot of customers. Moreover co-production sometimes enables companies to reduce labor costs, as the consumer becomes a free partial-employee (Collier & Kimes, 2012). Another benefit of co-production for producers are the reduced research and development costs as a result of customers being able to communicate with the company about their wants and needs. This also ensures the company to produce that specific product the customer wants and ensures a high profitability.

It seems that producers can benefit from co-production and this could be the reason why a lot of companies nowadays offer some kind of customer involvement. As can be learned from Toffler (1980) however, this claim can never be the full truth.

According to the arguments he puts forward as determinants for the uprising of co-production, it is mainly the customer that asks for this kind of interaction. Just as Firat and Venkatesh (1993) argued, six in seven of Toffler's statements describe how the customer himself would like to become part of the production process. As the customer is always right, the producers have no other option than to include customer involvement in the offering.

As co-production is an umbrella for different technologies, the benefits will vary from type to the other. In general the customer will experience the benefits of augmented service: customization makes the products fit perfectly to customer needs, time and money savings create an incentive to adopt co-production in the long run, higher control makes individualist people feel more important,… (Meuter et al., 2000; Dabholkar et al., 2003; Hilton & Hughes, 2008;…) all these things will create a long-term relationship between the customer and the producer. This relationship will benefit both parties in the long run (Etgar, 2008). Moreover reduced cost on the supply side will enable producers to sell their products at an even lower price, this is another benefit for the customer (Bendapudi & Leone, 2003).

2.3. Self-Service Technologies

As can be derived from Toffler (1980), the rapid change in information technology (IT) paved the way for co-production. Nowadays wireless internet connections, superfast computers and fullHD images are considered standard. Kids grow up with technology and non-adopters risk social isolation. Information technology stimulates co-production as it can be used to manage customer information, build a dialogue with customers, serve them and enable them to customize the offering. High labor costs force companies to reconsider shifting a part of the production process towards the customer, the progress in IT creates many opportunities for companies to do so (Dabholkar, 1995; Hilton & Hughes, 2008).

2.3.1. Benefits for the producer

Self-service technologies are technological interfaces that enable customers to produce a service independent of direct service employee involvement (Meuter et al., 2000). This creates a competitive advantage as the producer can reduce his costs without reducing the perceived level of service delivered. Self-service technologies enable producers to increase productivity (Dabholkar, 1996) and shorten the delivery times (Berry, 1999). Furthermore Radas and Shugan (1998) describe how self-service technologies extend the service delivery. Not only do they enable producers to provide a service at any time, they also enable the producers to handle wild shifts in demand. Opposed to staff, technology is always available for use.

In other words self-service technologies reduce costs for producers. Producers however should keep in mind that the offering must remain beneficial for the customer too. It's easy to reduce producer's costs by reducing customer value. The true challenge however, and the only way customers will adopt the new technology, is to offer the customer some kind of benefit to persuade him to prefer the new technology over the traditional service (Collier & Kimes, 2012; Hilton & Hughes, 2008).

2.3.2. Benefits for the consumer

Self-service technology adoption does have some clear benefits for customers. First of all, research has shown considerable time and cost savings for the customers too. Waiting time is reduced and customers perceive the service to be more customizable (Meuter & Bitner, 1998). Self-service technologies enable customers to choose from where to operate (Kauffman & Lally, 1994) and previous research has proven the importance of pure fun/enjoyment (Dabholkar, 1996). Meuter et al. (2003) described how customers perceived self-service technologies to be more effective, have a higher quality of service, were perceived as amusing to use and provide cost savings. Self-service technologies are more flexible than their traditional counterparts. They enable the customer to choose the time and location for an encounter (Collier & Kimes, 2012).

2.3.3. Costs for the consumer

On the other hand consumers may be hesitant to try out the new technology for a number of reasons. It is possible that certain customers feel anxious about a new technology. They don't know how it works and whether or not it's safe. A new technology brings along learning costs for the customer (Buell et al., 2010). Depending on the customers mentality he will or will not be prepared to tackle these costs (Gatignon and Robertson, 1991). His intelligence will decide how long it will take for him to get familiar with the new technology and as always, practice makes perfect. Maybe the customer is a fast learner, but afraid of technology. Technology Anxiety (TA) is defined as the fear, apprehension and hope people feel when considering to use or actually using computer technology (Meuter et al., 2003, pp. 900). People with technology anxiety are extremely timid when they are confronted with technologies. They would avoid coming in places where they might have to face technology and are negative about it (Doronina, 1995). As research has shown over 55% of Americans suffer from some form of technology anxiety (Williams, 1994), it should be included in this research as a negative motivator. Lastly consumers engaging in co-production invest their operant resources in the process. They will at least want some kind of reward in return.

2.3.4. Motivators to use self-service technologies

As mentioned in the introduction the implementation of self-service technologies is not cheap (Curran et al., 2003). Apart from investments in equipment, which according to an insight source from Delhaize is about 40.000 euro's for the scanners and an extra 10.000 euro's for every check-out tower, the company is forced to embed the technology in the entire organization. Comprehensively the total cost of self-service technologies is considerable. The company has to attract as many users as possible in order to spread the entry-costs over multiple transaction (Curran & Meuter, 2005, Jahangir & Begum, 2008). The only way to make this happen is by making the offering as appealing as can be. Therefore the producer has to be aware about why his customers would use the given technology.

Motivations to use self-service technologies have been studied in the past, but mainly automated teller machines (ATM's), petrol stations and the purchase of online tickets have passed in review. All these forms of self-service technologies however, involve some kind of simple low-tech self service (Meuter et al., 2000). Self-service technologies in retailing are somewhat neglected. As Curran and Meuter (2005) put forward, there are a lot of differences between different self-service technologies. Therefore it's not suitable, or even impossible, to take the conclusions of previous research about self-service technologies for granted. This research will built upon the hypotheses made in previous research and retest them for the specific case of self-scanning, which is the practice of customers scanning their own goods in the store while shopping and pay for them via automated checkout tills.

- Ease of use:

Ease of use is the degree to which a person believes that using a particular system would be free of effort (Davis, 1991, pp. 320).

Langeard et al. (1981) found a minor significance for the effort customers considered to need to invest in order to use a certain technology. Some customers can be concerned about the complexity and the effort they need to do in order to get a certain technology to work. When they consider the technology to be complex, customers could be afraid of looking foolish in their struggle to get the technology to work. On the other hand, if they consider the technology easy to use they could view it as a high quality option (Dabholkar, 1996). Useful technologies will fail if they are considered not to be easy to use.

- Utility:

Perceived utility or usefulness is the degree to which a person believes that using a particular system would enhance his job performance (Davis, 1991, pp. 320). Another way of looking at the concept are the potential rewards or punishments faced by the consumer when he engages in self-service technology (Curran & Meuter, 2007). Utility consist of a never ending list of benefits and punishments but it can be comprised in some key categories.

One way utility can be seen is as what Dabholkar (1996) describes as speed of delivery. Previous research showed how perceived time savings are a very important reason why customers might engage in self-service technologies (Collier & Kimes, 2012). Some customers, for example, could prefer self-scanning over the traditional checkout system because they perceive this checkout

method to be faster than having to wait in line, even when it's not. Because they are actually doing something, instead of just waiting in line, they could perceive the waiting as shorter (Maister, 1985). Dabholkar (1996) suggests enough self-checkout terminals should be installed to keep waiting times at a minimum during peeks.

Control is another important determinant of utility and thus service quality and intention. Perceived control has been defined as the amount of control a customer feels he has over the process or its outcome (Langeard, 1981). Langeard (1981) and Dabholkar (1996) found control to be very important to self-service customers. Other researchers, like Bateson (1985) and Bowen (1986) even claim control to be more important than monetary incentives for the intention to use technology-based self-service options.

- Reliability

In previous studies reliability, or the certainty that a given technology will work, has been shown to be an important indicator of service quality (Parasuraman, 1988; Van Gorder, 1990). Evans and Brown (1988) suggested this to be especially important with new technologies, like self-scanning in Belgium.

- Social needs

The perceived quality of a service has been proven to be very dependent of the employees (Bitner et al., 1990; Grönroos, 1982). While co-production often takes place in a social context where consumers and producers work closely together (Xie et al., 2008), this might be less the case regarding self-service technologies. Zeithaml and Gilly (1987) showed how people experienced technology to dehumanize the service encounter.

This matter has proven to be very personal. While some people prefer human interaction, others might not. Customers could actively choose to use self-service technologies to avoid obtrusive personnel (Meuter et al., 2000) or just because they like to play with machines (Langeard et al., 1981). Therefore it's hard to make solid statements about the effect of human interaction.

- Enjoyment

Customers might just enjoy being part of the production process, literature shows how the fun factor of a technology can be one of the main reasons for a customer to engage in co-production. (Dabholkar, 1996). Dabholkar (1996) suggested the fun and novelty-factor of a technology should be incorporated in the design of the technology as "colorful icons and humorous directions".

- Global Attitude

An attitude is defined as a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor (Eagly & Chaiken, 1993, pp. 1). It's possible to have multiple attitudes towards a certain target, in this case research has shown these attitudes to behave in a hierarchical way (Curran et al., 2003; Eagly & Chaiken, 1993). The importance of different factors of attitude could vary in time when the customer gets more familiar with the technology (Curran & Meuter, 2005).

- Self-efficacy

There is a long and complex way from ingredient to finished product, with co-production the customers is part of this journey. He has to have the knowledge and the force to push through till the end-product. Self-efficacy stands for the extent to which the customer thinks he can fulfill the task correctly (Xie et al. 2008)

- Social norms

New product trial has been shown to be very susceptible to social influences. Customers' intentions might switch if an important individual of the peer group has a pronounced opinion about a given technology (Curran & Meuter, 2007). Furthermore the intention to try out something new can be very dependent on the culture of the customer. Hofstede (The Hofstede Centre: geert-hofstede.com) described how inhabitants of different countries distinguish themselves in four dimensions. Power distance, individualism, masculinity and uncertainty avoidance will all scape the individual and how he will react to new technologies.

Power Distance (PDI) differs from one country to the other, it is the degree to which less powerfull individuals will respect their superiors. Individualism (ADV) refers to the importance members of a group will attribute to themselves. Individualist cultures are those where the individual and his close surroundings are considered much more important than the rest of the society. Third Hofstede noted the importance of masculinity (MAS), which relates to achievement, heroism and success. Masculine cultures are very competitive. The last dimension is uncertainty avoidance and this expresses how individuals feel when they have to cope with uncertain circumstances. All these factors will form a social environment in which members are expected to behave accordingly, therefore these social norms might also prove to be an important factor. Differences will probably mainly arise when two different samples are compared. A list of countries can be found in Appendix 1.

- Past behavior

In favor of the expression "Practice makes perfect!", Xie et al. (2008) described how repetition of successful acts could reduce consumer uncertainty and improve their eagerness to fully adopt a new technology.

- Technology anxiety

Technology anxiety and its importance has been explained before. Service providers must bear in mind that customers' fear to use technology will make some of them very reluctant to try out the new technology (Curran & Meuter, 2007). Meuter et al. (2003) propose some options to reduce Technology anxiety among customers. First of all, they argue all self-service technologies should be designed in collaboration with their future users. Then they stress the importance of user-education and guidance when the technology is introduced. Once again they note the importance of giving the customer the choice whether or not to engage in the technology as forcing the consumer will probably be counterproductive. Finally they explain how incentives could be used to convince hesitating customers.

2.4. Behavioral Models

In the past, several behavioral models have been proposed and proven reliable. In order to get an extended explanation of what determines a customer's intention to use self-service technologies the model used in this master's thesis will integrate two important existing theories, the theory of trying and the technology acceptance model, later on adding some of the important motivators mentioned before.

To get a deeper understanding of the theories that will be used, it's important to look into their predecessors first. This subchapter will start from the theory of reasoned action and built up to the theories of importance to this master's thesis.

2.4.1. Theory of reasoned action (TRA)

In 1975, Fishbein and Ajzen joined forces to investigate human behavior. This co-operation resulted in what's called the theory of reasoned action. Founded on the assumption that human beings think before acting and that they think rationally, this means that they make decisions based on the information they have at hand, Fishbein and Ajzen developed a framework that could understand and perhaps even predict human behavior.

According to Fishbein and Ajzen, people's behavior is primarily determined by their intention to behave. These intentions capture the motivational factors that influence behavior (Ajzen, 1991). Intentions in their turn are influenced by (1) the person's attitude towards performing a given behavior and (2) what Fishbein and Ajzen call a subjective norm, a person's assessment of how important people in his environment would want him to behave. The subjective norm could therefore be described as the social pressure put on an individual.

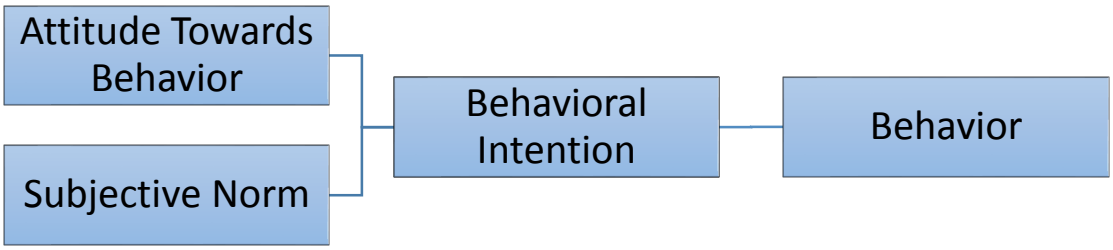


Figure 4: The Theory of Reasoned Action (Fishbein & Ajzen, 1975)

Applied to self-service technology: when a customer assesses the adoption of a self-service technology could pay off, he will have a positive attitude towards the technology. If, in addition, this customer expects his relevant others, this could be family, friends, colleagues, to also have a positive attitude towards the technology he will be likely to have an intention to use the technology. This intention will eventually lead to the behavior. On the other hand, if the customer thinks the technology will not pay out, e.g. he thinks he will have to do too much effort for the benefit, he will have a negative attitude and probably will not engage. The same applies when the customer thinks his environment disapproves the behavior, for example when someone wants to light a cigarette, but knows the people around him are non-smokers and will judge him for being one.

While the theory of reasoned action has proven to successfully predict human behavior, it is often considered to be too simplistic for real life scenarios. That being said, the theory of reasoned action was a true cornerstone in behavioral research, paving the way for a multitude of future theories.

2.4.2. Theory of planned behavior (TPB)

The theory of reasoned action overlooked the fact that sometimes people are not in full control of their behavior. Ajzen (1985; 1991) recognized this flaw and adjusted the theory of reasoned action by adding a control dimension. According to this new theory, the theory of planned behavior, people could be subject to different levels of control ranging from total control to a complete lack of control. While it is evident that actual control affects people's intention to behave, it is perceived control that is of greater psychological interest. Perceived behavioral control refers to the difficulty the subject thinks he will encounter to perform the behavior of interest.

The newly added dimension of perceived behavioral control refers to the degree in which a subject feels he is in control of performing a given behavior. If the subject feels he has no control, e.g. he doesn't have the necessary qualifications, he will be unlikely to form a strong intention towards the behavior, even if he has a positive attitude towards it and thinks his reference-group will approve the behavior.

In addition, perceived behavioral control does not only have an indirect effect on behavior via the intention to behave. Perceived behavioral control could also directly influence behavior. Ajzen (1991) uses the example of two people willing to learn to ski. Even with equal intentions, the one who thinks he can do it will be more likely to get the hang of it faster.

While the theory of planned behavior can be applied in multiple settings, it can be especially useful to research information systems, and thus this research, as the involvement of technology could be a barrier for people leaving them with a feeling they have no control.

