Influence product recall between two different product categories

Product recall, (non)-durable goods, likelihood of purchase, price perception, product reputation, perceived quality, product reliability and product loyalty

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Abstract

Product recalls are significantly growing worldwide. The requirements of governments, consumers and retailers regarding the safety of durable- and non-durable goods have increased. In the past years major recalls have occurred and the companies involved lost millions of dollars. In most cases the crisis management teams of these companies did not know how the consumer would respond to these harm crises. Does the product loyalty of the consumer changes after the recall? How would the product reputation or the perception about price, reliability and the perceived quality of a product change after being involved in a product recall situation? And most importantly, to what extent does the likelihood of purchase change?

Previous research regarding this topic mainly focused on the changing perception of the consumer in a single product category. The way this research distinct itself from the previous studies is the fact that it will focus on two different product categories; the durable goods- versus the non-durable goods industry. To be more specific, the following research question will be examined:

"What is the effect of a product recall on the likelihood of purchase between a durable and a non-durable product category?"

In order to answer this research question, and make a proper distinction between the impact of a product recall situation on the likelihood of purchase between two different product categories, this study has conducted an experimental design. Six questionnaires have been set up in order to test the likelihood of purchase in different product recall scenarios, where the main difference between the questionnaires was the durable product (telephone) versus the non-durable product (beer). Also a distinction between the causes of the product recalls has been made. The mild scenario simulated a product recall situation caused due to quality issues and the severe scenario simulated a product recall situation caused due to health issues. Also two control questionnaires were included. In total 430 respondents filled in one the six questionnaires, which resulted in the following outcomes:

- A significant difference has been found between the two product categories regarding their direct impact on the likelihood of purchase after being exposed to a product recall scenario
- A product recall caused due to potential health issues in the non-durable goods industry has a negative influence on product reliability and on perceived quality
- No significant difference between the two product categories have been found in their impact on the relation between the five independent variables and the dependent variable likelihood of purchase after being exposed to a product recall scenario

1

1. Introduction

1.1 Motivation

Major product recalls are significantly growing. Product recalls occur in the U.S. almost every day, in the durable product industry, but especially in the non-durable industry (FDA.gov). Obviously, most of these recalls are small batches of products with insignificantly small mistakes that would hardly harm a company. The big recalls that include million of products that cost the companies the same amount of money have a large impact indeed. For instance, after a recall, depending on the cause, the sales of a particular product will be less and the consumer's trust will be lower than before (Jarrel and Peltzman, 1985). Besides, the requirements of the customers have increased. Customers expect to have their preferred products available in high quality at all time. This puts even more pressure on the companies' responsibilities than before. In order to meet this demand high volumes of food and goods are produced within a short amount of time. In this changing market landscape, national authorities, businesses and governments have to respond more quickly to address issues. At the same time keeping the consumer healthy has priority number one. In that case the demands of the different governments worldwide for producing food, drugs and beverages are high. Especially for products that are imported.

The effects of a recall depend on the cause and the consequences it has for the consumer. Product recalls in the food industry can cause serious health or safety problems directly and the governments' agency won't take any risk with ingredients or parts that can be harmful. For that reason, companies that are facing a recall in these industries are often forced to act immediately. For instance, in 2012 Heineken USA recalled several thousands of beers because the bottles may be defective. In that case there was a potential for small particles of glass to separate from the inside lip of the bottle and fall into the beer (FDA.gov). In the telephone industry the consequences are mainly not immediately harmful. Mostly, problems with the software, signal or screen occur. However, issues that could harm the consumers' health occur as well. In 2007 a battery issue occurred with Nokia. During a routine data analysis of customer complaints, Nokia's head office in Finland discovered that Nokia phones using a particular battery were likely to swell. In order to guarantee the safety of the consumer 46 million batteries were recalled (Desai and Patel, 2014). In both cases a product recall could have a potential influence on the company, the particular brands and the customers. In that way it is of great importance how companies handles a product recall in both local and global scale. In this research the response of the customers will be central, more specific in what way does the perception of the customer change after having bought a product that has been recalled?

Furthermore, is there any difference in response or perception change of the customer in the situation of a product recall between two different product categories?

In this research we focus on the product categories beer and telephone. The reason why this research focuses on those two product categories is because they both belong to a different good. The product category beer belongs to the non-durable goods and the product category telephone belongs to the durable goods. The main difference between those two categories is the buying frequency. Non-durable goods will be bought more regular compared to durable goods, where durable goods have a longer product lifetime compared to non-durable goods (Nelson, 1970). It would be interesting to see in what way the consumer reacts in terms of repurchasing, loyalty and perception after a product recall of a durable good compared to a recall of non-durable good. Within the product recall between difference product categories, this research will also test how the reaction or perception of the customer changes after different reasons for the product recall. The most importance difference in the recall reasons is that the mild reason does not affect the health of the customer, where the severe reason could seriously harm the customers' health.

Because governments are strict and the consumer is easily up to date in terms of issues it is important for companies to be prepared (Ten Berge, 1998; Birch, 1994; Mahoney, 1993). In that case knowing how the consumers' perception about quality, reliability or loyalty changes after a product recall among different product categories will be interesting. Of course, every product recall has a different impact on the company, society and the customers. As a company it is important that you act adequate by informing your customers on time to minimize health and safety issues and to prevent eventual equity damage. The way of handling the recall in combination with the way of communicating it to the public is key. In most of the cases the possible reasons for recall success or failure depends on how it's communicated to the public (Gibson, 1995). However, this research does not involve communication itself, it is still an important subject to mention.

More important in this study is the effect a product recall has on the perception of the customer relating the product involved. As said, the way of handling the recall is important, but what happens after the recall has been finished? Will the consumer be as loyal as before? Did the quality or reliability perception about a product change? What values influences the perception of the customer in the process of a product recall? Does the cause of the recall play a significant role and what is the effect of a recall within two different product categories? This information can all be of great value for the companies in both the durable-, as in the non-durable goods industry when it comes to preparation.