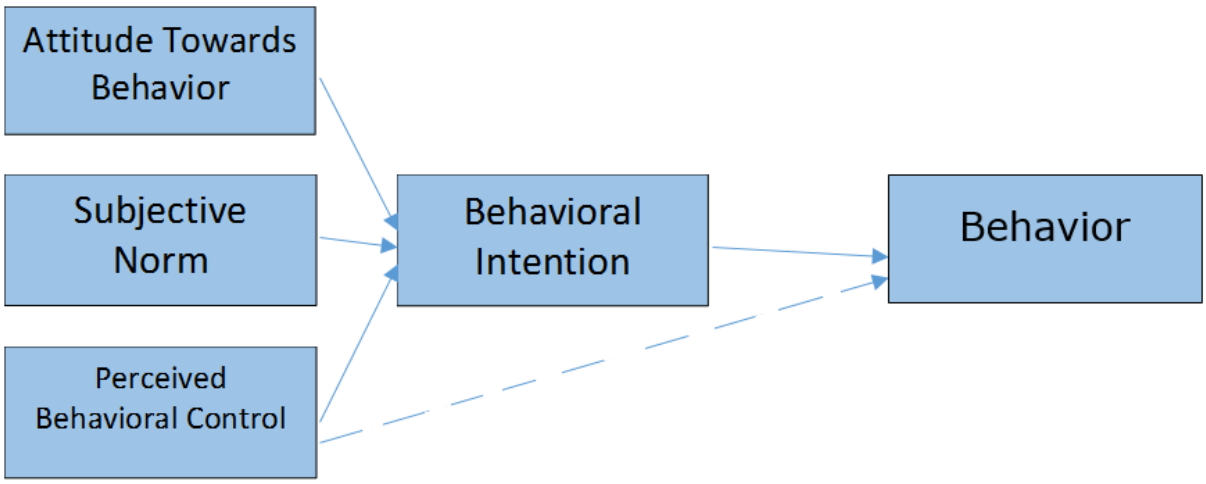


Figure 5: Theory of Planned Behavior (Ajzen, 1991)

2.4.3. Theory of goal pursuit (TGP)

Just like Ajzen (1985), Warshaw, Sheppard and Hartwick (1986, in Bagozzi & Warshaw, 1990) think the usefulness of the theory of reasoned action is rather limited. They agree impediments could come forward that can hamper an individual's ability to perform a certain behavior. Contrary to Ajzen (1985) however, they don't settle for an extra determinant adding "level of control" to the equation. Warshaw et al. feel there is a difference between reasoned behavior and what they call goals. They argue "goals are those behaviors for which an individual thinks impediments will stand in the way" (Bagozzi & Warshaw, 1990, pp. 128).

The use of goals instead of reasoned behavior as central thought, makes the model Warshaw et al. (1986) propose much more applicable in different settings. The Fishbein model will fail to address more complicated goals, as there will always be a level of uncertainty involved, disabling the individual to make a proper assessment. Goals on the other hand are typically not associated with just one behavior, multiple paths can lead to the same goal. Warshaw et al. state it this way: "if a sales man would want to sell a million dollars' worth of merchandise, according to the Fishbein model he would have to list every single behavior that could lead to this goal. He then should research his intentions about every single behavior before integrating it into a general prediction. This would not only take a lot of time, it would be near to impossible as people have different ways of attaining the same goal" (Bagozzi & Warshaw, 1990, pp. 128).

For this reason, Warshaw et al. (1986) adapt the theory of reasoned action to the theory of goal pursuit. A first step in revising the former is to change behavior for trying. Because there are a lot of impediments that could intervene, it is not sure that the goal will be reached. The individual will thus try to accomplish a given goal. In favor of this assumption, Bagozzi, Baumgartner and Yi (1989) found that "intentions correlated better with trying to achieve a goal than with actual goal attainment" (Bagozzi & Warshaw, 1990, pp. 129). Analogue with the Fishbein model, Warshaw et al. (1986) concluded trying was determined by intention to try, this in turn being determined by attitude towards trying and the social norm towards trying.

Determinants of the attitude toward trying in this model are adopted from Lewin et al. (1944, in Bagozzi & Warshaw, 1990). He sees attitude toward trying as a correlation between attitude and expectation toward both success and failure.

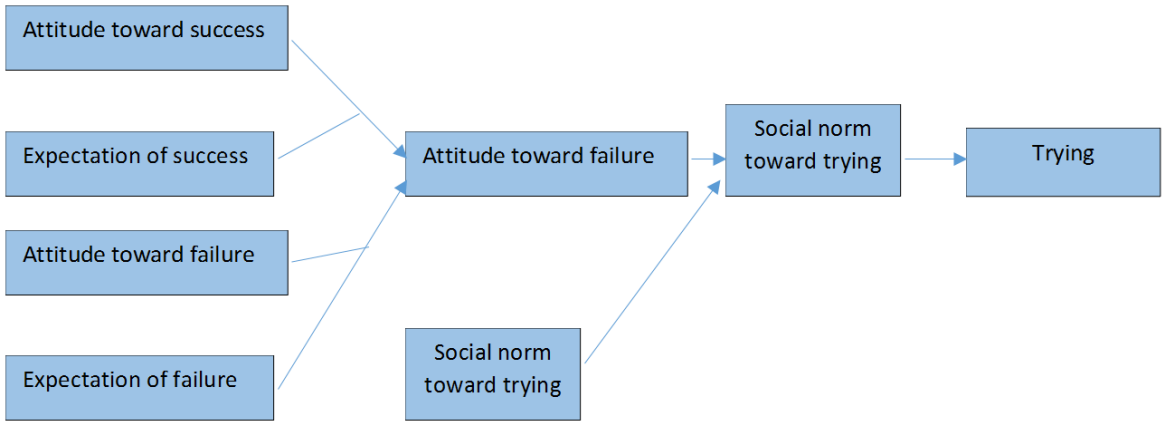


Figure 6: Theory of Goal Pursuit (Warshaw et al., 1986)

2.4.4. Theory of trying (TT)

While the theory of planned behavior and the theory of goal pursuit might be a better representation of the process an individual would go through when trying to perform a certain action, neither of them considers the influence of previous experiences with trying. Although previous research has shown the importance of past behavior on recent behavior, it has been neglected in most modern research. Bagozzi and Warshaw (1990) used the theories mentioned before in order to construct a new theory that includes this determinant.

According to the authors, the effect of past trying can be split up in two determinants. The first being the frequency of past trying and the second one the recency of past trying.

Bagozzi and Warshaw state that: "Even when an individual has well-defined attitudes toward trying, past frequency can have an independent influence on the intention to try if attitudes are only partially self-generated inferences rather than perfect reflections of past trying" (pp. 131). Frequency stands for how the experience the individual has with, in this case, the technology. This could influence his expectations of success, failure etc. Past trying can also influence trying directly, this is the case when trying is not determined by the intention to try alone (like when impediments prevent an intention to translate into concrete acting) or when the person is unclear about his intentions (Bagozzi & Yi, 1989, in Bagozzi & Warshaw, 1990).

Recency on the other hand, while related to frequency, is a totally different construct. One can frequently have tried to attain a goal, this could have been a long time ago. The problem with including recency is that it has shown to induce bias (Tversk & Kahneman, 1974 in Bagozzi & Warshaw, 1990). Recent events will overweigh the formation of intentions, because they are more easily accessible. While recency will probably introduce bias in every form of expectations, it will not affect the actual trying as this is not an expectation.

Bagozzi and Warshaw (1990) have proven the existence of these links in their study and propose the following model

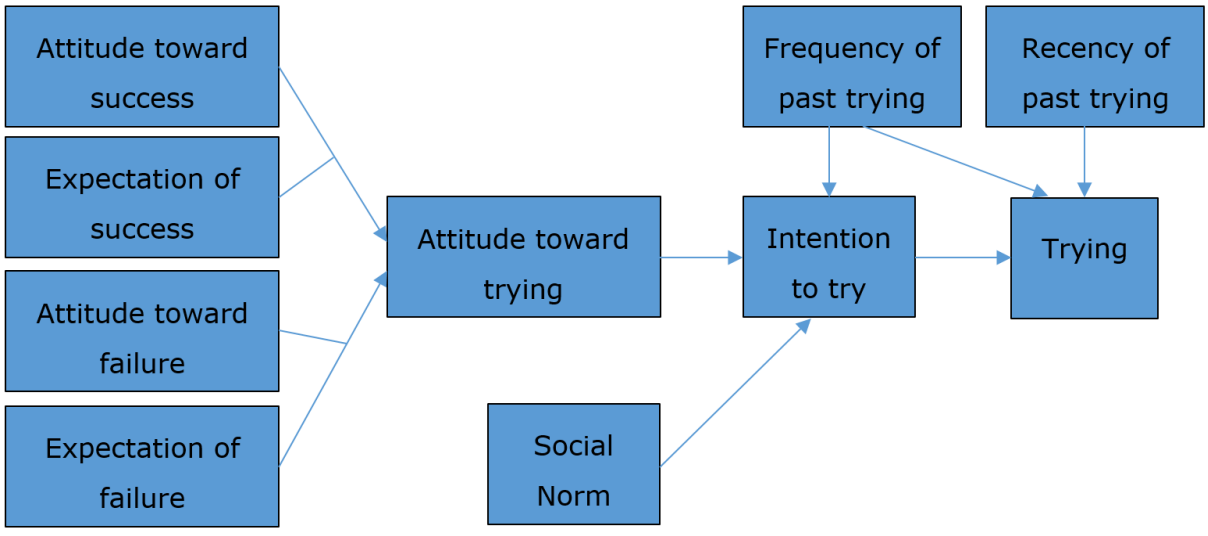


Figure 7: Theory of Trying (Bagozzi & Warshaw, 1990)

2.4.5. Technology acceptance model (TAM)

Davis (1986) also used the theory of reasoned action as a departure point for his research. With his research, he wanted to provide a general framework for computer acceptance, capable of explaining user behavior across multiple technologies. It will be called the technology acceptance model.

The model follows approximately the same path as the theory of reasoned action and the theory of planned behavior. The usage of information systems is caused by an intention to use those systems and this intention is created by attitudes towards the technology. As a first deviation from the theory of reasoned action, the technology acceptance model does not include the subjective norm as a determinant. Davis (1986) did so because this determinant has an uncertain theoretical status: it is the least understood aspects of the theory and could be related to more than intentions alone. While Davis did not elaborate on the subjective norm, he did go deeper in how the attitudes towards a technology are formed. According to the technology acceptance model, attitudes towards a technology will primarily be determined by the perceived utility and the ease of use of the technology.

As mentioned before, perceived usefulness is the 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, pp. 985). The technology acceptance model does not only add perceived usefulness as a determinant of attitude, contrary to the theory of reasoned action it also links the determinant directly to intention. This comes from the idea that people will form intentions towards a certain behavior if they consider the behavior to increase job performance, whatever their emotions about the behavior might be. For example, a salesman could have negative feelings about computers but he accepts that this technology is beneficial and will make it easier for him to obtain a promotion, this might not only change his attitude, it might also get him to use the technology although he doesn't like it.

The easier a system is to use, the less hesitant an individual will be to try it out. Because this could motivate the person to use the technology, perceived ease of use is thought to be positively related to attitude. The easier a technology is to use, the more the person will benefit from using it. Furthermore effort that is saved by using the technology can be invested in other tasks. Therefore ease of use could also increase utility.

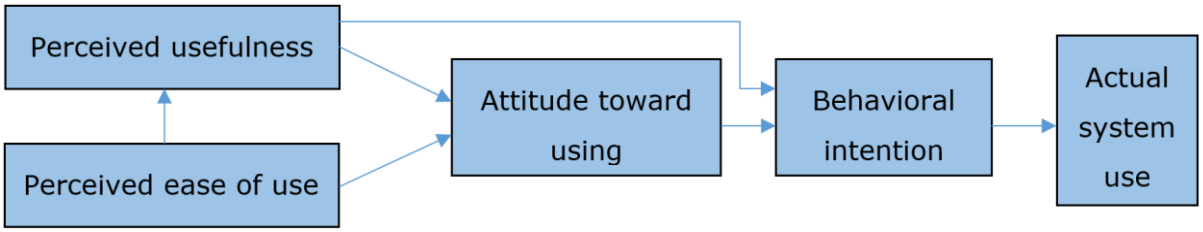


Figure 8: Technology Acceptance Model (Davis, 1986)

“Attitude is a little thing that makes a big difference.”

-Winston S. Churchill

3. RESEARCH MODEL

3.1. Introduction

The literature review first explained the concept of co-production: what it is, how it evolved and how it might change the business-encounter. Due to the scale of the subject, the literature narrowed down the field of interest to a specific form of co-production, namely of self-service technologies.

After having explained the purpose of self-service technologies, Subchapter 2.3 discussed how the adoption of self-scanning technologies could bring along costs as well as benefits for both the consumer and the producer. The subchapter explained how, while the producer ultimately has to decide whether or not to implement a self-service technology, the customer's motivation and willingness to adopt the technology in question is of utmost importance.

Lastly customer attitudes towards self-service technologies have passed in review. While there has been a lot of research on the topic, conclusions have not been univocal. Where one researcher was able to lay out a clear relationship between two variables, another did not find this relationship or even had contradicting results. Cultural differences could for some part explain these differences which illustrates how previous research is not generally applicable. Although conclusions tend to differ, most research started at the same point, the theory of reasoned action. This points out that for this research, the theory of reasoned action might not be a bad place to start.

3.2. Conceptual Framework

In this master's thesis a Frankenmodel will be presented. Just like the mythical creature of Frankenstein, the model that will be proposed later on will be a conglomerate of different models proposed in the past. While sometimes starting from scratch looks like a good idea, in this case two derivates from the theory of reasoned action will be used as a foundation for the final model, namely the technology acceptance model and the theory of trying. These two models combined include a whole part of the variables mentioned before:

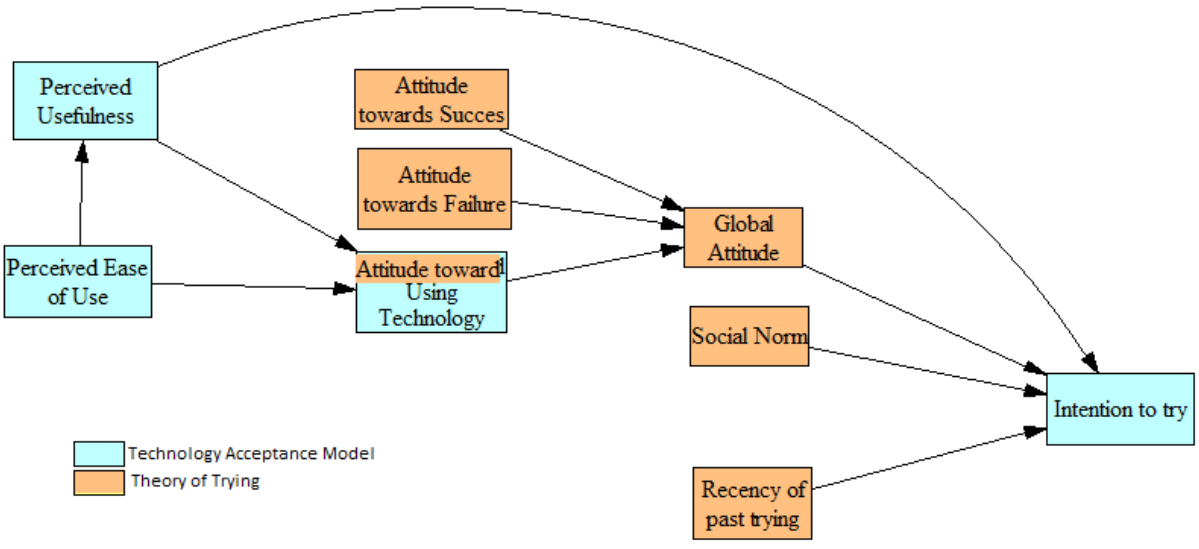


Figure 9: TAM & TT-integrated model

The technology acceptance model and the theory of trying have been explained before, both these theories ultimately try to explain/predict behavior. In this master's thesis however, the link between intention and actual usage/trying, will be omitted. This decision has been made because of the difficulty to measure actual usage. As measurement would require testing the same respondent before and after his purchase, neither the resources nor the time allowed for the measurement of this last construct.

With this merger, our first hypotheses can be noted:

- $H1_a$: A customer's behavioral intention to use self-scanning will be positively influenced by his global attitude toward self-scanning.
- $H1_b$: A customer's behavioral intention to use self-scanning will be positively influenced by his social norm.
- $H1_c$: A customer's behavioral intention to use self-scanning will be positively influenced by its perceived usefulness.

- $H2_a$: A customer's global attitude toward a given technology will be positively influenced by his attitude towards succeeding.
- $H2_b$: A customer's global attitude toward a given technology will be negatively influenced by his attitude towards failing.
- $H2_c$: A customer's global attitude toward a given technology will be positively influenced by his attitude towards the technology in itself.

- $H3_a$: A customer's attitude towards self-scanning is positively influenced by its perceived usefulness.
- $H3_b$: A customer's attitude towards self-scanning is positively influenced by its perceived ease of use.
- $H3_c$: A technology's perceived usefulness is positively influenced by its perceived ease of use.

The merger of TAM & TT marks the starting point for our model-to-be. The key to completing the Frankenmodel is now to add determinants which have proven to affect the existing determinants in the past.

For example, Xie et al. (2008) created a model very similar to the TAM&TT-integrated model, however, in line with their findings two constructs should be added. First of all they showed that past behavior has a significant effect on behavioral intention. Bagozzi and Warshaw (1990) added the frequency and recency of past trying to the theory of planned behavior when developing the theory of trying. Because the study described in this master thesis will omit the intention-behavior link, recency will not come forward in the model and frequency of past trying will be simplified to past behavior. Past behavior in this study will thus mean that the subject used the technology somewhere in the relevant past.