All in all, because of the increasing complexity of products and closer investigation by manufacturers and policy makers as well as higher demands by consumers, product recalls are expected to occur even more frequently (Dawar and Pilluta, 2000). Even in a small county as the Netherlands, on average, one product recall is issued per week (OECD.org).

This in combination with the heightened media attention the product recalls will also be more visible for the general public (Ahluwalia *et al.,* 2000). In the end, companies need to tempt the retail via the customers, since the customer needs to be satisfied with the product before the retailer is convinced to sell it. Therefore, knowing your customer potential perception change could be highly valuable.

1.2 Problem statement

Several previous researches have focused on the impact of the severity of the product recall on the equity of the brand or companies. According to a study of Korkofingas & Ang (2012) the severity of the product recall has a significant negative impact on the equity of the brand and brands with low equity are less likely to be penalized during a product recall than brands with high equity. But interesting enough the study of van Heerde *et al.* (2007) shows the opposite. Their research indicates that a non-durable good product involved in a product recall situation become more vulnerable to competitors and that required investments to recoup the brand again are much higher than expected. Therefore, companies have taken measures to minimize this damage in the situation of a product recall. Crisis management teams combines prevention, planning, risk transfer and response to ensure you can react quickly and effectively in the event of a crisis and protecting the integrity of your brand ("Product Recall & Contamination", 2015). Basically, companies have covered themselves, but less is known about the perception change of the consumer after a product recall.

Besides, could there be a difference in customer re-buying response with a product recall between two different product categories? This question makes the influences a product recall has on the likelihood of purchase an interesting object for research. In short, to be more precise, this research is about answering the following research question:

"What is the effect of a product recall on the likelihood of purchase between a durable and a non-durable product category?"

In general the messages of a company after a product recall includes the following aspects; first warn the customers for the potential health and safety issues and motivate them to carry out the desired action, secondly to protect the equity of the company or brand. But does the approach need to be the same for a company within the beer industry (non-durable good) compared to a company within the telephone industry (durable good)?

4

Technology, the sophistication of producing the product, the speed of producing, the usability and consumers' trust in the durable goods industry could play a role in the perceptions' (change) in loyalty, reliability or price.

On the other hand the simplicity of the product, the high buy frequency and the relatively low price of products in the non-durable goods industry could have a totally different effect on re-purchasing decision and reputation of customers.

Likelihood of purchase in the research question consists of the patron's likelihood to shop, buy gifts and recommends the product to others (Klemz & Boshoff, 2001). In order to find out what kind of effect a product recall has on the likelihood of purchase, the dependent variable likelihood of purchase will be split up in five independent variables; *product loyalty, product reputation, price perception, perceived quality and product reliability*. These five independent variables will become central in this research, according to those variables the potential customers' perception will be measured.

1.3 Research objective

Interesting to see is that previous research mainly focuses on the effects and impacts according to product recalls within one product category. Besides, it is primarily focused on what kind of effect a product recall has on the different aspects relating the company or brand. Less research has been done to the effect of a product recall on the perception of the customer, even though these factors are closely related to the brand equity of a company, since the customers are an important part of the creation of a companies' (brand) equity.

Additionally, this study will examine in what way the customer will be affected by a product recall between the two different product categories and more specific in what way its likelihood of purchase will be influenced. To give the research an extra dimension, a distinction between the causes of a product recall will be made. First, the mild reason, this includes a product recall caused due to quality issues. This could not harm the consumers' health. Second, the severe reason, this includes a product recall caused due to health issues which could potentially harm the consumers' health.

In this way it takes the components' health into account in order to find out if a product recall reason that could cause health problems affects the consumers' likelihood of purchase of a durable good compared to a non-durable good.

The outcome of this research will give companies in both the durable as non-durable goods industry a new insight in what kind of effect a product recall has on the *likelihood of purchase* and more specific to the *loyalty, reputation, reliability, quality and price perception* of customers after having been exposed to a product recall.

Companies, more specific crisis management teams, can use this knowledge to use a more targeted approach regarding the customers involved, since they will know which perception aspect(s) of the customer has been affected the most. Knowing this, companies can emphasize their approach, for example, more on loyalty programs or quality standards. Especially, this research will provide companies in the beer- and telephone industry with the most valuable insight, since this research will involve these particular industries.

1.4 Implications

Some previous research about the change in brand equity, reputation, perception, loyalty and the buying behavior of customers according to product recalls has been done. Below some key research findings will be presented together with the object research objective of this thesis.

A case study form Cleeren, Dekimpe, and Helsen (2008) investigates if all brands are equally affected by a product recall or if some brands more vulnerable than others. They found that the stronger brand recovers much faster in terms of market share than the weaker brand. The stronger brand recovered 70% of its previous sales level after three months compared to 50% of the weaker brand.

When a product recall occurs the companies may affect the brand equity by their action as well. For example by taking their responsibility immediately or not communicating the recall. Dawar and Pilluta (2000) did a research about the effectiveness of different approaches.

They found that when consumers find a product or company having a strong reputation, they accept lack of information easier, including information about product harm. This is less likely for a product or company where the consumer has no strong expectation. Reputation in this case is a very important determinant in terms of damaging the product equity or not. The better the reputation of a firm the more consumers discounting negative information.

But there are also studies that argue the opposite. Consumers may come to expect more from high equity products, so when failure or lack of information occurs they are more disappointed. A study of Rhee and Haunschild (2006) looked at the change in automobile sales data after product recalls over 15 years. They discovered that high quality products suffer more (2.92% drop) in terms of market share than the low quality products (1.64% drop).

In short, research has proven that a good reputation consists of an up- and a downside where the downside weights heavier. According to (Andreassen, 2000), companies with a high reputation suffer more in terms of market share than those with poor reputation. Whether there is evidence that a high-quality product better undergo a product crisis than a low-quality product (Cleeren *et al*., 2008; Dawar & Pilluta, 2000). Next to reputation of the company also speed of recall and communication to customers plays an important role. Keller (2003) stated that the longer the delay in initiating product recall, the greater the probability that the equity of the product will be damaged by the negative publicity and word of mouth.