- $H1_d$: A customer's behavioral intention to use self-scanning will be positively influenced by the frequency of his past trying

The other construct Xie et al. added to the equation is self-efficacy. While companies should try to reduce the complexity of the self-service technologies they offer to the maximum, there are always some skills the customer should bring to the table. Self-efficacy stands for the skill, confidence and endurance the customer displays when trying to use a technology (Xie et al, 2008). According to Yi and Hwang (2003) this self-efficacy not only influences behavior (or intention to behave) directly, but it also has an effect on the perceived ease of use of the technology. Therefore we will test following hypotheses:

-$H1_e$: A customer's behavioral intention to use self-scanning will be positively influenced by the customer's perceived self-efficacy

- $H3_d$: A customer's perception of the ease of use of a technology is positively influenced by his perceived self-efficacy.

Curran and Meuter did a lot of research on the topic of self-service technology adoption. With topic-related publications in 2000, 2003, 2005 and 2007 they clearly know what they are talking about. For this reason it would be irrational not to build on their knowledge to put together the conceptual model. Curran and Meuter (2005) put together the "SST attitude/intention-to-use model", this model narrates that attitude towards a self-service technology is predicted by ease of use and usefulness, just like the technology acceptance model on which it is based, but also by risk and the need for interaction. These links are also to be found in other articles like Bateson (1985), Dabholkar (1996), Curran and Meuter (2007), Meuter et al. (2005), Yen (2007), Wang et al.(2007). Where need for interaction is rather self-explanatory, namely the extent to which a subject desires to have some form of personal contact during a service encounter, the reach of perceived risk is less clear. Perceived risk can be defined as "the probability of certain outcomes given a behavior, and the danger and the severity of negative consequences from engaging in those behaviors" (Cunningham, 1967 in Curran and Meuter, 2005, pp. 105). Curran and Meuter (2005, pp. 105) clarify that perceived risk has been discussed in the past under other terminology like "reliability (Dabholkar, 1996), accuracy and recovery (Meuter & Bitner, 1998)". As there is no real risk (financial or non-financial) involved in self-scanning, risk will be determined by reliability, accuracy and recovery in this research. Different authors have made a distinction between risk and technology anxiety. For this reason the direct effect of technology anxiety on intention to use self-scanning will also be measured. The following hypotheses will also be analyzed:

-$H3_e$: A customer's attitude towards self-scanning is negatively influenced by his need for interaction.

-$H3_f$: A customer's attitude towards self-scanning is negatively influenced by perception of risk involved.

-$H1_f$: A customer's behavioral intention to use self-scanning will be negatively influenced by the technology anxiety

Several researchers studied the importance of enjoyment in the formation of attitudes. As early as 1992, Davis, Bagozzi and Warshaw illustrated that in order to get people to use computer technology, producers should make sure the technology is perceived as enjoyable to use. In other words, they found evidence for a link between enjoyment and attitudes towards computer technology.

Accordingly Dabholkar (1996) found strong evidence that enjoyment was a strong attribute towards the formation of an intention. More recent research by Curran and Meuter (2007) and Hilton and Hughes (2008) had the same conclusions about the attribute. For this reason, the conceptual model would not be complete without the incorporation of enjoyment.

- $H3_g$: A customer's attitude towards self-scanning is positively influenced by the level of enjoyment he derives from using the technology.

Concerning this determinant Xie et al (2008) also mention that past behavior can influence the enjoyment of consumers in a positive way as they will not get bored due to the abundance of co-production possibilities. Therefore this will also be studied with following hypothesis:

-$H3_h$: The enjoyment a customer derives from using a technology is positively influenced by his past behavior concerning the usage of this technology.

Furthermore Sun and Zhang (2006) studied the relationship between enjoyment and perceived ease of use. They found evidence for an effect in both directions, however the "enjoyment -> perceived ease of use"-effect was proven to be stronger.

- $H3_i$: A customer's perception of the ease of use of a technology is of positively influenced by his level enjoyment.

Demographics are another topic that have been widely discussed. Hilton and Hughes (2008, pp.29) state that "everybody brings their own baggage to the service encounter which will impact their willingness and ability to engage with it and their perception of its effectiveness". The baggage to which Hilton and Hughes refer consists not only of past encounters, social environment, etc… but also to their demographics: their age, gender, education… Furthermore Jacob and Rettinger (2011) found how certain age-groups preferred human interaction over self-service technologies and other age-groups did the opposite. They indicate people open to self-service technologies to be younger and better educated and located in jobs with better salary prospects. Other research about the the influence of demographic factors proved inconclusive (Meuter et al., 2005). As previous research has shown mixed results, it might be interesting to observe how Attitude towards a Technology and the Intention to use this technology varies with different demographic factors.

Uniting all the theories mentioned above, the conceptual model that will be tested in this master's thesis will be the following:

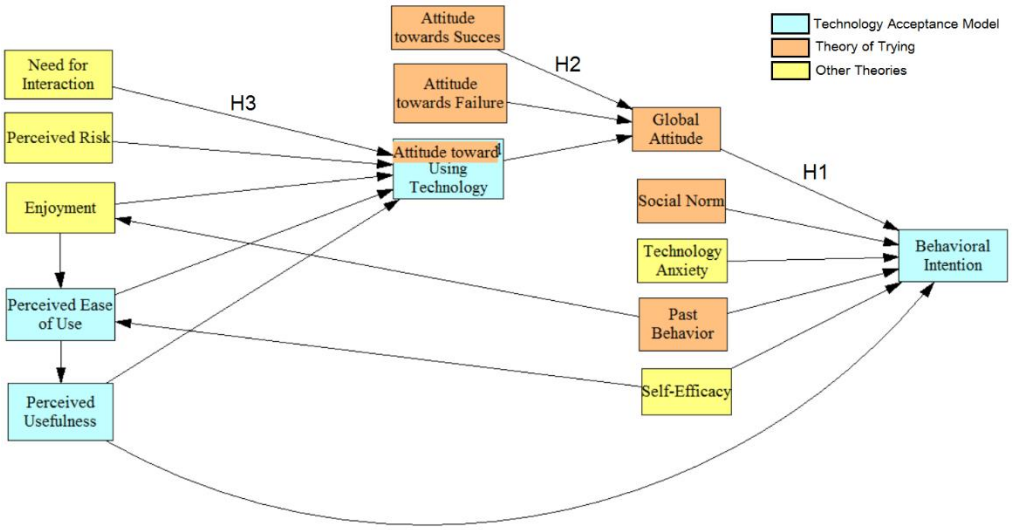


Figure 10: Conceptual model

3.3. Summary of hypotheses

The main purpose of this master's thesis is to examine which characteristics influence the likelihood of a subject trying out self-scanning. As can be derived from the conceptual model mentioned above and the concerning literature explained before, the main variables believed to affect this intention are global attitude, social norm, frequency of past trying self-efficacy and perceived risk/technology anxiety. Therefore following hypotheses will investigated:

- $H1_a$: A customer's behavioral intention to use self-scanning will be positively influenced by his global attitude toward self-scanning.
- $H1_b$: A customer's behavioral intention to use self-scanning will be positively influenced by his social norm.
- $H1_c$: A customer's behavioral intention to use self-scanning will be positively influenced by its perceived usefulness.
- $H1_d$: A customer's behavioral intention to use self-scanning will be positively influenced by his past behavior.
- $H1_e$: A customer's behavioral intention to use self-scanning will be positively influenced by the customer's perceived self-efficacy.
- $H1_f$: A customer's behavioral intention to use self-scanning will be negatively influenced by the technology anxiety.

According to the theory of trying, a customer's global attitude will be determined by a customer's attitude towards the process/technology and his attitude towards failing & succeeding, there for a second line of hypotheses will be examined:

- $H2_a$: A customer's global attitude toward a given technology will be positively influenced by his attitude towards succeeding.
- $H2_b$: A customer's global attitude toward a given technology will be negatively influenced by his attitude towards failing.

- $H2_c$: A customer's global attitude toward a given technology will be positively influenced by his attitude towards the technology in itself.

As a customers' attitude towards a technology is hard to inquire, for example because the customer doesn't know what his attitude is or can't explain it very well, the construct will be divided in several elements. The customer's opinion about perceived usefulness and ease of use will be inquired just like their level of enjoyment when using self-scanning, their need for interaction and the risk they think the technology brings along. Molded into some final hypotheses this makes:

- $H3_a$: A customer's attitude towards self-scanning is positively influenced by its perceived usefulness.
- $H3_b$: A customer's attitude towards self-scanning is positively influenced by its perceived ease of use.
- $H3_c$: A technology's perceived usefulness is positively influenced by its perceived ease of use.
- $H3_d$: A customer's perception of the ease of use of a technology is positively influenced by his perceived self-efficacy.
- $H3_e$: A customer's attitude towards self-scanning is negatively influenced by his need for interaction.
- $H3_f$: A customer's attitude towards self-scanning is negatively influenced by perception of risk involved.
- $H3_g$: A customer's attitude towards self-scanning is positively influenced by the level of enjoyment he derives from using the technology.
- $H3_h$: The enjoyment a customer derives from using a technology is positively influenced by his past behavior concerning the usage of this technology.
- $H3_i$: A customer's perception of the ease of use of a technology is positively influenced by his level enjoyment.

4. EMPIRICAL STUDY

4.1. Self-scanning in Belgium anno 2014

As mentioned before, self-scanning is a relatively new technology in Belgium. Despite its introduction in Q4 2008 only now, 6 years later, retailers are starting to offer the service on a national scale. The two biggest providers of self-scanning technologies in Belgian food retailing are Carrefour and Delhaize. Market leader Colruyt is not (yet) offering the solution, as it believes its check-out system is already more efficient than traditional check-out methods.

Check-out systems Delhaize

Type	Frequency	Percentage
Traditional	138	100%
Self-Scan	92	67%
Quick-Scan	97	70%
Other	137	99%

Table 2: Check-out systems Delhaize

In Belgium Delhaize owns 138 stores (excl. the ±220 franchisees, AD Delhaize) all of them have traditional check-outs (100% in Table 2). 92 of these stores (or 67%) also offer self-scanning as a service of their customers.

Most franchisees don't offer the technology as the €40.000 + €10.000 x paytower initial investment is deemed too high for them.

The other two check-out methods, "Quick-Scan" and "Others" have been comprised to be complete and can be used as a guidance. Quick-scan is a traditional check-out method for people with only a few groceries, others comprises a range of service offerings, like for example E-shopping, which account for just a very small portion of total sales.

Table 3 illustrates that in total 63 percent of the customers checking out at these 138 supermarkets do so via the traditional check-out system. 15 percent of them check-out using self-scanning. This relatively small percentage however, translates in up to 30 percent of the customers using the technology if it is available. Both the numbers of traditional and self-scan check-out relate to customers checking out with the "Plus" fidelity card, which corresponds to about 80% of total check-outs. This is important because self-scanning can only be done using a fidelity card.

Weekly sales average Delhaize

SalesType (%Store who offer)	NumberCustomers (U)	NumberItems (U)	NumberSales (€)
Traditional (100%)	482,068	12,384,870	29,920,910
% of total	63%	68%	68%
Self-Scan (67%)	110,534	3,527,950	8,963,875.9
% of total	15%	19%	20%
Quick-Scan (70%)	135,453	1,627,824	3,712,449.9
% of total	18%	9%	8%
Other (99%)	33,254	723,016	1'520'371.9
% of total	4%	4%	3%
Total	761,309	18,263,660	44,117,607

Table 3: Weekly sales per check-out method

The table above shows the number of customers, the number of units they buy and the total sales Delhaize Belgium generates with each technology. While these totals might be useful, much more information can be derived from the percentages. These percentages represent the numbers per category divided over the totals.

In line with previous research on self-scanning (Collier and Kimes, 2012), self-scanning consumers at Delhaize seem to be far more profitable as their traditional counterparts. An average self-scan consumer buys 32 units for a total of 81.10 euro's. The average consumer checking-out via the traditional check-out channel only buys 26 units for a total of 62.07 euro's (numbers calculated by dividing NumberItems and NumberSales by NumberCustomers).

The same applies for Carrefour. Being the bigger retailer they achieve about 200.000 sales a week through self-scanning. This translates in about 20% of the customers checking-out using self-scanning.

These 20% of transactions account for 25% of the total revenues and over 30% of the articles sold. Without complex mathematics, it is clear that customers using self-scanning spend more money per purchase. Just like Delhaize, Carrefour thus notices that self-scanning customers are more profitable or like their Business Solutions IT manager formulates it: "We could say the self-scan customer is the "better" customer".

Self-scanning is gaining ground in Belgium and retailers acknowledge the system to be beneficial. While the technology is becoming more and more readily available, it is still in development and mistakes still occur as illustrated in tv-show VOLT[13]. It is safe to assume the technology will be further developed in the future. In order to enlighten future readers about the current day technology, there will be a short guide on the next page.

Figure 12: Delhaize's Datalogic Joya X2

Figure 11: Carrefour's Motorola MC17

[13] VOLT Undercover : Carrefour selfSCAN http://deredactie.be/cm/vrtnieuws/videozone/archief/programmas/volt/2.18635/2.18636/1.1151575

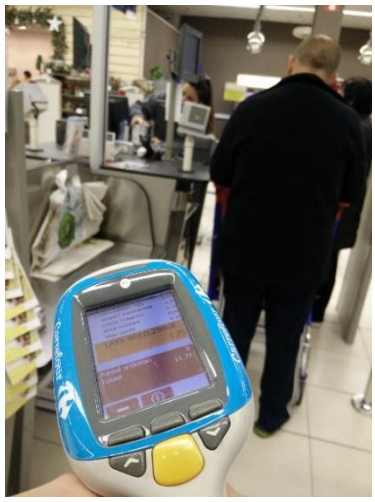
Delhaize		Carrefour
	**1.** The first step is equal in both stores. By scanning your fidelity card you get access to a personal scanner. A light on the scanner will indicate which scanner you have to take from the wall. The technology Delhaize uses seems to work more quickly. At Carrefour you have to wait a moment before the light appears.	
	**2.** The technology in itself is pretty straight forward. You take a product from the shelf and before putting in in your cart, you are personally responsible for scanning the barcode. The name and price will then appear on the display, as well as a subtotal. If you don't want the product you simple scan it again with the minus button. While the scanners at Carrefour seem to have better ergonomics, the Delhaize scanners feel more intuitive in use as they have "+" & "-" signs.	
	**3.** Check-out is the main difference. Delhaize makes use of payment towers which require the customer to check-out personally. Carrefour has an employee at every check-out and therefore queues can arise. Once in a while a random control will be performed with both retailers. Overall the Delhaize check-out method is preferred as it ensures quick check-outs and requires fewer employees, however for people with little technical background the Carrefour check-out might be the better option.	

Table 4: Delhaize - Carrefour self-scan procedure

4.2. Research Method

The primary objective for this research is to test whether self-service technology based options have enough appeal to convince customers to switch to a modern way of shopping. The aim is to provide businesses, retailers in particular, with a deeper knowledge of what could motivate Flemish customers to use self-scanning as their daily check-out method. Second, the existence of certain self-scanning-adoption profiles will be examined.

In order to get an answer to these questions, a survey is targeted at the customers of a supermarket. This enables the answers to be as genuine as possible. The supermarket in question has to offer both the traditional check-out system and a self-scanning system, because this would mean some respondents have used self-scanning in the past and some of them haven't. Ethical considerations require the investigation to be done in mutual consent with shop owners. As self-scanning is a relatively new technology for Belgian retailers, the choice is limited. Luckily the manager of a nearby Delhaize supermarketwas prepared to collaborate for this master thesis.

While a field study might take up more time than an online survey it ensures that different kinds of people complete the questionnaire. Furthermore there will always be someone around to explain a question if a participant doesn't get it immediately. Furthermore, as the questionnaire is rather long, the chance of winning some cinema-tickets will hopefully persuade customers to participate. Ultimately a goal of 150-200 participants is pinned, this should provide enough quantitative data to draw some useful conclusions about self-scanning.

4.2.1. Questionnaire Development

The survey that can be found in Appendix 2 is established by comparing different validated measurement scales from previous research and selecting the scales that seem most appropriate for the purpose of inquiring on intentions to use self-scanning. To avoid a long questionnaire that could possibly scare people away, priority is given to short scales. Ultimately mostly scales validated by Bagozzi and Warshaw (1990), Dabholkar (1996), Curran and Meuter (2005, 2007), Meuter, Bitner, Ostrom & Brown (2005) and Xie et al. (2008) were used. As most of this literature is/was considered cutting edge (at the time), the scales have been validated and proven reliable multiple times afterwards by researchers using them as the foundation for their work. The complete list of items and their origin is listed on the next two pages. The asterisks illustrate questions from which the answers will have to be recoded later on.