Speed of product recall becomes valuable if the product has the greatest potential for harm. However, this research does not make use of brands nor it examines the way of how to communicate a product recall, they still are important factors in the creation of the customers' reputation.

In contradiction to previous research, this research will examine the effect of two different product recall scenarios on the customers' perception change between two different product categories. This will give an insight for companies in both industries in what way they need to handle a product recall to minimize the change in their customers' perception.

2. Theory and Background of Product Recalls

It is now clear that product recalls have several consequences for the product, the company and the consumer. To find out in what way the consumer may be affected in the buying decision process through a recall, the study has chosen for the dependent variable 'likelihood of purchase'. Furthermore, it will decompose the variable likelihood of purchase in five independent variables to find out what components of the likelihood of purchase variable may be influenced by the product recall. Describing the process of the product recall and the way handling a recall is the first step of the theory. Additionally, the difference between the durable and non-durable goods industry will be explained. Finally, the hypotheses and the conceptual framework will be described.

2.1 Product recall

"A product recall is the act of requesting the return of a batch, unit or entire production run of a commercial product, usually because of a defect, safety concern or efficiency problem. Wherein products are found to be defective or even dangerous" (Dawar and Pillutla, 2000).

In general, a product recall is primarily characterized by damage to the manufacturer, but also by a very short decision time, fast escalation of negative publicity and stress for officers. Nowadays, there is a visible increase in such adverse publicity in media brands. The damage of a product recall is often extensive. There is serious financial damage associated with damage to the image of the brand, not to mention the recall costs and other costs associated with a companies' reaction. In the situation of a recall, what actions do companies undertake to minimize the damage? According to Ten Berge, 1998; Birch, 1994; Mahoney, 1993, the most important lesson is: be prepared. However, research among large companies in the Netherlands showed that only 47% actually had a crisis plan that was ready for use (Raaf, 2002). In these plans there was not even mentioned in what way to respond to the customers involved in the recall. Well prepared is what the content of the message to their customers should be. A company needs to communicate the nature of the safety risk and the procedures to be followed in implementing the recall to its distributors, dealers, service centers, and final consumers. At this point, consumers create an attitude towards the product and the recall (Berman, 1999).

The figure below (figure 1) shows the process of a product crisis in general. 1. Crisis; the start of a crisis has a number of stages, each with a different reaction and different form of communication (2. reaction). The damage increases or decreases to the extent of bad publicity (3. impact). The escalation phase is the most essential moment to inform consumer about how they should react and what is actually going on. If a company does not inform consumers about the actual status of a recall, the media will suggest several causes that are mostly not in favor of the company (Raaf, 2002).
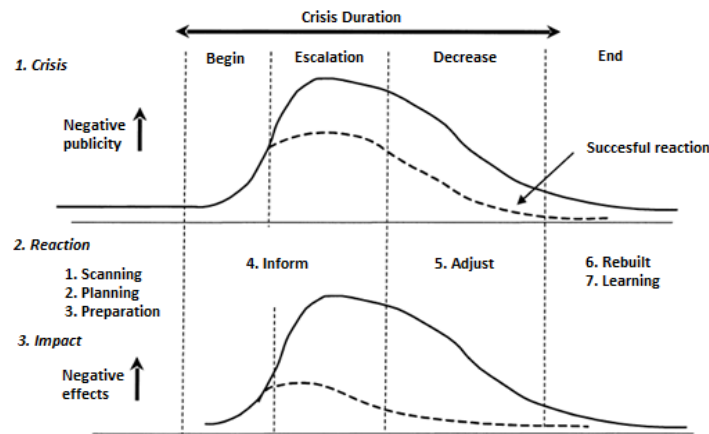
Crisis Duration

1. Crisis   Begin | Escalation | Decrease   End

Negative
publicity ↑

Successful reaction

2. Reaction   4. Inform   5. Adjust   6. Rebuilt
1. Scanning   7. Learning
2. Planning
3. Preparation

3. Impact

Negative
effects ↑

Figure 1. Crisis duration product recall

Even though product-crisis incidents are increasing the last couple of years, fairly little systematic research has been conducted on the topic (Klein & Dawar, 2004). Existing research can be broadly classified into three streams: Case bases studies, experiments and performance measurements.

1. *Case based studies*

Cased based studies mainly focus on advising which strategies work or do not work in the market place. Typically checklists are provided to advise in detail the appropriate managerial actions to avoid product recalls and how to respond when they occur (Mitroff 2004, Rupp & Taylor 2002).
The purpose of these studies is to provide little directions for understanding the underlying mechanisms through which products recalls harm the company or brand (Ahluwalia *et al.*, 2000). To understand the underlying mechanisms experiments are used.

2. *Experiments*

Experiments are used to assess the impact of hypothetical recalls and moderating variables on brand evaluations, such as consumer expectations (Dawar & Pillutla, 2000), commitment to the brand (Ahluwalia *et al*., 2000) and brand loyalty (Stockmeyer, 1996). For example, experiments have also been used to determine whether gender differences matter in blame attributions with a product recall (Laufer & Gillespie, 2004). However theses experiments are grounded properly in various psychological theories, their use of experimentally manipulated hypothetical product recalls often limits the external validity of the insights. Moreover, these studies typically do not attempt to quantify the financial implications of the recall. This is where the third stream comes in.

3. Performance measurements

Performance measurements focus on gauging the effects of actual product recalls on of performance measures including security prices (Chu *et al.*, 2005) and category consumption (Marsh *et al,* 2004). However, the above-mentioned performance measurements are combined indicators and may not be as informative as more disaggregate analyses. Primary demand measures, for instance, do not account for the fact that not all aspects can be affected to the same extent by a recall (van Heerde, Helsen, Dekimpe, 2007). Indeed, the core of the problem may external to some, but internal to others (Klein and Dawar, 2004). Besides, they also may have reacted differently to the recall (Griffin *et al.*, 1991). For example, stock price reactions do not recognize the underlying reasons through which the resulting value loss emerged: do investors penalize the company for a potential loss in marketing effectives because of the crisis or is it due to loss in sales?

This research uses a combination of *cased based studies* and *experiments.* A case based study will be conducted in order to gain knowledge about the way of handling a product recall and what the potential influence of a recall is on the company and especially the customers' perception based on different product recall cases occurring in the durable- and non-durable goods industry.

In order to test the hypotheses and to find a potential effect of a product recall on the likelihood of purchase within the two different product categories this research uses a experiment. Instead of general experiments, this research also focuses on the outcome variables and tries to find a potential effect of a product recall on those variables.

Therefore, this study does not make use of performance measurements. Performance measurements are mainly used to explain the impact of a product recall on the sales of a company or on the changing equity of the brand. These results mainly focus on the outcomes relating the company, where this study is interested in the underlying reason for those sales decreases based on the changing perception of the customer after being exposed to a product recall. A combination of a cased based study and a experiment is therefore the most obvious approach.

2.2 Insights in how to handle a product recall

It's the call that no CEO ever wants to get. The product that was supposed to help, enjoy or stimulate people gets broken and may harm unknown consumers with possible disastrous results. Some recalls involves millions of products and the global public, other recalls do not even reach the news and happen on a local scale. One thing is sure, the all have a different outcome. But what influences the result? And in what way is it possible for companies to steer the result? In order to gain knowledge and in attempt to understand why certain product recalls have a positive influence on the general public compared to negative examples this section will compare some previous product recall cases.

Analyzing these cases will also give us an insight in the best way of handling a product recall and what kind of role proper communication could play to minimize the damage for the company and its customers. Below you will find some impactful examples of product recalls within the durable- and non-durable goods industry. In the first place this study has chosen to analyze these cases because two recalls occurred in the durable goods industry and the other two in the non-durable goods industry, and therefore are the most representing for this research. Second, all four the product recalls were caused due to different external and internal reasons that are in line with the different causes that will be used in this research. The cases of Nokia (durable good) and Coca-Cola (non-durable good) both were caused due to quality reasons. And the cases of Toyota and Tylenol were both caused due to health/safety reasons. Third, they happened on a different scale, affected the companies' equity and financially wise, but were all handled in a different way and that did change the perception of the customer. Finally, the outcome of the four recalls differ significantly, which makes it extra interesting to find out what the reasons for these different outcomes are.

Altogether, those four recall scenarios are highly representative for this research.

The analysis below is based on the detailed description of the four different cases (Appendix 1). In order to present a clear overview in the text of this research, a small summary of the outcomes of the four different product recall cases is presented below.

Tylenol

The features that made Johnson & Johnson's handling of the crisis a success included the following:

- They were completely open about what happened, and immediately required to remove any source of danger.
- They acted quickly, they required to ensure that measures were taken which would prevent a recurrence of the problem.
- Finally, they showed themselves to be prepared to bear the cost in the name of consumer safety. That more than anything else established a basis for trust with their customers (Mitchell, 1986).

Toyota

Compared to Tylenol, Toyota made big mistakes regarding their response to the public;

- Toyota acted way too slow. It wasn't until seven months after the fatal crash that Toyota held a news conference about the problem, when their management of the situation should have sprung into action as soon as the accident occurred (Bowen & Zheng, 2014).

- Toyota broke the cardinal rule in crisis management: assume the worst (Gibson, 1995). Companies often don't realize they have a problem until it hits the media fan – and nowadays, Twitter, bloggers and YouTube beat most lumbering corporations to it. From a disgruntled employee to toxic waste – assume the worst.
- No apology. News conference appearances were also adjudged to have failed to deliver the contrition or sincerity that the public demanded.

Nokia
- Acted quickly and immediately took control over the situation. Took away consumers' anxiety by admitting the problem.
- Target communication to reach and motivate the consumer to return their device to the stores. Adequate service was provided within the stores.
- Organized communication with the distributors and delivery companies in the region in order to relatively replace the batteries of the consumers quick.
- Neglected to record their employees, consumer and third party actions, so difficult to take detailed learning out of their actions.

Coca-Cola

For Coca-Cola this recall has disastrous consequences, mainly because of certain key moves during their recall:
- Coca-Cola did not have a proper crisis management plan
- Acted too slow
- Inadequate communication
- Lack of leadership
- Lost millions on marketing campaigns

2.2.1 Analyzing different outcomes product recall

The previous product recalls all have happened in four different industries, but you can assign the involved products in two different product categories. The Tylenol and Coca-Cola case involve non-durable products, where products of the Toyota and Nokia case belong to the durable goods industry. As said, every product recall has a different outcome, but if you give the recalls independent from each other a closer look it is interesting to see that there are also similarities. In the first place we compare the non-durable good recalls Coca-Cola and Tylenol.

12

Looking at the reasons for recalling the products, Coca-Colas' recall happened due to a production failure, which could be assigned as their own fault. In the Tylenol case it was an external factor that lead to the recall. However, the causes and impact were totally different, after certain time they both reached their usual level of reputation. But how did they achieve this?

Compared to Coca-Cola, Tylenol showed from the beginning great leadership, the top management acted immediately, took no risk and recalled every potential product involved without waiting for any evidence. Moreover, they sought to ensure that measures were taken which would prevent as far as possible a recurrence of the problem. Although seven people died as a consequence of inhaling their product, Tylenol did not have to putting forth a big marketing campaign to regain their consumers' trust back. Simply putting the consumer and its safety as a priority number one, be open and prepared in combination with great leadership did the job.