As the aim of this thesis is to get a broader knowledge on the formation of intentions with both adopters and non-adopters of self-scan technology, items are formulated in a way that they can be answered by both these groups. Where adopters will find the questions to relate to their actual usage, non-adopters are asked about how they would feel if they would use the technology. The use of concepts involving perceptions (instead of experiences) has proven to be helpful in these cases.

Furthermore some additional questions are asked to get a general idea about the profile of respondents. As they are not the main purpose of the survey they are positioned at the beginning of the questionnaire as an entrance for respondents to get into the questionnaire.

Most questions can be answered by the help of a 7-point Likert scale. The Likert scale is a very popular bipolar scaling method that measures the level of agreement by giving the respondent the choice between multiple (in this survey 7) gradations between strongly disagree and strongly agree. The use of a 7-point Likert scale has a slight benefit over the typical 5-point Likert scale as it gives the respondent the opportunity to elaborate on their answer a bit more. On the other hand, research has proven 5 or 7-point Likert scales to be slightly more effective at capturing means than their 10-point counterparts (Dawes, 2008).

The questions concerning attitudes and enjoyment are measured using a semantic differential. This scale enables the respondent to express his favour between two opposites. Also with this scale a 7-point approach was chosen as this would enhance the consistency of the questionnaire.

To keep an overview, the questions are listed below in English. As the survey will be held in a supermarket in Hasselt, a city in the Flemish part of Belgium, the actual questionnaire will have to be constituted in Dutch, this version can be found in Appendix 2.

Construct	Items	
Demographics	Age	
	Gender	
	Education	
Past Behavior (adapted from Ajzen, 2006)	PastBeh	When I go grocery shopping, I use self-scanning about … % of the time.
Attitude towards Failure (Xie et al, 2008)	AttFail1	My trying but failing to use self-scanning would make me feel: Pleasant-unpleasant.
	AttFail2	My trying but failing to use self-scanning would make me feel: Enjoyable-disgusted.
Attitude towards Succes (Xie et al, 2008)	AttSucces1*	My trying and succeeding to use self-scanning would make me feel: Pleasant-unpleasant.
	AttSucces2*	My trying and succeeding to use self-scanning would make me feel: Enjoyable-disgusting.
Perceived Usefulness (Curran & Meuter, 2007):	PU1	Self-scanning is cheaper than a normal check-out.
	PU2	Self-scanning is faster than the normal check-out.
	PU3	Self-scanning makes shopping easier.
Perceived Ease of Use (Dabholkar, 1996)	PEoU1*	Self-scanning is complicated.
	PEoU2*	Self-scanning is confusing.
	PEoU3*	Self-scanning takes effort.
	PEoU4*	Self-scanning requires work.
Need for Interaction (Dabholkar, 1996; Meuter, Bitner, Ostrom & Brown, 2005)	Inter1	I like interacting with the person who provides the service.
	Inter2	Personal attention by the service employee is not very important to me.
	Inter3	It bothers me to use a machine when I could talk to a person instead.
Perceived Risk (Curran & Meuter, 2005)	Risk1*	I feel safe conducting my shopping through the use of self-scanning.
	Risk2*	I know self-scanning will handle my transaction correctly.
	Risk3*	There is little danger that anything will go wrong when I use self-scanning.
Social Norm (Curran & Meuter, 2007)	Social1	My friends or family think I should use self-scanning.
	Social2	Self-scanning makes me look good to others.
	Social3	Self-scanning makes other people think better of me.

Construct	Items	
Technology Anxiety (Meuter, Bitner, Ostrom & Brown, 2005)	TA1	I feel apprehensive about using technology.
	TA2	Technical terms sound like confusing jargon to me.
	TA3	I have avoided technology because it is unfamiliar to me.
	TA4	I hesitate to use most forms of technology for fear of making mistakes I can't correct.
Self-Efficacy (Xie et al, 2008)	SelfEffic1	I feel capable of using self-scanning.
	SelfEffic2	I know what to do when self-scanning.
	SelfEffic3	I think that I am good in self-scanning.
	SelfEffic4	I feel that I possess the necessary skills to use self-scanning.
Behavioral intention (Bagozzi & Warshaw, 1990)	Intention	I presently intend to use self-scanning next time I go shopping.
Enjoyment (Dabholkar, 1996)	Fun1	I find using self-scanning to be/not to be enjoyable.
	Fun2	I find using self-scanning to be/not to be fun.
	Fun3	I find using self-scanning to be/not to be entertaining.
	Fun4	I find using self-scanning to be/not to be interesting.
Attitude toward the Technology (Xie et al, 2008)	AttTech1	How would you describe your feelings toward using self-scanning, no matter the outcome: pleasant – unpleasant.
	AttTech2	How would you describe your feelings toward using self-scanning, no matter the outcome: satisfying – unsatisfying.
	AttTech3*	How would you describe your feelings toward using self-scanning, no matter the outcome: disgusting – enjoyable.
Global Attitude (Simmons & ecker-Olsen, 2001)	Att1	I think self-scanning is: pleasant – unpleasant.
	Att2	I think self-scanning is: satisfying – unsatisfying.
	Att3*	I think self-scanning is: disgusting - enjoyable.

* Recoded

Table 5: Research items

Strongly disagree	Disagree	Somewhat Disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
1	2	3	4	5	6	7

Table 6: Item measurement scale

4.2.2. Data collection

a. Online

The survey in Appendix 2 was published online from November 5th till November 17th. Ultimately 55 respondents fully completed the survey. 31 (or 56,4%) of them were males and 24 (or 43,6%) of them females. Respondents range from 16 to 52 years old but as the survey was distributed on Facebook, most respondents were people my age. For this reason the average age of respondents is only 23. For the same reason the average education is 5,47 which translates in a college to university education.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age	55	16	52	22.91	6.530
Educ	55	3	6	5.47	.900
Past	55	0	100	17.64	26.705
Valid N	55				

Table 6: Descriptive statistics - Online sample

Not very surprisingly past behaviour ranges from 0 to 100% and on average respondents use self-scanning on 17,64% of their grocery shopping trips. Furthermore 18% of the respondents indicated to use self-scanning for more than half of their supermarket visits and only 4 respondents (7%) indicated to use self-scanning on a regular basis (more than 75% of the time). These numbers match the key figures given by Carrefour and Delhaize about the usage of self-scanning amongst their customers. This is not surprising as they are two of the biggest players on the Belgian food-retailing market, so most people will shop at one of these stores.

A reason for this low number of full time users can be found in the fact that self-scanning is not yet readily available in each and every supermarket. As a matter of fact only 2 supermarkets, Delhaize and Carrefour, offer their customers a choice between self-scanning and the more traditional check-out methods in about half their stores. Respondents who switch supermarkets or shop at other supermarkets full time will not frequently come in contact with self-scanning. This assumption is supported by the second sample of the survey.

Past behavior of respondents in internet-sample

	Frequency (between categories)	Percent (between categories)	Cumulative Percent
<25% of the time	43	78.2	78.2
<50% of the time	2	3.6	81.8
<75% of the time	6	10.9	92.7
≥75% of the time	4	7.3	100
Total	55		

Table 7: SST-usage – Online sample

b. In-Store

In addition to the 55 online respondents, 190 respondents successfully completed the questionnaire at Delhaize Hasselt on Friday the 14th and Saturday the 15th November 2014.

103 (or 54,2%) of them were females, only 87 (or 45,8%) of them were males. This slight difference could be explained as grocery shopping still being a slightly more feminine activity. The Delhaize respondents have an average education of 4,9 which means the average respond has a college degree. The age of Delhaize respondents ranges between 22 and 84, with an average of 50 years. This result is not very surprising as Delhaize targets a slightly older clientele which appreciate a more comfortable shopping environment (music, well decorated, broad assortment) and are willing to pay a small premium for this kind of service. Overall the respondents are normally distributed around this average age.

Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation
Age	181	22	84	49.70	14.537
Educ	190	1	7	4.90	1.291
Past	190	0	100	52.32	45.625
Valid N	181				

Table 8: Descriptive statistics - In-Store sample

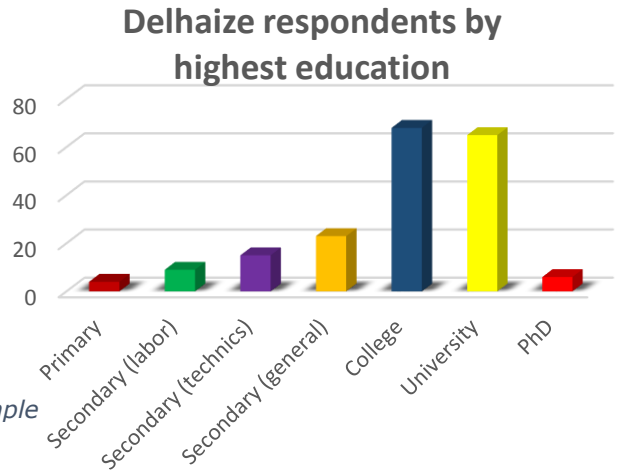


Figure 13: Distribution by education - In-Store sample

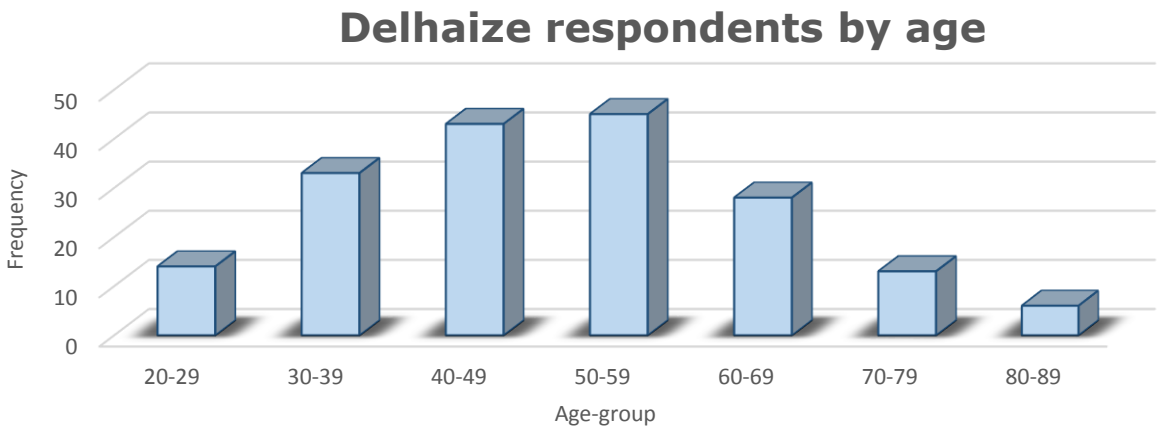


Figure 14: Distribution by age - In-Store sample

The biggest difference between the Delhaize respondents and the online respondents is their past behavior. As mentioned before, only a few stores offer self-scanning. It was key for this research to find a store not only willing to contribute to this master's thesis by giving permission to ask their customers to fill in the questionnaire, but also one that offered both self-scanning as more traditional systems as a check-out method. The store used in this survey, the Delhaize in Hasselt, fits both these criteria. This means each and every respondent taking the questionnaire in this store has come in contact with self-scanning and freely chose whether or not he or she would engage with it.

On average, self-scanning is used 52,32% of the Delhaize customers' grocery shopping trips. This is a big contrast with the 17,64% online respondents mentioned. Clearly a lot of customers are drawn towards self-scanning, if the technology is available. This is a first indicator that the implementation of the technology in supermarkets could be beneficial. It doesn't stop there, no less than 34% of the respondents indicated to use self-scanning every time they visit a supermarket. Actually the respondents are mainly divided between non-users and full-time users, which can be seen in figure 15.

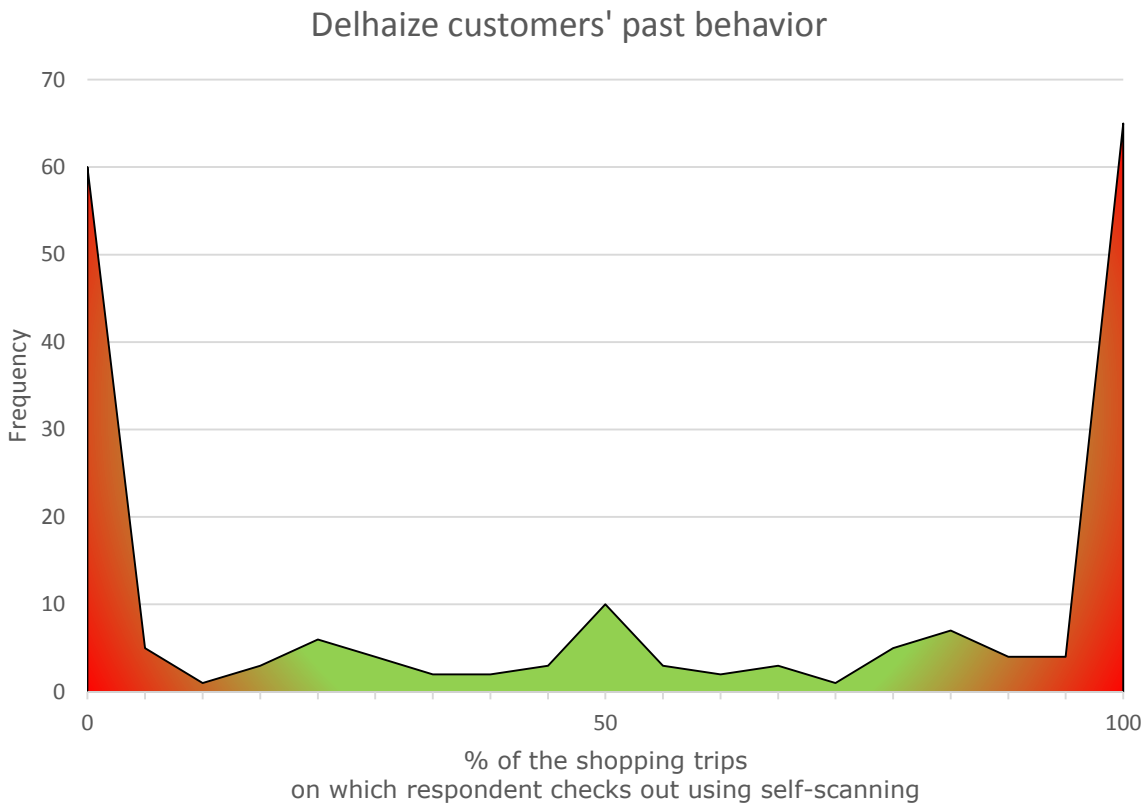


Figure 15: Past Usage of self-scanning

As the respondents from the Delhaize sample are so different from the ones in the internet sample, it would not be a good idea to merge both samples into one big sample to draw conclusions. For this reason, the decision was made to only work with the respondents from the Delhaize sample. This sample on its own is large enough to enable significant conclusions to be drawn from it.

This will however affect the generalizability from the study, as the results will mainly relate to customers that come into contact with self-scanning regularly. This might not be a bad focus point because if a store would start offering the service, the customer will frequently come into contact with the technology and attitudes are likely to quickly resemble those of the respondents in this sample.

The internet sample is not totally useless as it gives a clear indicator that when customers come in contact with the technology, their attitudes towards it will start to change.

5. RESULTS

As the goal of the survey is to test whether the hypotheses mentioned before hold for the case of self-scanning, quantitative methods will be used to analyse the data. The conceptual model brought forward in this thesis consists of multiple constructs where, depending on the relation that is tested, latent variables can be both dependent and independent. Therefore analyses will require structural equation modelling (SEM) techniques. Second generation data analyse techniques, such as PLS, LISREL, AMOS & CALIS, can model the relationship between multiple dependent and independent variables simultaneously, hereby reducing the error caused when multiple regressions are combined (Gefen, Straub & Boudreau, 2000). For this reason they have become the most important method of empirical research (Reinartz, Haenlein, & Henseler, 2009). Partial Least Squares Structural Equations Modeling or PLS-SEM, is a variance based method and tends to be preferred when sample sizes are rather small (under 250 observations). It is therefore better suited for this master's thesis.

PLS tries to interrelate different constructs. These constructs are variables that cannot be observed directly (i.e. latent variables) and therefore need to be predicted by the use of underlying indicators (e.g. Intelligence (construct) is measured by math-skills and language-skills (indicators)). There should however be a clear distinction between two different kinds of constructs: reflective and formative constructs (Diamantopoulos & Siguaw, 2006; Freeze & Raschke, 2007).

- Reflective constructs are the most common kind. In the case of reflective constructs, questionnaire items are caused by the construct and are therefore forced to be changed when the construct is modified. Indicators in reflective constructs are mutually interchangeable, have high correlations (because they share a common theme) and therefore are likely to share the same factor.