If we compare this with the Coca-Cola case, where 'only' six children got sick due to possible inhaling a Coca-Cola product, their response was dramatically. First, it all started with lack of a crisis management plan, which did not exist. Contingency planning is crucial to ultimate success in dealing with opportunities and threats to a company (Johnson & Peppas, 2003). Moreover, because factors of impact vary from country to country and culture to culture, it is very important that response plans are developed for each location and include input from local management and public officials (Gibson, 1995). Also acting quickly appears to be of great importance. One of the mistakes Coca-Cola made was waiting until the evidence was there. Although it took several weeks to find out that Coca-Cola did nothing wrong, there first statement came more than a week after the first incident report. From a historical perspective, there is evidence that the greater the response time to a critical incident, the greater the long-term damage to a company's financial security and reputation (Johnson & Peppas, 2003). This role should be delegated to those with expertise in the appropriate professional discipline, which directly reflect to the third point of critic; lack of leadership. Even with a crisis management plan proper leadership is key, but without a plan it is even more a necessary. As potential situations in the business continuity planning process are identified, teams of professional experts should be assembled to prepare responses in order to minimize risks/damages. This will enable management not only to forecast potential damaging events, but also to decisively confront a situation as quickly as possible after an actual crisis has occurred. Fact is that, Coca-Cola needed a massive marketing campaign in the affected area to regain the consumers' trust. Two months later this goal was achieved. Tylenol needed five months to reach the same level of trust and quality with their consumers, but created this via quick handling and sympathy.

Within the durable goods industry, more precisely with the Toyota and Nokia case, a comparable situation occurred. Both companies needed to recall millions of products in a widely spread area. In this case both companies were responsible, because the recall occurred due to a production error.

13

Comparable to Tylenol, Toyota also faced several deaths because of product failure. For seven months Toyota was deaf for the accidents and did not want to admit that it was a production failure. In this case, perception becomes reality, because the company's silence as they attempted to identify the problem led to a loss of public confidence. Without any reaction of the company the consumer makes his own truth. In most cases this truth has a negative association with the particular company.

Trust and confidence are a critical component in the emotional contract in the corporation's ability to maintain its successful position in the market and in the community. If you wait too long the media will take it over and the prevailing media trend is to accentuate the negative rather than the positive aspects of situations. And nowadays, Facebook, Twitter and YouTube beat most lumbering corporations to it.

Meanwhile, Nokia handled a totally different approach. Without exactly knowing the problem they did not hesitate, but recalled and replaced approximately 46 million batteries from the first moment. It immediately took control, communicated the problem in a targeted way and they were even capable to motivate their customers to return their device to the store in a country with over a billion people. If you compare the results of Toyota and Nokia a big difference arises. Of course, it is difficult to compare the car business to the telephone business, but if you look at it objectively, Toyota could have minimized the damage. Years after the recall billions of dollars have been lost and sales dropped low as never before. Product reputation plays a crucial role here. Product reputation is created in the minds of the consumers and convinces them that products have value-added components above and beyond the products offered by the competition (Keller, 2003). Value-added components can include product quality, price, design, and intangible elements such as status, trust, previous experiences, confidence in company management and leadership, and a positive record of corporate social responsiveness. When the tangible elements are relatively equal, then intangible elements must be preserved and protected for a company to maintain and to continue its long-term position in the market. Nokia took the recall serious from the first moment and a few months later consumers' trust was on the same high level as before.

All in all, several aspects in the way a company handles a product recall could have a certain impact on the variables that influences the likelihood of purchase. For example product loyalty can be retained through a combination of leadership and acting quickly. Loyalty depends how the company treat their consumer and in to which extend they minimize the risk in order to give the consumer their highest priority. This goes along with the product reliability and perceived quality. In the Tylenol case consumers started to buy the product again, without being indoctrinated with a million dollar marketing campaign.

Preventing any risk by taking the blame and come up with a solution was in this case enough to re-win the trust of the consumer again. Which indirectly meant that the consumer got the trust in the quality of the product back and felt confident enough using the product again.

Showing your customer that you are taking care of them have happened to be the best solution, although in case of a well-known worldwide brand, just money will do the job as well. Interesting to see is that both Tylenol and Nokia have chosen for the same approach to tackle the product recall and for both it turned out to be successful.

For the limitations of this analysis, see Appendix 1.2.

In the next section the way on handling a product recall in the most accurate and effective way is described. As said before, this research does not focus on the companies' communication towards its customers, but the result of this study is certainly useful for their future communication to customers involved.

2.2.2 Handling product recall

According to the previous section handling a product recall in the correct and right way is extremely important. Obviously, every product recall is different, but the way of handling and communication towards customers is generalizable for every case. Although this research does not focus on communication, it is still an important subject to mention. Despite the results of this research, crisis management teams of the companies involved in a product recall situation should communicate in the most accurate way to stimulate and motivate their customers to undertake the right actions. The next section describes the main steps in how to handle a product recall followed by the most important communication rules that go along with it. This is important since managers can use this information in combination with the results of this study.

However, accurate prediction and explanation of product recall outcomes is not yet entirely possible. Given the literature about recalls there are few unequivocal facts, but two things are of great importance: The way of handling the recall in combination with communication. The ultimate challenge in making recalls effective must be seen as a communication challenge (CPSC, 1980). The main question we want to ask ourselves is; why do some recalls succeed while others fail? In the first place the editors' perception of the newsworthiness of a hazard may not always be equal to the perception of the customer. Editors serve as media gatekeepers, denying access to mass media channels and thus to their audiences. A second possible reason to recall success involves customer perceptions. Mostly, lack of public knowledge is the greatest weakness in his agency recall success. Many consumers do not perceive recall news as personally relevant until they notice the recall has resulted in injury or death to a loved one. Closely related to customer perception is recall overload.

The Food and Drugs Administration noted more than 1,000 recalls in the year 2014 (FDA.gov), the public is inundated with product warnings.

15

This amount is rising every year since the complexity of the products increase, higher expectations for product quality and safety by consumers, global production and closer monitoring by companies and government agencies (Berman, 1999).

It is also reasonably that salient recall messages are irrelevant or mistargeted communication (Scanlan, 1990). In general publicity is credited with power, but it may involves lack as well. In order for a recall to be effective there has to be publicity. Publicity produces a general awareness in 85% of a sample, but however publicity alone is not always sufficient.

Several studies have published examples where extensive national and local exposure on television, radio and in the media resulted in response rates below ten percent (Gibson, 1995). This concludes that it is not publicity per se, but the type and quality of publicity that makes a significant difference. The Working Group on Product Recalls pointed accusing fingers at both the media and themselves. They concluded that three barriers limit recall efficacy, cost and difficulty of informing consumers about recalls that receive little media coverage, less and inconsistent media coverage of most recalls, and low response rates of even informed consumers to many recalls (Seltzer, 1990). In short, as a company it is extremely important that you create the right type of publicity, via the most targeting channel and with a message that involves content that its public understand. On the other hand, no matter what a company does, certain percentages either does not receive the information or do not act on it. Even with the new recall programs and the technology of these days some consumers simply do not return the products even if they are aware of it (Gibson, 1995).

2.2.3. Product recall campaign communication rules

In the *'handling product recall'* section we have concluded that it is necessary to create the right type of publicity in combination with a message that has the content that understands the public or target group. We also have compared different product recall cases in both the durable- as the non-durable goods industry. According to those two subsections and the following analysis, we can conclude that companies indeed are able to 'steer' the result of a product recall. (Gibson, 1995) has set up twelve product recall communication rules that must be taken into account in the way of handling your campaign. This research is focusing on the impact of a product recall on the change in consumers' perception and therefore the most important handling or communication elements of Gibson (1995) that could have an impact on this changing perception have been highlighted below. Besides, these communication elements play an important role in distinguishing the mild/severe and product category aspect.

16

Be Candid. Openness is important in relations between consumers and manufacturers. Recent examples corroborate this opinion. A Tylenol recall participant recalled the key to their success in saving the product and retaining the image of our company was their openness with their consumers, their employees, and the government agencies involved (Broom, 1994).

Be Consistent. If PR messages are even slightly inconsistent, media attention will most likely focus on that. The fact that inconsistent communication occurs in product recalls mostly results in too much, too often communication to employees, government agencies, media and the consumer. It gives the impression that the company is out of control (Gibson, 1995).

Be Contrite. It doesn't hurt to say you're sorry, and it doesn't admit legal liability. Indeed it shows confidence and it creates sympathy with the public. "We recalled, we recycled, we publicly acknowledged we made a mistake" Perrier group CEO Ronald David said (Winter, 1990).

CEO Involvement. Consumers respond better to recall information disseminated by CEO's. One study found that subjects reacted more favorably to the recall when a corporate officer made statements (Mowen, 1979). If the information comes from the top consumers notice that the product recall will be handled seriously and in a proper way. The message will reach the consumer target easier.

Be Credible. Especially, a primary consumer product recall PR objective involves credibility. The success of the Tylenol recall was attributed to credibility, from a PR and corporate credibility standpoint, the Tylenol recall was perhaps perceived in the end more in positive than in negative terms (Jackson, 1990).

Be Quick. Finally, prompt action is essential to minimize consumer product recall problems. One recall analyst declared that it is absolutely essential that all the steps be taken promptly, because time is most important (Aon.com). Another attributed the success of the Tylenol recall to Johnson and Johnson's ability to reach all of the media as quickly and simultaneously as possible (Gibson, 1995).

When being involved in a product recall situation, these six communication rules are the most important steps to take in order to keep the customers' perception stable. Although this research does not involve the communication element, it has a huge influence on the customers' perception and therefore it is worth mentioning.

2.2.4. Threat or opportunity?

After having discussed how important a decent way of handling a product recall is and how communication plays a determinant role in the creation of the customers' perception, it would be interesting to look at a product recall from a different perspective. Most companies interpret a product recall as something extremely negative. They regard recalls as a threat and are very remorseful about announcing them. According to manufactures a recall announcements somehow imply inefficient design systems and lack of quality control techniques, even though many of the world best known multinationals have been reporting and recalling broken or harmful products. However, a company can view product recall as an opportunity.

According to Fisk and Chandran (1975) a product recall could also be used as a sign of professionalism and confidence. They give a couple reasons why a product could has a positive impact on the companies' image and even market share.

First, in the situation of a product recall you have the ability to show the customer that a product safety problem is being handled professionally. This can be proof that the quality control system to protect the customer, even after the product has been sold, is working properly. This service offers many unexploited opportunities for extending customer loyalty (Fisk and Chandran, 1975).

Second, a well working product traceability system can provide a legal defense in many product liability cases. This can also help a producer to understand his distribution system better. For instance, the situation of a product recall mostly asks for a reverse of backward channel of distribution in order to get the products back. This could also be valuable in case the company wants to recycle sold products (Fisk and Chandran, 1975).

Third, a product recall enables the manufacturer to keep in contact with the consumer. Companies spend a lot of energy and money to determine what customers will buy, but they rarely know how the consumer thinks about the product after purchase (Fisk and Chandran, 1975).

Finally, the knowledge the company gains with the fact that a product does not work properly, even though it passed the companies' test phase, will give the company new valuable insights, which they can use in the long run for developing better products (Fisk and Chandran, 1975).

In fact you can approach a product recall from two different sides, from a negative but also from a positive perspective for the particular company involved. The negative side of a product recall is generally known, but the positive side is relatively unknown. Important is the ability to trace your sold product, reach the right consumer on time and provide the target public with a message that involves key information. In fact, you can say that a company is able to control the outcome of a product recall if they handle it in a responsible and accurate way (Fisk and Chandran, 1975).