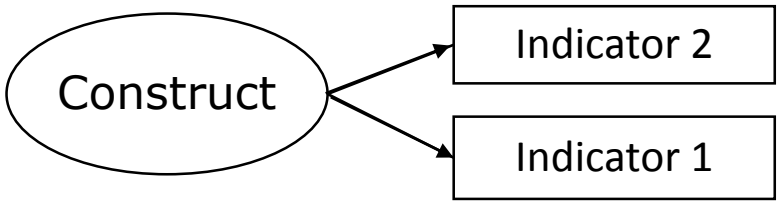


Figure 16: Reflective construct

- Formative constructs work the other way around. The indicators influence the construct, if the indicators are changed, so is the construct (but not vice versa). In this case the construct is often referred to as a combination variable because it combines several antecedents in one variable. High correlation between the items is not required.

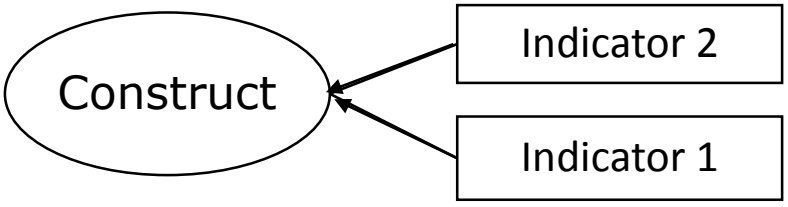


Figure 17: Formative construct

The model tested in this master's thesis contains mostly reflective measures. Perceived ease of use, enjoyment, need for interaction, perceived risk, attitude towards success and failure, attitude towards technology, global attitude, social norm, past behaviour, self-efficacy and technology anxiety are all reflective constructs in this model. Questionnaire items refer to the same antecedent and should be answered in a similar way. Therefore we expect the items in these construct to have high correlations.

Perceived usefulness on the other hand is a formative construct. Multiple aspects of usefulness are reviewed: economic benefits, time-related benefits and overall benefit.

With SEM, two different but interrelated models are analysed. First there is a measurement model that relates the observed variables (yellow) to the constructs (blue), this part of the model can be reflective or formative. Secondly there is the structural model which relates the different constructs to each other. Based on an investigation of these structural relationships we can assess whether or not the hypotheses formulated before will hold.

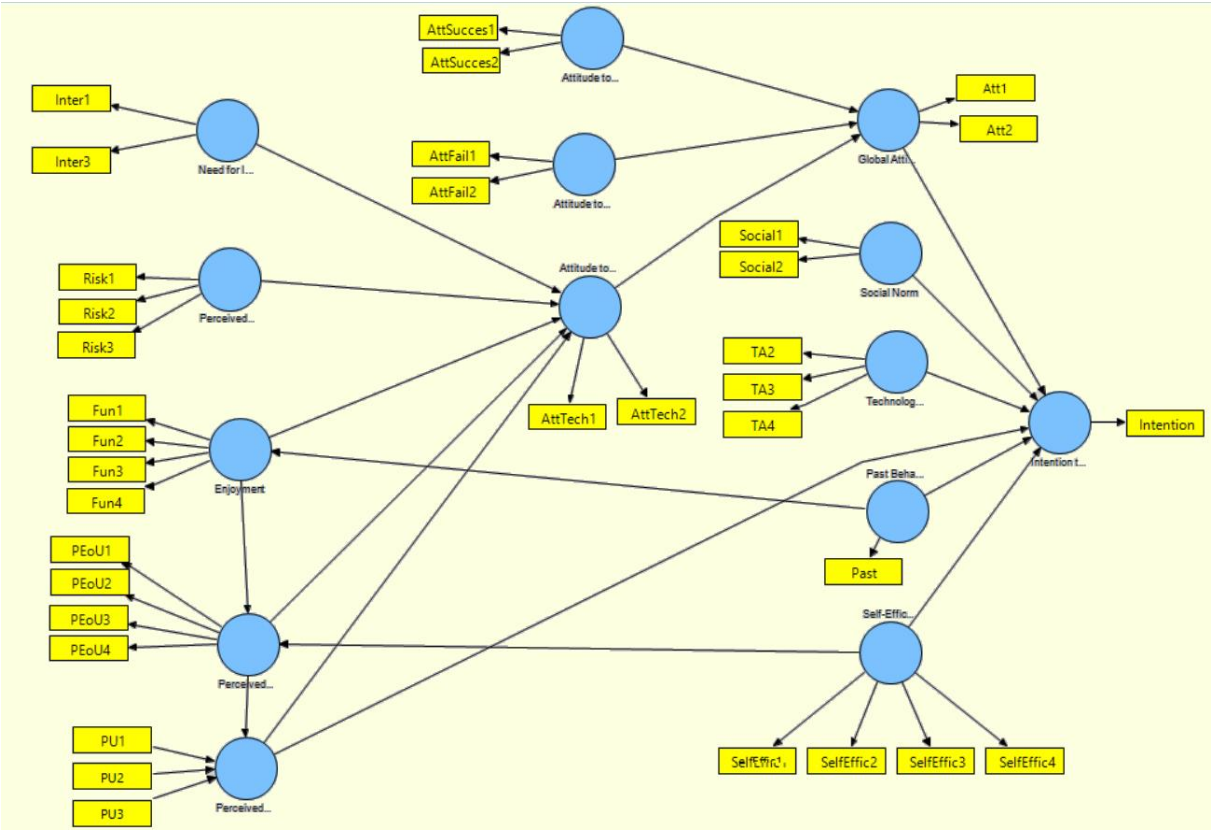


Figure 18: Conceptual model including items

5.1. Measurement Model

For the analyses of the measurement and structural model, this master's thesis will make a distinction between the reflective and formative constructs as proposed by Jarvis, Mackenzie and Podsakoff (2003). Underlying schematics will be followed:

Reflective construct		**Formative construct**
Unidimensionality test (SPSS)		
Reliability Test	Composite reliability	
	Cronbachs alpha	
Validity	Item validity (Item loadings)	Item validity (Item weights)
	Within-method convergent validity	
	Discriminant validity	Discriminant validity (CI)

Table 9: Order of testing

5.1.1. Unidimensionality Test

Before analyzing the data in SmartPLS, a unidimensionality test is performed in SPSS. In a unidimensionality test all the items of a certain construct are crunched in a factor analysis. The goal is to make sure that all items can be reduced to one and the same factor, this factor would then be the construct corresponding to the items (Anderson, Gerbing, & Hunter, 1987). To divide the items into factors the Kaiser criterion is used. The Kaiser criterion implies that every factor with an eigenvalue greater than one is accepted. Why? Factors with an eigenvalue above 1 will account for more variability than the underlying items do individually.

For the unidimensionality test this would mean that the result would be a first eigenvalue greater than one (1st factor significant) and a second eigenvalue below one (2nd factor not significant). If these criteria are met, unidimensionality can be assumed.

This calculation can be done with statistics software SPSS. In addition to the total variance explained output, SPSS will always show a component matrix (Appendix 3). This matrix explains how well the items correlate with the factor that is computed. While there are no real criteria for this correlation we want the items to have a correlation as high as possible. In any case all items from reflective constructs with a R^2 lower than 0.5 will not be integrated in the SmartPLS model because they explain less variance in the construct than the error does.

	First EigenValue	Second Eigenvalue	%variance explained
Attitude towards Failure	1.84	0.16	91.98
Atitude towards Succes	1.87	0.13	93.52
Perceived Ease of Use	2.73	0.71	68.35
Need For Interaction	1.88	0.7	62.71
Perceived Risk	2.14	0.5	71.34
Social	1.77	0.88	58.83
Technology Anxiety	2.46	0.75	61.41
Self-Efficiency	2.98	0.47	74.59
Enjoyment	3.16	0.51	78.98
Attitude towards Technology	1.84	0.85	61.41
Global Attitude	1.85	0.87	61.77

Table 10: Unidimensionality test

As can be derived from table 10, all reflective items have a first eigenvalue above one and a second eigenvalue below one. This means that the items can be brought back to the construct they are supposed to. The percentage of variance explained indicates how much of the variance in the construct can be accounted for by the items it relies on. The remainder can only be explained by an error.

The items from the formative construct, perceived usefulness, should not be tested with a unidimensionality test. They are supposed to touch different aspects of the construct. Therefore they are very likely to fall into different factors.

5.1.2. Reliability Test

In a next step the reliability of the constructs is measured. With this test the consistency of results is tested. Reliability is "the extent to which scales are free of random error and so produce consistent results" (Schmidt & Hollensen, 2006, pp. 127). The more random errors occur in the data, the less reliable they will be. Systematic errors however do not decrease reliability, as they will consistently influence the data.

There are several criteria that can be used to measure this reliability. The most common measure is without any means the Cronbachs alpha (Peterson & Kim, 2013). Nunnally (1978) concluded that a Cronbachs alpha of 0.7 can be considered a reliable coefficient, Schmidt and Hollensen (2006) report a Cronbachs alpha above 0.6 to be reliable. It is important to know that the Cronbachs alpha assumes that each item is equally important for the model, this might sometimes be too simplistic (Vinzi, Trinchera, & Amato, 2010). Because the Cronbachs alpha could underestimate the reliability, Bagozzi and Yi (1988) urge to use the composite reliability instead. Constructs with a composite reliability above 0.70 are considered to be reliable and consistent. For this reason this study will provide both criteria, but only the composite reliability will be taken into account for the assessment of the reliability.

	Cronbachs Alpha	Composite Reliability
Attitude towards Failure	0,91	0,96
Attitude towards Succes	0,93	0,97
Attitude towards Technology	0,67	0,81
Enjoyment	0,91	0,94
Global Attitude	0,84	0,93
Intention to Use	1,00	1,00
Need for Interaction	0,70	0,79
Past Behavior	1,00	1,00
Perceived Ease of Use	0,89	0,92
Perceived Risk	0,80	0,88
Self-Efficacy	0,89	0,92
Social Norm	0,63	0,77
Technology Anxiety	0,78	0,86

Table 11: Reliability

As can be derived from the table above, the Cronbachs alpha criterion of 0.7 is not met on two occasions. This was to be expected for attitude towards technology and for the social norm as both constructs consist of one item that had a very low correlation-coefficient. This could mean that respondents did not understand that question very well and interpreted it differently. Under the 0.6 criterion, they do however pass the test. Also under the composite reliability criterion all constructs prove to be reliable.

5.1.3. Validity Test

The next step is to test whether the questionnaire items are valid. A validity test measures whether the different items of a construct accurately measure what they are supposed to measure (Schmidt & Hollensen, 2006). This is a crucial step, as it will determine whether or not any meaning can be drawn from the results.

In an ideal world, perfect validity would mean that the measurement is free of any error, this however is close to impossible to achieve.

Information about the whole population should be used for the correct assessment of validity tests. This ensures that the items will correctly represent the opinion of all people in the population.

It is however impossible to question each and every person from this population as it would take too much time and cost too much money. For this reason generally samples will be taken from the population and the answers from those respondents are assumed to represent the answers of the

whole population. This is where error arises, as samples are always too small to correctly represent the population (in the case of this master's thesis 190 respondents to represent the millions of shoppers in Belgium alone).

For this reason a technique called bootstrapping is used. Essentially a *bootstrap* uses probability scores and indicator measurements from the sample (here 190 respondents) and uses this information to simulate a desired number of sample means (here 5000). At this point, a confidence interval can be used to assess the population and to determine whether or not the calculated results is significant.

The following picture clearly explains how validity and reliability, which we analyzed before, go hand in hand. When measurement items are reliable, this does not necessarily mean that they are reliable. Both criteria should be met before any interpretation of results is meaningful.

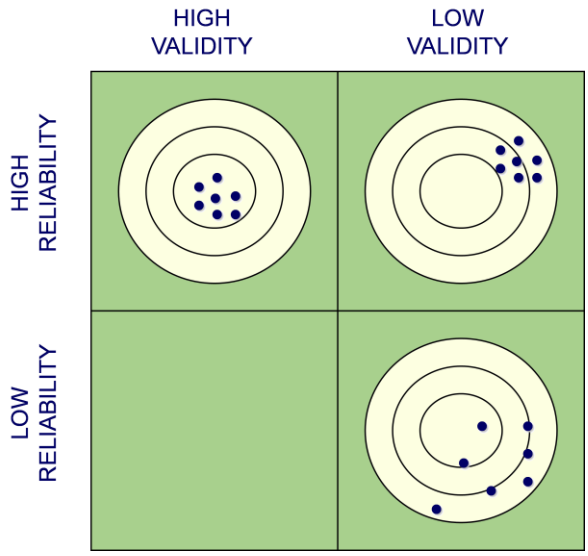


Figure 19: Reliability - Validity interaction

There are multiple kinds of validity: content, item, within-method, discriminant and so on.

Content validity cannot be measured by any kind of test as it is a subjective evaluation of how well certain scales measure the construct (Schmidt & Hollensen, 2006).

a. Item Validity

An item validity test describes how well each indicator represents the construct it is based upon. To test the item validity of reflective constructs, first the outer loadings of each item are reviewed. Outer loadings should be greater than 0.5 and ultimately above 0.7. The 0.7 criterion is used because as of that number the variance between a construct and its related items is greater than the error of the variance ($=\sqrt{0.50}$) (Henseler, Ringle, & Sinkovics, 2009). Next the significance of each item loading should be checked. This is done by calculating a 95% confidence interval for the item loading, if this confidence interval contains zero, the outer loading is not significant, if not it is significant.

	Item Loading	CI_{95}
Att1 <- Global Attitude	0.9408	[0.93;0.96]
Att2 <- Global Attitude	0.9154	[0.87;0.95]
AttFail1 <- Attitude towards Failure	0.9569	[0.91;0.98]
AttFail2 <- Attitude towards Failure	0.9612	[0.93;0.98]
AttSucces1 <- Attitude towards Succes	0.9658	[0.93;0.98]
AttSucces2 <- Attitude towards Succes	0.9686	[0.94;0.99]
AttTech1 <- Attitude towards Technology	0.9163	[0.89;0.94]
AttTech2 <- Attitude towards Technology	0.9029	[0.86;0.93]
AttTech3Rec <- Attitude towards Technology	0.4063	[0.15;0.61]
Fun1 <- Enjoyment	0.8747	[0.84;0.91]
Fun2 <- Enjoyment	0.9346	[0.91;0.95]
Fun3 <- Enjoyment	0.8416	[0.76;0.89]
Fun4 <- Enjoyment	0.8895	[0.84;0.93]
Intention <- Intention to Use	1	[1;1]
Inter1 <- Need for Interaction	0.7469	[0.52;0.84]
Inter2 <- Need for Interaction	0.5362	[0.22;0.71]
Inter3 <- Need for Interaction	0.9295	[0.87;0.99]

	Item Loading	CI_{95}
PEoU1 <- Perceived Ease of Use	0.7977	[0.68;0.88]
PEoU2 <- Perceived Ease of Use	0.8265	[0.72;0.90]
PEoU3 <- Perceived Ease of Use	0.9041	[0.84;0.95]
PEoU4 <- Perceived Ease of Use	0.919	[0.88;0.95]
Past <- Past Behavior	1	[1;1]
Risk1 <- Perceived Risk	0.8582	[0.77;0.91]
Risk2 <- Perceived Risk	0.7928	[0.67;0.87]
Risk3 <- Perceived Risk	0.871	[0.82;0.91]
SelfEffic1 <- Self-Efficacy	0.7767	[0.66;0.86]
SelfEffic2 <- Self-Efficacy	0.8716	[0.83;0.91]
SelfEffic3 <- Self-Efficacy	0.9071	[0.87;0.94]
SelfEffic4 <- Self-Efficacy	0.8915	[0.83;0.94]
Social1 <- Social Norm	0.8319	[0.60;0.98]
Social2 <- Social Norm	0.7387	[0.40;0.87]
Social3 <- Social Norm	0.5925	[0.15;0.79]
TA1 <- Technology Anxiety	0.671	[0.48;0.80]
TA2 <- Technology Anxiety	0.7872	[0.67;0.87]
TA3 <- Technology Anxiety	0.8357	[0.73;0.90]
TA4 <- Technology Anxiety	0.8236	[0.71;0.90]

Table 12: Item validity - Reflective constructs

As Table 13 shows, most items prove to be valid, only AttTech3Rec scores below the lower bound 0.5 criterion, this was to be expected as this was one of the two scales on which a lot of people made the mistake of not noticing the inverse scaling. As to ensure maximum validity of our analysis however, Inter2, Social3 and TA1, which fail to meet the 0.7 criterion, will also be omitted.

The item validity for formative constructs is checked somewhat differently. As the items from formative constructs are not supposed to correlate, item loadings are not to be compared, it is important however that the item weights are significant. For this reason we want to make sure the item weights are significant on a alpha=0.05 significance level. For this reason we construct a 95% confidence interval which is not supposed to comprise zero (Henseler, Ringle & Sinkovics, 2009).