2.3 Theoretical Framework

The theoretical framework of this study consists out of four components. The first component is the independent variable, consisting out of the five underlying factors of the likelihood of purchase. These factors are Perceived Quality, Product Reliability, Product Reputation, Product Loyalty and Price Perception. The second component is the dependent variable, Likelihood of Purchase. The two components that complete the framework are the moderating influence of a product recall scenario and the distinction between the two product categories, durable- versus non-durable goods.

2.3.1 Durable goods versus non-durable goods industry

The distinct this research makes compared to the previous research within the area of the changing perception of the customer as a consequence of a product recall, is the fact that this thesis is trying to find a significant difference in perception change between product recall scenarios occurring in the durable goods compared to the non-durable goods industry. It would be interesting to find out if a customer treats one product recall different than the other. Below you find a more detailed description about the difference between the two product categories involved in this thesis.

Durable goods

Durable goods are a category of consumer products that are made for a longer period of time. Therefore the buy frequency is low, but the product lifetime is long. For example, we categorize a washing machine, car or telephone to the category durable goods. An important advantage of a durable good product is its traceability. Therefore traceability and recall are not difficult when dealing with durable goods. Although their variety and complexity create problems, the manufacturer can establish a workable plan by using warranty cards. The warranty should be pre-coded with all information for tracking the product at the manufacturing plant and in the distribution system. He can also use the cards to obtain information from the consumer, which can be automated for fast retrieval. Complaints should also be automated. By analyzing these two systems the company can warn consumers if it notes anything inappropriate (Fisk & Chandran, 1975).

Warranty cards are sometimes not returned because (a) many customers know that they can sue regardless of whether they return them, (b) they are full of disclaimers that make their return meaningless, and (c) customers identify them as tools for collecting market research information. Emphasizing the benefits of returning these cards should strive manufacturers to improve credibility. (Fisk & Chandran, 1975). The easiness of recalling durable goods could be considered as an advantage when a product recall occurs.

This structure of the hypotheses will be set up as follows. First, the effect of a different product recall scenarios on the likelihood of purchase will be tested. Second, the direct effect of the five underlying factors on the likelihood of purchase will be measured.

Third, the effect of the different product recall scenarios on the five underlying factors will be pointed out. Finally, a three-way interaction is conducted in order to find a possible moderation effect of the recall on the relation between the five underlying factors and the likelihood of purchase. Below the related hypotheses have been summed up.

H1: A product recall has a negative effect on the purchase likelihood

H1b: The more severe the recall the more negative the effect on purchase likelihood

H2: The durable good industry has a lower likelihood of purchase than non-durable goods

Due to the fact that products within the durable goods industry are easier to trace compared to products within the non-durable goods means that the customers involved can be targeted more precisely. In that way it is expected that customers involved in a durable goods product recall situation will be notified quicker, which means less accidents happen.

Non-durable goods

Non-durable goods are the opposite of durable goods. This category involves products that are either immediately consumed or ones that have a product lifetime of less than 3 years. For instance, products that will be considered as non-durable goods are food, clothing and beer. In general, the buy frequency is high, but the product lifetime is short. Tracing nondurable goods are more difficult than tracing and recalling durable goods because complex problems arise at all stages of the production, packaging, and use cycle (Fisk & Chandran, 1975). For non-durable goods consider two stages: 1. *Production stages*: In the situation of a recall, it is essential that pre-production and production data be quickly traced to locate possible sources of problems. 2. *Finished products, packaging and distribution*: Systems to implement production coding and other traceability information can cover a wide range of sophistication (Fisk & Chandran, 1975). Although there are many alternatives, uncoded and coded production data marked on the product itself uses two common systems. With these markings the producer can trace data on (a) the warehouse, distributor, retailer, or store to which the product was shipped. (b) The way of shipment, and (c) production and place. In addition, cross-filing shipping invoices by product, place of destination, and way of shipment can facilitate quick traceability. According to the above, the following hypothesis has been set up:

20

H3: A recall has a more negative effect on purchase likelihood for non-durable versus durable goods

2.3.2 Likelihood of purchase variables

Likelihood of purchase can be defined as the desire that someone has to purchase one product instead of its equal competitor. Another commonly used definition of likelihood of purchase is that it is the economic value that a consumer is willing to sacrifice in order to acquire a certain utility (Shogren *et al.*, 1994). For companies that want to offer their products, the measurement of likelihood of purchase is an important analysis. It is important how pricing, importance of attributes, and consumer's loyalty to a specific segment is influencing the likelihood of purchase to obtain competitive strategies. When measuring likelihood of purchase, it is important to collect data in a setting that is as realistic as possible (Miller *et al.*, 2011). In economics, the intangible value of a good (or services) to the individual that play a sufficient role in the decision to purchase a product. Collectively, likelihood of purchase within this research consists of five dimensions: *product loyalty, product reputation, product reliability, perceived quality of a product, and price perception*, as proposed by Aaker (1991, 1996) and Keller (1993). In this research these dimensions are used to explore the findings of marketing and consumer behavior research in relation to likelihood of purchase (Barwise, 1993); thus, this study develops a likelihood of purchase measure that capitalizes on these dimensions. According to the theory it is not expected that there is an interaction effect between the five factors and the likelihood of purchase. In that way the five hypotheses below have been based on the relation between the two variables. In order to test what the influence of the five underlying factors on the likelihood of purchase is, the following hypotheses have been set up.

Perceived quality is ``the consumer's judgment about a product's overall excellence or superiority'' (Zeithaml, 1988, p. 3). It therefore is based on consumers' or users' (i.e., not managers' or experts') subjective evaluations of product quality. Basically, previous studies suggest that consumers use unit price information as a measure of quality and therefore making purchase decisions (Zeithaml, 1985). The following hypothesis has been created in order to test what kind of influence a product recall has on the perceived quality of the consumer after being exposed to a product recall within the two product categories. In general customers value products more according to their higher price and their longer product lifetime, and the positive word of mouth regarding the particular product. In that way, the higher the perceived quality, the bigger is the likelihood of purchase. Therefore the following hypotheses has been set up:

H4a: Perceived quality has a positive effect on the likelihood of purchase

Product reliability is the ability of an existing brand name to act as a heuristic to reduce consumers' perceptions of risk when evaluating a brand extension in a particular product category (Aaker, 1991). In the durable goods product category reliability is mainly based on previous experience and price. In the non-durable goods industry mostly brand name and brand image could be a reference for product reliability. The same thing is expected for the creation of product reliability perception.