	CI_{95}
PU1 -> Perceived Usefulness	[-0.11;0.18]
PU2 -> Perceived Usefulness	[-0.09;0.40]
PU3 -> Perceived Usefulness	[0.70;1.04]

Table 13: Item validity - Formative construct

PU1 and PU2 fail the validity test, this would mean that in future research better questions should be sought to explain perceived usefulness. As this is a formative construct deleting the items would drastically change the meaning of the construct. For this reason we can't simply omit them.

b. Within-method convergent validity

Also the within-method convergent validity is checked. This validity proves that the corresponding indicators represent the same construct well. The convergent validity is measured through the average variance extracted (AVE), which is the amount of variance in the construct captured by the underlying items instead of by the measurement error (ε) (Farrel, 2009), and should be at least 0.5. Constructs with an AVE above this criterion are said to explain more than half the variance of their own indicators (Götz, Liehr-Gobbers, & Krafft, 2009 in Henseler, Ringle, & Sinkovics, 2009). Each construct succeeds in this test, therefore we can conclude that at least 50% of each construct is explained by its items.

	AVE		AVE
Attitude towards Failure	0.92	Past Behavior	1.00
Attitude towards Succes	0.94	Perceived Ease of Use	0.75
Attitude towards Technology	0.61	Perceived Risk	0.71
Enjoyment	0.78	Self-Efficacy	0.75
Global Attitude	0.86	Social Norm	0.53
Intention to Use	1.00	Technology Anxiety	0.61
Need for Interaction	0.57		

Table 14: Convergent validity

c. Discriminant validity

The last type of validity that will be tested in this masters' thesis is the discriminant validity. Discriminant validity tries to prove that there is no correlation between two items measuring different concepts (Schmidt & Hollensen, 2006). Because of this, the measurement of discriminant validity is different for reflective and formative constructs.

For reflective constructs Fornell and Larcker (1981) determined that each construct should share more variance with his own indicators than with other constructs. The Fornell-Larcker criterion thus cites that the AVE of each construct should be higher than its squared correlation with other constructs, in simpler terms: AVE > [Cor(construct-otherconstruct)]². These results can be found on the next page under table 17.

The Fornell-Larcker criterion is met for every construct except for Perceived Usefulness. This construct however is formative and should therefore be tested in another way. For formative constructs the rule is to construct a confidence interval with the latent variable correlation plus/minus 2 times its standard error. If this confidence interval contains the value 1, there is no discriminant validity.

	AttFail	Att Succes	Att Tech	Fun	Global Att	Intention to Use	Inter	Past Behavior	Ease of Use	Risk
R^2-2SE	-0.51	0.16	0.57	0.50	0.54	0.49	-0.59	0.46	0.35	-0.58
R^2+2SE	-0.74	0.13	0.68	0.53	0.65	0.53	-0.97	0.61	0.44	-0.46

Table 15: Discriminant validity - Formative construct

	Attitude towards Failure	Attitude towards Succes	Attitude towards Technology	Enjoyment	Global Attitude	Intention to Use	Need for Interaction	Past Behavior	Perceived Ease of Use	Perceived Risk	Perceived Usefulness	Self-Efficacy	Social Norm	TA
Attitude towards Failure	**0.92**	0.01	0.12	0.05	0.08	0.09	0.05	0.05	0.05	0.07	0.13	0.07	0.03	0.02
Attitude towards Succes	-0.09	**0.94**	0.19	0.17	0.17	0.14	0.08	0.11	0.14	0.03	0.08	0.09	0.06	0.03
Attitude towards Technology	-0.34	0.43	**0.61**	0.56	0.71	0.46	0.26	0.39	0.24	0.22	0.44	0.28	0.09	0.12
Enjoyment	-0.22	0.41	0.75	**0.78**	0.57	0.45	0.22	0.44	0.19	0.22	0.35	0.21	0.06	0.12
Global Attitude	-0.28	0.41	0.84	0.76	**0.86**	0.53	0.26	0.45	0.16	0.19	0.38	0.29	0.11	0.14
Intention to Use	-0.3	0.38	0.68	0.67	0.73	**1**	0.33	0.45	0.19	0.19	0.33	0.39	0.09	0.17
Need for Internation	0.23	-0.29	-0.51	-0.47	-0.51	-0.57	**0.57**	0.28	0.23	0.05	0.19	0.1	0.01	0.25
Past Behavior	-0.23	0.32	0.62	0.66	0.67	0.67	-0.53	**1**	0.23	0.1	0.33	0.28	0.05	0.13
Perceived Ease of Use	-0.22	0.38	0.49	0.43	0.41	0.44	-0.48	0.48	**0.75**	0.06	0.18	0.15	0.01	0.15
Perceived Risk	0.27	-0.18	-0.47	-0.46	-0.44	-0.44	0.21	-0.32	-0.25	**0.71**	0.19	0.21	0.05	0.05
Perceived Usefulness	-0.37	0.28	0.66	0.59	0.62	0.57	-0.43	0.57	0.42	-0.43	**0**	0.23	0.09	0.08
Self-Efficacy	-0.26	0.3	0.53	0.46	0.53	0.63	-0.31	0.53	0.39	-0.46	0.48	**0.75**	0.01	0.17
Social Norm	-0.17	0.24	0.31	0.24	0.33	0.29	-0.12	0.23	0.12	-0.23	0.3	0.12	**0.53**	0.01
Technology Anxiety	0.14	-0.16	-0.35	-0.35	-0.37	-0.41	0.5	-0.36	-0.38	0.23	-0.28	-0.41	0.11	**0.61**

Table 16: Discriminant validity - Reflective constructs

5.2. Structural Model

While the measurement model described the relation between constructs and the corresponding questionnaire items, the structural model will examine the relation between constructs themselves. This is the key part of the analyses and it is here that the answer to the main research question will be found. Before examining the structural model, the PLS-regression is run once again. This time, the items which performed badly in the previous tests are deleted, leaving the model with those items which really matter. This means that apart from Att3Rec, which was already deleted after the unidimensionality test, also Inter2, Social3 and TA1 will be removed.

5.2.1. Coefficient of determination

The coefficient of determination (R^2) measures how well the endogenous latent variables (in other words the dependent variables) are predicted by the exogenous latent variables (or the independent variables). The coefficient of determination therefore stands for the variance in dependent constructs accounted for by the regression model. The model tested in this master thesis contains six such constructs: attitude towards technology, enjoyment, global attitude, intention to use, perceived ease of use and perceived usefulness. As with any R^2, the coefficient of determination varies between zero and one. The higher the value, the better the model predicts the latent variable. According to Chin (1998 in Henseler, Ringle, & Sinkovics, 2009) endogenous latent variables with Rsquares from 0.67 onwards are substantially predicted by the model, endogenous latent variables with Rsquares between 0.33 and 0.67 are moderately predicted and endogenous latent variables with Rsquares between 0.19 and 0.33 are weakly predicted.

	R^2	Interpretation
Attitude towards Technology	0.68	Substantial
Enjoyment	0.44	Moderate
Global Attitude	0.73	Substantial
Intention to Use	0.65	Moderate
Perceived Ease of Use	0.23	weak
Perceived Usefulness	0.25	weak

Table 17: Coefficients of determination

Attitude towards Technology and Global Attitude are substantially predicted by the model, Intention to use however falls just outside this category and is therefore only moderately explained by the model. This is a first indication that the conceptual model proposed in this study should be further elaborated. Also enjoyment is moderately predicted by its determinants and there is an existing but weak predictive value for the exogenous variables of perceived ease of use and perceived usefulness.

5.2.2. Path Coefficients

In this last step the structural model coefficients (or paths) of the exogenous latent variables are calculated and tested for significance. This is once again done by obtaining a bootstrap and afterwards calculating a 95% confidence interval for the 5000 cases. The results are shown in the following table.

	β	CI_{95}	Significant
Attitude towards Failure -> Global Attitude	0.04	[-0.04 ; 0.14]	No
Attitude towards Succes -> Global Attitude	0.04	[-0.05 ; 0.14]	No
Attitude towards Technology -> Global Attitude	0.85	[0.77 ; 0.92]	Yes
Enjoyment -> Attitude towards Technology	0.49	[0.32 ; 0.63]	Yes
Enjoyment -> Perceived Ease of Use	0.33	[0.16 ; 0.49]	Yes
Global Attitude -> Intention to Use	0.34	[0.17 ; 0.48]	Yes
Need for Interaction -> Attitude towards Technology	-0.14	[-0.27 ; -0.02]	Yes
Past Behavior -> Enjoyment	0.67	[0.60 ; 0.73]	Yes
Past Behavior -> Intention to Use	0.20	[0.06 ; 0.33]	Yes
Perceived Ease of Use -> Attitude towards Technology	0.05	[-0.06 ; 0.18]	No
Perceived Ease of Use -> Perceived Usefulness	0.50	[0.37 ; 0.64]	Yes
Perceived Risk -> Attitude towards Technology	-0.08	[-0.20 ; 0.03]	No
Perceived Usefulness -> Attitude towards Technology	0.25	[0.10 ; 0.40]	Yes
Perceived Usefulness -> Intention to Use	0.12	[-0.03 ; 0.28]	No
Self-Efficacy -> Intention to Use	0.25	[0.07 ; 0.42]	Yes
Self-Efficacy -> Perceived Ease of Use	0.23	[0.08 ; 0.40]	Yes
Social Norm -> Intention to Use	0.07	[-0.03 ; 0.16]	No
Technology Anxiety -> Intention to Use	-0.07	[-0.18 ; 0.03]	No

Table 18: Principal model path coefficients and confidence intervals

Figure 19 clearly illustrates the key findings of this master thesis. It contains all the path coefficients between constructs. The red arrows are paths that didn't prove to be significant. The green paths are significant. Retailers should keep this figure in mind when redesigning the technology or when making up commercials/advertising to increase self-scan usage.

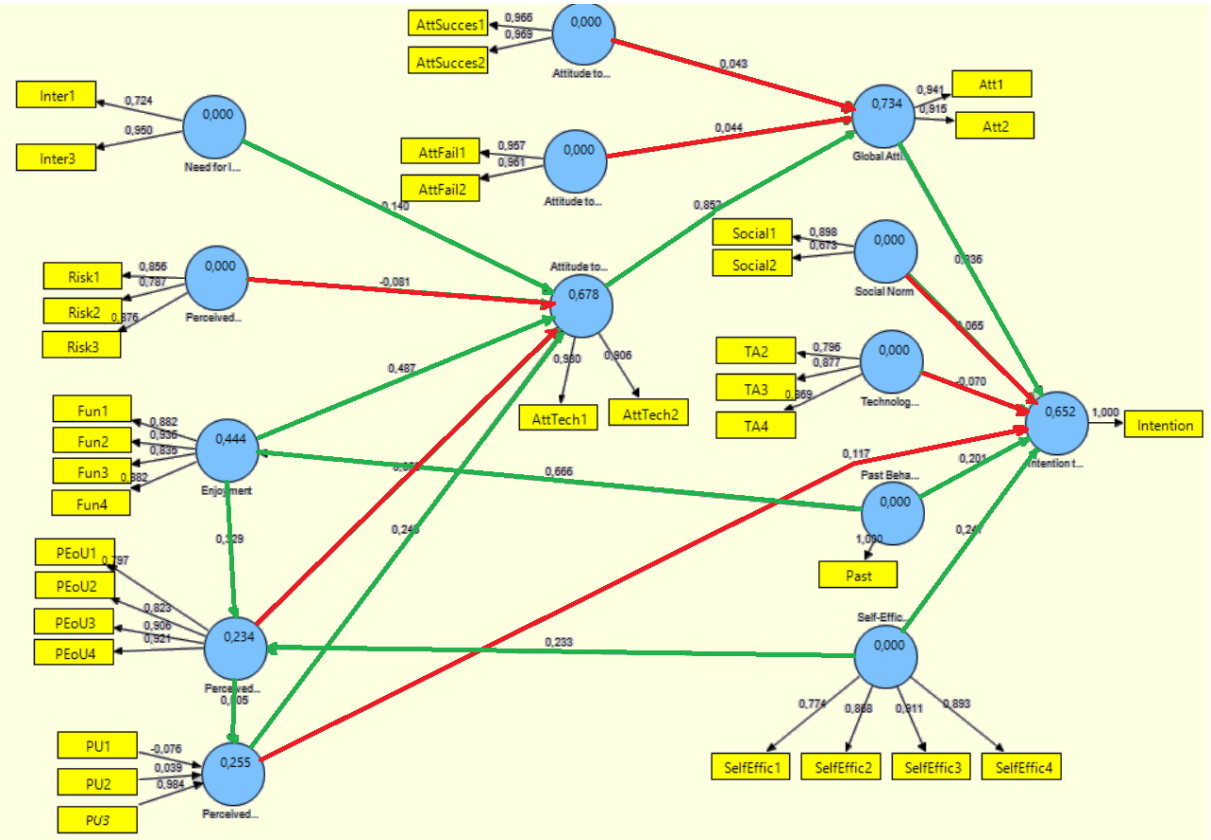


Figure 20: (In)significant paths

The interpretation of these results will be done systematically. First, the path coefficients concerning behavioral intention will be interpreted and the corresponding hypotheses checked. Secondly, the path coefficients concerning global attitude will be examined and finally the path coefficients determining the attitude towards the technology will pass in review.

a. Behavioral intention

$H1_a$: A customer's behavioral intention to use self-scanning will be positively influenced by his global attitude toward self-scanning.

With a path coefficient of 0.34 and a 95% confidence interval of [0.17; 0.48], which does not contain zero, there is significant evidence that the intention to use self-scanning is positively influenced by a person's general attitude towards Self-scanning. Therefore $H1_a$ is supported which means customers with a more positive attitude towards Self-scanning are more likely to try out the technology.

$H1_b$: A customer's behavioral intention to use self-scanning will be positively influenced by his social norm

With a path coefficient of 0.07 and a 95% confidence interval of [-0.03; 0.16], there is no significant evidence to conclude that a social norm will influence a customer's intention to try out self-scanning. $H1_b$ is to be rejected on an α=0.05 significance level. This means there is not enough proof that customers are influenced by their significant others in their choice whether or not to use self-scanning during their grocery shopping trips. A possible explanation could be that for most people shopping is an individual activity and therefor the opinion of other people is not deemed that important.

$H1_c$: A customer's behavioral intention to use self-scanning will be positively influenced by its perceived usefulness.

A path coefficient of 0.25 and a 95% confidence interval of [-0.03; 0.28] force us to reject $H1_d$. There is no support that the intention to use self-scanning will be positively influenced by a person's assessment of the usefulness of the technology, as claimed by Davis (1986).

$H1_d$: A customer's behavioral intention to use self-scanning will be positively influenced by the frequency of his past trying

With a path coefficient of 0.20 and a 95% confidence interval of [0.06; 0.33], which does not contain zero, there is significant evidence to conclude that the level of past trying is an important indicator for a customer's intention to try out self-scanning. For this reason we find support for $H1_c$. This however should not be a surprise. It sounds very logical that a customer who has past experience with a given technology is likely to use it again in the future.

$H1_e$: A customer's behavioral intention to use self-scanning will be positively influenced by the customer's perceived self-efficacy

With a path coefficient of 0.25 and a 95% confidence interval of [0.07; 0.42], there is significant evidence to conclude that a customers perceived self-efficacy is an important determinant for his/her intention to try out self-scanning. Therefore $H1_d$ is supported. This means that the extent to which a customer thinks he would be able to use self-scanning will influence the likelihood of him trying to use Self-scanning. This is a very important conclusion, as it means that retailers should focus on promoting how straightforward self-scanning is and how everybody should be able use it.

$H1_f$: A customer's behavioral intention to use self-scanning will be negatively influenced by the technology anxiety

With a path coefficient of -0.07 and a 95% confidence interval of [-0.18; 0.03], which contains zero, there is not sufficient evidence of a significant relationship between technology anxiety and intention to use self-scanning. Therefor we do not find support for $H1_e$. Technology anxiety is not a significantly concluding factor in the formation of intentions to use self-scanning.

b. General Attitude

In $H1_a$, the general attitude towards self-scanning has proven to have a significant effect on the formation of intentions to use self-scanning. As explained in the preliminary examination by the theory of trying, this attitude is an agglomeration of three factors: the attitude towards self-scanning, the attitude towards failing and the attitude towards succeeding. In the second part of this analyses these assumptions are analyzed.

$H2_a$: A customer's global attitude toward a given technology will be positively influenced by his attitude towards succeeding.

With a path coefficient of 0.04 and a 95% confidence interval of [-0.05; 0.14], containing zero, $H2_a$ was not supported by the data. Meaning that the attitude towards trying and succeeding to use self-scanning is not a crucial factor in the formation of a general attitude towards self-scanning.

$H2_b$: A customer's global attitude toward a given technology will be negatively influenced by his attitude towards failing.

The same holds for the attitude towards failing. With a path coefficient of 0.04 and a 95% confidence interval of [-0.04; 0.14], containing zero, $H2_b$ also must be was not supported

$H2_c$: A customer's global attitude toward a given technology will be positively influenced by his attitude towards the technology in itself.

With a path coefficient of 0.85 and a 95% confidence interval of [0.77; 0.92], there is significant evidence to conclude that the attitude towards the technology is a very important factor in the formation of a general attitude towards self-scanning.

c. Attitude towards the technology

Attitude seems to be one of the crucial factors on the path to trying out self-scanning. Therefor it is critical to know how these attitudes are formed. Apparently successful and unsuccessful attempts are not the key to this mystery. Therefore attitudes towards the technology should be examined more closely.

$H3_a$: A customer's attitude towards self-scanning is positively influenced by its perceived usefulness.

With a path coefficient of 0.25 and a 95% confidence interval of [0.10; 0.40], the results show that perceived usefulness has a positive effect on attitude towards the technology. We thus find support for this hypothesis. This means that people who perceive self-scanning as being useful (economical and non-economical benefits) are likely to have a positive attitude towards the technology. This is also an important conclusion as it means that, if retailers stress the benefits of self-scanning, this might lead to people changing their attitude from positive to negative. When this happens they are more likely to try out and use self-scanning.

$H3_b$: A customer's attitude towards self-scanning is positively influenced by its perceived ease of use.

Next the effect of perceived ease of use was tested, contrary to expectations this hypothesis cannot be supported by the data. With a path coefficient of 0.05 and a 95% confidence interval of [-0.06; 0.18], there is no significant evidence to assume that perceived ease of use is positively related with attitude towards technology.

$H3_e$: A customer's attitude towards self-scanning is negatively influenced by his need for interaction.

Need for interaction has a path coefficient of -0.14 which could imply that the construct has an inverse impact on the attitude towards technology. This would mean that people with a higher need for personal contacts with employees have a lower attitude towards self-scanning. This hypothesis can be supported as zero is not part of the constructs 95% confidence interval [-0.27;-0.02]. Contrary to Leagard et al. (1981) this master thesis thus succeeds in proving a significant relationship between need for interaction and attitude towards technology.

$H3_f$: A customer's attitude towards self-scanning is negatively influenced by perception of risk involved.

Just like with need for interaction the path coefficient of -0.08 implies an inverse relationship, but cannot be proven significant on a α=0.05 significance level, as zero is part of the [-0.20; 0.03] 95% confidence interval. The reason for this result could be explained using the remark a lot of people (both adopters and non-adopters) had with this construct: if they offer the service, I expect it to be reliable. As Curran and Meuter (2005) suggest, this might be a good example of the customers changing their opinion over time as the get more familiar with the technology.

$H3_g$: A customer's attitude towards self-scanning is positively influenced by the level of enjoyment he derives from using the technology.

The hypothesis that enjoyment is positively related with attitude towards technology however is surely supported by the data. A path coefficient of 0.49 with a 95% confidence interval of [0.32; 0.63], dictates that the level of enjoyment is a key determinant for the formation of a positive attitude towards self-scanning. This means that when retailers can persuade their customers that it is enjoyable to use self-scanning, a lot of them will actually try out the technology. The level of enjoyment could, amongst others, be enhanced by the use of simple navigation options, colorful displays and few errors. The importance of the path coefficient confirms Curran and Meuter's (2007) claim that enjoyment could be one of the most important factors in self-service technology-adoption.

d. Other endogenous variables

The hypotheses confirmed before should give a clear idea about how attitudes and intentions towards self-scanning are formed. Some of the hypotheses proved not to be significant and therefore a direct effect between some constructs could not be supported. However there are some inter-variable relationships which might be interesting to address.

$H3_c$: A technologies' perceived usefulness is positively influenced by its perceived ease of use.

While there is not significant evidence that perceived ease of use has a direct influence on the formation of attitudes, significant evidence was found that perceived ease of use positively influences perceived usefulness With a path coefficient of 0.5 and 95% confidence interval of [0.37;0.64] there is significant support for $H3_c$.

$H3_d$: A customer's perception of the ease of use of a technology is positively influenced by his perceived self-efficacy.

Furthermore ease of use has been found to be significantly influenced by self-efficacy. A path coefficient of 0.23 and a 95% confidence interval between 0.08 and 0.40 supports hypothesis 3D

$H3_h$: The enjoyment a customer derives from using a technology is positively influenced by his past behavior concerning the usage of this technology.

As Xie et al. (2008) predicted, a strong positive influence (0.67) of past behavior on enjoyment was found. This illustrates that people start enjoying a technology once they become more acquainted with it.

- $H3_i$: A customer's perception of the ease of use of a technology is of positively influenced by his level enjoyment.

As predicted by Sun and Zhang (2006), we also found a positive and significant (ß=0.33, 95% CI [0.16; 0.49]) influence from enjoyment on perceived ease of use. This teaches us that once people start to enjoy using a technology they will find it more easy to use, an explanation could be that they become less frustrated when something doesn't work.

5.3. Demographic differences

Another goal of this master thesis is to examine whether or not there are substantial differences amongst demographic groups. We asked respondents for their age and gender. As this is personal information, not all people were willing to provide this. Ultimately 181 people agreed to provide the information.

Using the answers of these 181 respondents the model was retested. In SmartPLS the two demographic factors were added to the model as control variables. One last time a bootstrap was performed and path coefficients were calculated.

5.3.1. Gender

	ß	CI_{95}	CI_{90}
Gender -> Attitude Technology	-0.02	[-0.10; 0.06]	[-0.09; 0.05]
Gender -> Attitude towards Success	0.04	[-0.09; 0.19]	[-0.07; 0.17]
Gender -> Enjoyment	0.02	[-0.09; 0.13]	[-0.07; 0.11]
Gender -> Global Attitude	-0.01	[-0.09; 0.07]	[-0.08; 0.05]
Gender -> Need for Interaction	0.17	[0.04; 0.31]	[0.06; 0.28]
Gender -> Perceived Risk	0.07	[-0.07; 0.22]	[-0.05; 0.20]
Gender -> Perceived Ease Of Use	0.00	[-0.12; 0.14]	[-0.10; 0.12]
Gender -> Perceived Usefulness	-0.13	[-0.25; -0.01]	[-0.23; -0.02]
Gender -> attitude towards Failing	0.11	[-0.03; 0.26]	[-0.01; 0.23]
Gender -> Intention	0.03	[-0.06; 0.12]	[-0.04; 0.10]
Gender -> Past Behavior	-0.02	[-0.17; 0.13]	[-0.14; 0.10]
Gender -> Self Efficiency	-0.07	[-0.20; 0.07]	[-0.18; 0.05]
Gender -> Social Norm	-0.06	[-0.21; 0.08]	[-0.19; 0.06]
Gender -> Technology Anxiety	0.13	[-0.01; 0.26]	[0.01; 0.24]

Table 19: Demographic differences - Gender

Gender is a dummy variable, with zero responding to male respondents and 1 responding to female respondents. This means that negatives signs represent lower estimates for females and accordingly positive signs represent higher estimates for females.

As can be denoted from the red color of table 19, gender does not seem to be a great way of segmenting self-scan users and non-users. This makes sense. Men and women are considered to be equal nowadays. They get the same education, work the same jobs and have the same pass-times. Therefore it is not unlikely that they have very similar opinions about self-scanning.

On a α=0.05 significance level there only seems to be a difference in the need for interaction and perceived usefulness. The beta of 0.17 explains how females have a higher need for interaction than males do, meaning they appreciate human contact during their shopping encounter more than males do. Eventually this might be something you can notice in the store. Women will hold their steps once in a while to chitchat with somebody they (used to) know, men are more likely to say hello and continue with their groceries. This is just an opinion based on life experience and should be examined more closely before making a solid claim.

The negative beta for perceived usefulness (-0.13) indicates that, on a 95% significance level, females have lower expectations of the utility of self-scanning. Further research could look into this matter.

On a α=0.10 significance level the technology anxiety also varies between males and females.

The positive beta for technology anxiety indicates that, on a 90% significance level, females are more anxious about using technology. A possible explanation for this is that men will more frequently use technology because the majority of them finds this interesting.

5.3.2. Age

	ß	CI_{95}	CI_{90}
Age -> Attitude technology	0.05	[-0.04; 0.14]	[-0.03; 0.13]
Age -> Attitude towards succes	0.03	[-0.13; 0.20]	[-0.10; 0.17]
Age -> Enjoyment	-0.13	[-0.25; 0.00]	[-0.23; -0.03]
Age -> Global Attitude	-0.12	[-0.20; -0.04]	[-0.19; -0.05]
Age -> Need for Interaction	0.29	[0.14; 0.43]	[0.17; 0.41]
Age -> Perceived Risk	0.07	[-0.11; 0.24]	[-0.08; 0.21]
Age -> Perceived ease of use	-0.04	[-0.20; 0.12]	[-0.17; 0.09]
Age -> Perceived usefulness	-0.15	[-0.30; 0.00]	[-0.28; -0.02]
Age -> attitude towards failing	0.18	[0.04; 0.32]	[0.06; 0.30]
Age -> intention	-0.04	[-0.13; 0.05]	[-0.12; 0.04]
Age -> past behavior	-0.11	[-0.26; 0.04]	[-0.23; 0.01]
Age -> self efficiency	-0.16	[-0.30; 0.00]	[-0.28; -0.03]
Age -> social norm	-0.08	[-0.25; 0.07]	[-0.22; 0.05]
Age -> technology anxiety	0.27	[0.13; 0.40]	[0.16; 0.38]

Table 20: Demographic differences - Age

Age appears to be the most influencing demographic factor. On a α=0.05 significance level age seems to influence global attitude and attitude towards failing but more importantly need for interaction and technology anxiety.

When taking the questionnaires, it was surprising how a lot of older people told us that they really appreciated coming to the store. For a lot of them a shopping trip was not just about getting supplies, much more important was that the trip enabled them to come in contact with other people: customers, employees and friends. Older people, especially the ones who lost their partner, really expressed a need to be amongst others as they often felt solitude. The question rises whether the store has a social duty to meet the social needs of elder customers, but in fact they do not have a choice. Older people are a big target market which, if the retailer decides to switch to a technology-only concept, will be lost to a more humane competitor.

The fact that technology anxiety varies strongly with age is grounded in the fast development of technology after WW2, as mentioned in the literature study. Older people didn't come in contact with technology when they grew up as much as youngsters nowadays do. Therefore they are much less acquainted with the use of it. They have lived their long lives without it and this went well, so why would they learn how to use it? Because of this lack of knowledge, elder people will feel hesitant about technology and this could translate into technology anxiety. This has however not much to do

with age, but much more with the date of birth. In 10 years these results will, without doubt, have changed dramatically as older people from the future came in contact with technology on a much larger scale.

The two previous reasons are without doubt important factors that contribute to elder people having a more negative attitude towards self-scanning.

On a $\alpha=0.10$ significance level also perceived usefulness, self-efficacy and enjoyment seem to vary with age. The negative beta of enjoyment (-0.13) illustrates how the older people become, the lesser they derive enjoyment from scanning their own groceries. This seems logical. The older people are, the more they become technology anxious and the more they have a higher need for interaction, furthermore their self-efficacy decreases. Why would they enjoy using a technology that reduces their personal contacts? Because they acknowledge the utility of using self-scanning?

The older they get, the less advantage they see in using the technology. Keeping in mind retirement we could say that the older one gets, the more time one has to spare. Moreover for the customers of Delhaize, which most of the time have had a higher education, we can say that they probably have some money to spare too. If, in addition to the increased technology anxiety and need for interaction, the time related and financial benefits of the technology become less important, what would motivate these older people to use self-scanning?

Clearly for older people, self-scanning doesn't have a lot of advantages to offer, given the assumptions made in the previous paragraph hold, of course. This is in line with the findings of Jacob and Rettinger (2011).

6. CONCLUSION

The last thing to do in this final chapter is to recite the key findings and conclusions reported in the previous chapters of this master thesis.

First a general conclusion will be given for the research findings. Succeeding there will be a discussion on how the findings of this master thesis might contribute to real life decision making, a chapter "managerial implications" will therefore try to approach the research findings from a retailer's point of view. Lastly the limitations of this master thesis will be elaborated and suggestions for further research will be formulated.

6.1. Conclusions

The goal of this master thesis was to investigate how customers form intentions towards a self-service technology like self-scanning. This would provide retailers with valuable knowledge to help them in the decision making about the innovation and implementation of self-scanning in supermarkets.

By adding some possibly important determinants of customer intentions and attitudes towards the use of self-scanning to the theory of trying and the technology acceptance model, a new model was created which, in theory anyways, would explain a big part of the variance in both customer intentions and attitudes towards self-scanning usage. In total 18 hypotheses were tested for significance, 7 of them were eventually rejected.

The intention to use was found to be determined by primarily three determinants: a global attitude towards self-scanning, past behavior and the perceived self-efficacy. In order of increasing importance, past behavior had a positive effect on customers' intention to try out a certain technology again. Meaning that once customers become more familiar with self-scanning they are likely to keep using it. Perceived self-efficacy also positively contributed to the customers' intention to try out the self-scanning. The more confident one feels about ones capability to use self-scanning the more likely one is to actually go out and try it out. Lastly the attitude towards self-scanning was deemed the most important factor in a customers' intention to try out the technology. While this might be a pretty good result, attitude is a rather abstract determinant which could be formed by close to anything. To try and explain the global attitude, this master thesis fell back on the theory of trying.

The theory of trying posits that global attitudes are formed by a person's attitude towards trying and succeeding and his attitude towards trying but failing. No evidence of this relation is found in this master thesis for the specific case of self-scanning. No explanatory meaning can thus be derived from these constructs. This means that the attitude towards a technology is shaped by other determinants. These links were tested in hypothesis three.

Perceived usefulness and enjoyment seem to be the most important factors when forming an attitude towards technology. If people think self-scanning can reduce the time spent in the store and provide them with a more flexible solution towards shopping, they will have significantly better attitudes towards this technology. However, as Curran and Meuter (2007) claimed enjoyment proved to be the most important determinant towards the formation of an attitude towards self-scanning.

If customers perceive self-scanning as a technology that is enjoyable to use, they will probably have a positive attitude towards it and thus be likely to use self-scanning for their grocery shopping. Further research should investigate what makes a technology to be perceived as enjoyable.

Some of the constructs whose direct influence onto the dependent latent variable could not be proven to be significant, did however significantly influence other construct and should therefore be considered to be included in the model.

In this master thesis for example we were not able to find support for a significant direct effect of perceived ease of use on the formation of attitudes towards self-scanning. We did however find support that perceived ease of use positively contributed to the perceived usefulness of the technology. Indirectly perceived ease of use thus has an effect on attitude towards self-scanning and thus intentions.

At the end of the day, the following model is proposed to assess the intention of customers to try out self-scanning:

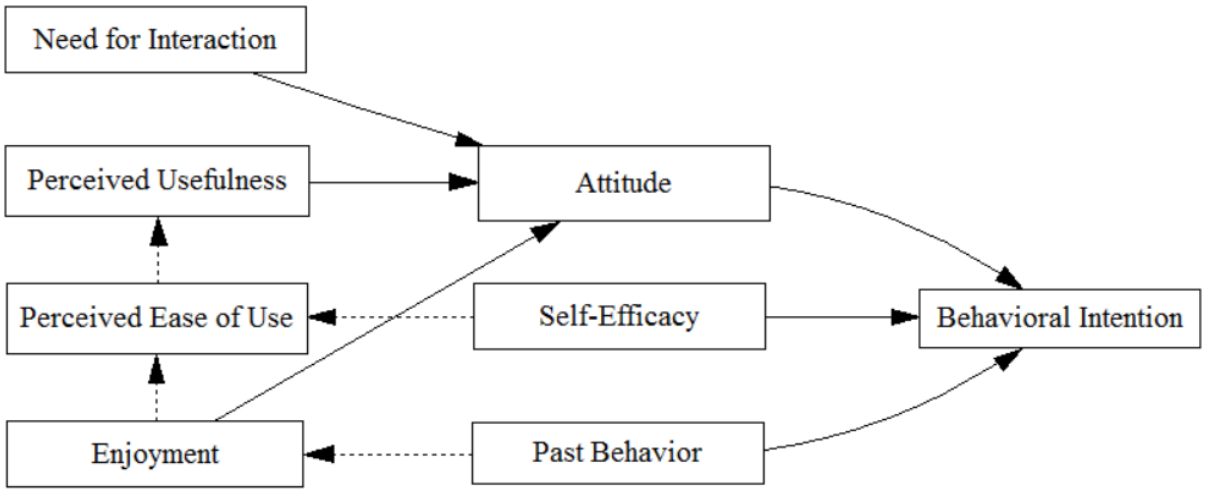


Figure 21: Final model

Finally further analyses showed how there is little difference between males' and females' perception of the different variables. Males do however show a lower need for interaction and perceive self-scanning to be more useful than women do.

The age of the customer on the other hand, seems to be a very important factor in trying to predict his attitude and likelihood to try out the technology. The lack of technology during the lives of older people makes them more hesitant to use technology. Older people at this moment are more likely to be anxious of technology than younger people. While no direct effect of technology anxiety on intention to use technology was found in master thesis, further research should examine the effect of technology anxiety on other determinants of the model. It is more than likely that for example perceived ease of use, enjoyment and perceived usefulness will suffer from technology anxiety.

Also older customers' need for interaction should not be overlooked, grocery shopping is much more than getting supplies for older people and the question should be asked whether or not it is worth it to try to persuade them to try out self-scanning.

6.2. Managerial implications

These conclusions lead to some important managerial implications.

This research shows how important it is to persuade people to try out self-scanning. By helping them the first time and providing a good service during the first encounter (especially when dealing with older people), chances are that the customer will keep on using the technology. This support might also lead to customers becoming less anxious about the technology and being more confident that they should be able to use it.

Whilst this study could not provide a direct relationship between technology anxiety and the intention to try out a given technology, it should be monitored. As this study failed to prove the direct relationship it is most likely technology anxiety affects intention indirectly via other attributes, such as enjoyment or perceived ease of use. This linkage should be researched in the future. One of the best ways to reduce technology anxiety is to create a technology that is easy to use. Making the technology as intuitive as can be and providing first time users or interested people with a clear guide should not only increase the intention to try via the perceived self-efficacy, it should also make self-scanning more enjoyable.

Enjoyment is the key to success for self-scanning. Make it interactive! Make it fun! By providing easy controls and clear illustrations, the technology will become much more enjoyable. Maybe the integration of quiz-questions to win eg. reduction coupons would also add to the experience. There are no limits to the technology only to the people who have to create it. While these kinds of extra features might be interesting and are surely worth a thought the main goal is to keep the technology as simple as possible.

This ease of use will also benefit the perceived usefulness. Retailers should investigate which other aspects influence this perceived usefulness. In this master thesis perceived usefulness was a formative construct measured by the time-savings and budget controls, the list doesn't end there however. It is important to know what benefits the customer thinks he gets when self-scanning and which ones he would like to get. One of the remarks frequently made while taking the questionnaire is: if it reduces costs for the retailer, shouldn't we get some kind of a bonus? I don't think customers are talking about huge reductions, but maybe offering them extra bonus-points would go a long way?

To conclude this subchapter it should be noted that elder people are less willing to use self-scanning. The question should be asked whether or not it is worth trying to persuade them to use it anyway. For a lot of them, going to the store is about more than doing their groceries. It is more about getting in touch with other people. While it might not be the primary task of the store to comply with this need, meeting these customer's demand is equally (if not more) important as turning a profit on self-scanning.

For this reason I don't think self-scanning as we know it now is the future. Instead of a revolution it should be considered an evolution towards a dual system, where check-outs will primarily go via self-scanning (using personal scanners built into smartphones/watches/glasses, instead of the ones offered by the store) but where service employees will be numerously present to assist the customer into satisfying all his shopping needs.

6.3. Limitations and further research

The research in this master thesis was intentionally performed in a supermarket that offered both the self-checkout method and the traditional check-out method. The thought behind this was that all respondents would have come into contact with the technology and therefore made up their minds about it. I was however surprised by the number of people using self-scanning in this store just because they could. This provided some interesting insights in how the technology appeals to a lot of people once they get in contact with it, but limits the generalizability of this study. The sample used in this thesis does not represent the total population of shoppers, which I tried to attain. It represents the population of shoppers shopping in supermarkets which offer both check-out systems. If this research was to be recreated it would be interesting to ask random people on the street about their perceptions. This would be a much more representative sample as the one used in this study. Without the context of being in a supermarket, the survey would however take much longer and this time was not at hand when writing this master thesis.

Also the items used in the survey could have been picked better. For example the social construct is not significant because people felt weird answering the questions. While all questions where validated in previous research, some of them are not the best fit for the subject of self-scanning.

Concerning the questionnaire I also learned that inverse scaling, while seeming like a good idea on paper, is not the most successful approach in real life. A lot of respondents fail to spot the catch and thus answer the question "wrongly". This causes the scales to be less reliable.

As mentioned in the conclusion it would be interesting to analyze which benefits customer's think they have when using technology and which benefits they would like to receive for it. Trying to meet some of those whishes might lead to even more people willing to use the technology.

Another item mentioned in the conclusion is that the effect of technology anxiety on the different constructs of the final model should be examined. While the construct is not present in the final model I feel pretty confident it should be as a mediating term for other constructs.

Furthermore it should be interesting to do the same study in a few years, turning it from a cross-sectional to a longitudinal study. This might help practitioners to establish a knowledge in how customer attitudes and intentions change overtime when facing a new technology.

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“An investment in knowledge always pays the best interest.”

-Benjamin Franklin

APPENDIX

Appendix 1: Hofstede's Cultural Dimensions

HOFSTEDE'S CULTURAL DIMENSIONS PDI = Power Distance IDV = Individualism/Collectivism MAS = Masculinity/Feminity UAI = Uncertainty Avoidance				
Country	**PDI**	**IDV**	**MAS**	**UAI**
Arab Countries	81	38	53	68
Argentina	50	46	56	86
Australia	38	90	61	51
Austria	11	55	79	70
Belgium	66	75	54	94
Brazil	74	38	49	76
Canada	40	80	52	48
Chile	64	23	28	86
Colombia	68	13	64	80
Costa Rica	36	15	21	86
Denmark	18	74	16	23
East Africa	65	27	41	52
Equador	80	8	63	67
Finland	33	63	26	59
France	69	71	43	86
Germany FR	35	67	66	65
Great Britain	35	89	66	35
Greece	61	35	57	112
Guatemala	95	6	37	101
Hong Kong	68	25	57	29
India	78	48	56	40
Indonesia	78	14	46	48
Iran	60	41	43	59
Ireland(Republic of)	28	70	68	35
Israel	13	54	47	81
Italy	54	76	70	75
Jamaica	49	39	68	13
Japan	55	46	95	92
Malaysia	104	26	50	36
Mexico	94	30	69	82
Netherlands	39	80	14	53
New Zealand	22	79	58	49
Norway	31	69	8	50
Pakistan	57	14	50	70
Peru	64	16	42	87
Philippines	95	32	64	44
Portugal	63	27	31	104
Salvador	67	19	40	94
Signapore	76	20	48	8
South Africa	49	65	63	49
South Korea	60	18	39	85
Spain	58	51	42	86
Sweden	31	71	5	29
Switzerland	34	68	70	58
Taiwan	58	17	45	69
Thailand	64	20	34	64
Turkey	66	37	45	85
Uruguay	63	36	38	100
USA	45	91	62	46
Venezuela	81	12	73	76
West Africa	77	20	46	54
Yugoslavia	77	27	21	88

Appendix 2: Questionnaire

1	2	V	Z

Geachte heer, mevrouw,

Ik ben laatstejaarsstudent Toegepast Economische Wetenschappen aan de Universiteit Hasselt. In het kader van mijn thesis, onderzoek ik de motivatie van de klant om al dan niet Self-scanning te gebruiken.

Ik zou u daarom willen vragen enkele minuutjes van uw tijd te spenderen aan het invullen van deze vragenlijst. Het onderzoek staat volkomen los van deze winkel en er zullen geen persoonlijke gegevens doorgegeven worden. Uw deelname wordt erg op prijs gesteld.

Bij voorbaat dank voor uw medewerking!

Felix Broeckx

---

1. **Geslacht:**
   - Man
   - Vrouw

2. **Leeftijd**: ……

3. **Hoogst genoten opleiding:**
   - Lager onderwijs
   - Middelbaar onderwijs – Beroeps (BSO)
   - Middelbaar onderwijs – Technische opleiding (TSO)
   - Middelbaar onderwijs – Algemeen (ASO)
   - Hoger niet-universitair onderwijs
   - Hoger universitair onderwijs
   - Doctoraat

4. **… … … % van de keren dat ik boodschappen doe, maak ik gebruik van Self-scanning.**

5. **Als ik Self-scanning zou uitproberen, maar het zou foutlopen, zou ik me … voelen:**

Aangenaam	1	2	3	4	5	6	7	Onaangenaam
Plezierig	1	2	3	4	5	6	7	Verveeld

6. **Als ik Self-scanning zou uitproberen en ik zou perfect in mijn opzet slagen, zou ik me … voelen:**

Aangenaam	1	2	3	4	5	6	7	Onaangenaam
Plezierig	1	2	3	4	5	6	7	Verveeld

De volgende vragen kan u beantwoorden door het overeenkomstige cijfer aan te kruisen. Zo komt het cijfer 1 overeen met helemaal niet mee eens en 7 met helemaal mee eens. Aangezien de wereld niet zwart-wit kleurt, kunt u aan de hand van de cijfers 2-6 uw antwoord nuanceren.

Helemaal niet mee eens			Neutraal			Helemaal mee eens
1	2	3	4	5	6	7

Indien een vraag niet helemaal duidelijk is mag u steeds om meer uitleg vragen.

Self-scanning is goedkoper dan de normale manier van afrekenen	1	2	3	4	5	6	7
Self-scanning is sneller dan de traditionele kassa's	1	2	3	4	5	6	7
Self-scanning maakt winkelen makkelijker (tussentotaal, etc…)	1	2	3	4	5	6	7
Self-scanning is moeilijk	1	2	3	4	5	6	7
Self-scanning is verwarrend	1	2	3	4	5	6	7
Self-scanning kost veel moeite	1	2	3	4	5	6	7
Self-scanning vereist veel inspanning	1	2	3	4	5	6	7
Ik hou ervan om in contact te staan met een medewerker	1	2	3	4	5	6	7
Hulp van een medewerker is zeer belangrijk voor mij	1	2	3	4	5	6	7
Het stoort me een machine te gebruiken als het ook persoonlijk kan	1	2	3	4	5	6	7
Ik vind Self-scanning een veilig systeem	1	2	3	4	5	6	7
Ik vertrouw erop dat het systeem mijn transactie goed zal verwerken	1	2	3	4	5	6	7
Er is weinig kans dat er iets fout gaat via Self-scanning	1	2	3	4	5	6	7
Mijn vrienden en/of familie vinden dat ik Self-scanning moet gebruiken	1	2	3	4	5	6	7
Self-scanning verbetert mijn imago	1	2	3	4	5	6	7
Anderen kijken naar me op als ik Self-Scan	1	2	3	4	5	6	7
Ik ben bezorgd over het gebruik van technologie	1	2	3	4	5	6	7
Technische termen, zoals check-out en terminal, verwarren me	1	2	3	4	5	6	7
Ik vermijd meestal technologie omdat ik er niet bekend mee ben	1	2	3	4	5	6	7
Ik vermijd liever technologie omdat ik bang ben fouten te maken die ik niet zelf kan corrigeren	1	2	3	4	5	6	7
Ik voel me bekwaam Self-scanning te gebruiken	1	2	3	4	5	6	7
Ik weet wat ik moet doen als ik Self-Scan	1	2	3	4	5	6	7
Ik denk dat ik goed ben in Self-scanning	1	2	3	4	5	6	7
Ik bezit de juiste vaardigheden om aan Self-scanning te doen	1	2	3	4	5	6	7
Ik ben van plan in de nabije toekomst Self-scanning te gebruiken	1	2	3	4	5	6	7

De volgende vragen peilen naar uw attitude ten opzichte van verschillende aspecten van Self-scanning.

De antwoorden bestaan steeds uit twee extremen, u duidt aan waar u zich tussen deze extremen bevindt, 4 zijnde neutraal (geen voorkeur voor een van beide).

Bijvoorbeeld: Het gebruik van Self-scanning vind ik… eerder aangenaam, duid u zo aan:

onaangenaam	1	2	3	4	(5)	6	7	aangenaam

Het gebruik van Self-scanning vind ik: (Hoe zou u zich voelen tijdens het Self-Scannen)

				Neutraal				
onaangenaam	1	2	3	4	5	6	7	aangenaam
niet leuk	1	2	3	4	5	6	7	leuk
saai	1	2	3	4	5	6	7	vermakelijk
oninteressant	1	2	3	4	5	6	7	interessant

Ongeacht het resultaat vind ik Self-scanning: (Wat vindt u van Self-scanning op zich)

onaangenaam	1	2	3	4	5	6	7	aangenaam
nadelig	1	2	3	4	5	6	7	voordelig
gunstig	1	2	3	4	5	6	7	ongunstig

Al bij al vind ik Self-scanning:

(dezelfde vraag maar wetende dat u persoonlijk instaat voor het goede verloop)

onaangenaam	1	2	3	4	5	6	7	aangenaam
nadelig	1	2	3	4	5	6	7	voordelig
gunstig	1	2	3	4	5	6	7	ongunstig

Dit was de laatste vraag van deze vragenlijst. Indien u nog opmerkingen hebt mag u deze hier onder noteren:

……
……
……
……

Indien u kans wil maken op twee Cinema-Tickets, gelieve hieronder uw E-mailadres in te vullen:

……

Hartelijk bedankt voor uw deelname!

Appendix 3: Unidimensionality tests

Attitude towards Failure

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	1,84	91,98	1,84	91,98
2	,16	8,02		

Component Matrix[a]

	Component
	1
AttFail1	,96
AttFail2	,96

Attitude towards Success

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	1,87	93,52	1,87	93,52
2	,13	6,48		

Component Matrix[a]

	Component
	1
AttSucces1p	,97
AttSucces2p	,97

Perceived Usefulness

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	1,65	55,16	1,65	55,16
2	,93	30,93		
3	,42	13,92		

Component Matrix[a]

	Component
	1
PU1	,42
PU2	,87
PU3	,85

Perceived Ease of Use

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	2,734	68,35	2,73	68,35
2	,714	17,85		
3	,436	10,90		
4	,116	2,89		

Component Matrix[a]

	Component
	1
PEoU1p	,65
PEoU2p	,82
PEoU3p	,90
PEoU4p	,92

Need for Interaction

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	1,88	62,71	1,88	62,71
2	,70	23,41		
3	,42	13,88		

Component Matrix[a]

	Component
	1
Inter1	,86
Inter2	,78
Inter3	,73

Perceived Risk

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	2,14	71,34	2,14	71,34
2	,50	16,60		
3	,36	12,06		

Component Matrix[a]

	Component
	1
Risk1	,87
Risk2	,84
Risk3	,82

Social

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	1,77	58,83	1,77	58,83
2	,88	29,45		
3	,35	11,72		

Component Matrix[a]

	Component
	1
Social1	,51
Social2	,89
Social3	,85

Technology anxiety

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	2,46	61,41	2,46	61,41
2	,75	18,73		
3	,52	13,05		
4	,27	6,81		

Component Matrix[a]

	Component
	1
TA1	,64
TA2	,78
TA3	,86
TA4	,84

Self-Efficiency

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	2,98	74,59	2,98	74,59
2	,47	11,82		
3	,34	8,47		
4	,20	5,12		

Component Matrix[a]

	Component
	1
SelfEffic1	,80
SelfEffic2	,86
SelfEffic3	,90
SelfEffic4	,90

Enjoyment

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	3,16	78,98	3,16	78,98
2	,51	12,71		
3	,19	4,70		
4	,14	3,60		

Component Matrix[a]

	Component
	1
Fun1	,83
Fun2	,93
Fun3	,88
Fun4	,91

Attitude towards Technology

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	% of Variance
1	1,84	61,41	1,84	61,41
2	,85	28,29		
3	,31	10,30		

Component Matrix[a]

	Component
	1
AttTech1	,87
AttTech2	,89
AttTech3Rec	,53

Global Attitude

Total Variance Explained

Component	Initial Eigenvalues		Extraction Sums of Squared Loadings	
	Total	% of Variance	Total	Cumulative %
1	1,85	61,77	1,85	61,77
2	,87	29,00		
3	,28	9,23		

Component Matrix[a]

	Component
	1
Att1	,90
Att2	,90
Att3Rec	,49

Auteursrechtelijke overeenkomst

Ik/wij verlenen het wereldwijde auteursrecht voor de ingediende eindverhandeling:
The customer as co-producer: an empirical research on customer motivations to use self-service technologies

Richting: **master in de toegepaste economische wetenschappen-marketing**
Jaar: **2015**

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Broeckx, Felix

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