The perception of reliability is based on experience and the trust a consumer has in the product. The more reliable a product is, the more eager a consumer is to purchase it. The following hypothesis has been created in order to test what kind of influence a product recall has on the product reliability perception of the consumer after being exposed to a product recall.

H4b: Product reliability has a positive effect on the likelihood of purchase

Product reputation is a created status that a consumer has about a specific product based on the aggregated experiences of themselves and others (Aaker, 1991). Thus, product reputation consists of both brand recognition and recall (Rossiter and Percy, 1987; Keller, 1993), which in this research will be compiled as product reputation. Within the durable goods industry reputation has been build up via previous experience over a longer period of time. Therefore it is expected that the reputation has a positive effect on the likelihood of purchase. The following hypothesis has been set up:

H4c: Product reputation has a positive effect on the likelihood of purchase

Aaker (1991, p. 39) defines product loyalty as ``the attachment that a customer has to a product. In this study, product loyalty refers to the tendency to be loyal to a product, which is demonstrated by the likelihood of purchase the product as a primary choice (Oliver, 1997).

According to the case based study and the article of Heerde *et al.* (2007) it is expected that product loyalty could be influenced due to a product recall situation in the case of non-durable goods. For durable goods the loyalty of a consumer regarding a product involves several aspects. Certain aspects that a consumer creates of over a longer period of time and are difficult to influence or change with one product recall scenario. In that case the following hypothesis has been created:

H4d: Product loyalty has a positive effect on the likelihood of purchase

Holbrook and Corfman (1985) maintain that price perception is situational and hinge on the context within which an evaluative judgment occurs. For instance, in the beverage category the frame of reference used by the consumer in providing meanings included preparation, consumption and point of purchase (Zeithaml, 1988). In the telephone category price perception depends from different aspects, such as quality, features, previous experience or brand. The following hypothesis has been created in order to test what kind of influence a product recall has on the price perception of the consumer after being exposed to a product recall within the two product categories. Due to the fact that it is easier to switch between products the perception of price will not be influenced easily. However, when the perception of price about a product is positive, it will positively influence the likelihood of purchase of that certain product. Therefore it is expected that a product recall does positively influence the likelihood of purchase.

H4e: Price perception has a positive effect on the likelihood of purchase

Now we have mentioned the hypotheses that measures the influence of the relation of five factors on the likelihood of purchase, it will be interesting to find out in what way a product recall influence the five underlying factors of the likelihood of purchase. Also, does the severity of the recall and a different product category make a difference regarding this influence? These hypotheses will give the core of the study, in what way does the consumers' perception change after being exposed to a recall, a good insight. The following four hypotheses below have been set up to test this:

H5a: A product recall has a negative effect on the five underlying factors of purchase likelihood

H5b: the more severe the recall the more negative the effect on the five underlying factors of purchase likelihood

H6: The durable goods industry has a lower effect on the five underlying factors of purchase likelihood than non-durable goods

H7: A recall has a more negative effect on the five underlying factors of purchase likelihood for non-durable versus durable goods

Finally, it is interesting to find out if a product recall has an effect on the relation between the five underlying factors and the likelihood of purchase. Therefore the following and last hypothesis has been created:

H8: There is no effect of recall on the relation between the five factors and the purchase likelihood

2.3.3. Brand equity between product categories

Brands represent enormously valuable pieces of legal property, capable of influencing consumer behavior, being bought and sold, and providing the security of sustained future revenues to their owner. The value directly or indirectly accrued by these various benefits is often called brand equity (Kapferer, 2005; Keller, 2003).

Brand equity deals with the comparison of two products that are identical in all respects except brand name (e.g., brand X vs. brand Y). All consumers could have an impression of what brand X conveys about a product are, but they do not have a similar impression about what brand Y conveys. It could be that brand Xs' brand equity has extra value embedded in its name, as perceived by the consumer, compared with an otherwise equal product without that name. The difference in consumer choice between these two products can be assessed by measuring the likelihood of purchase or a preference for the local brand in comparison with the no-name counterpart. According to Aaker (1991, 1996), brand equity is a multidimensional concept. It consists of brand loyalty, brand awareness, perceived quality, brand associations, and other proprietary brand assets. However, this research does not make use of any brand names, brand equity will be seen as the associations the consumer has with the product within the particular product categories. It depends in what way the consumer attaches value to the perceived quality, loyalty, reputation, price perception and the reliability of the product of the non-durable good beer, compared to the durable good telephone. Moreover, this study mainly focuses on the change in perception regarding the product category instead of the brand. In fact, brand equity changes to product equity. The same elements play a role in the perception creation, only the brand (name) does not have any influence.

There are several instruments to measure the consequences of a product recall. One of the research methods is considering the stock prices of a company before and after a crisis. Another instrument is the brand equity (Keller, 1993). In comparison with each other, brand equity allows you to analyze several aspects regarding the company, product or customers in a broader way, and therefore gives you a deeper insight into the process of perceiving recalls. Hence, measuring the stock prices includes only one variable.

The variables in this research disaggregate both from the dependent variable likelihood of purchase as from brand equity.

Yoo and Donthu (2001) first distinguish consumer-based brand equity from firm-based brand equity. They describe consumer-based brand equity as a measurement of behavioral and cognitive brand equity at the individual consumer level. It construct is important from a strategy-based motivation to understand customer behavior and their changing perception and therefore to improve marketing productivity.

In this research the consumer-based brand equity will be central, because this element will give better insides in the behavior of the customer at the individual consumer level before and after the product recall. Keller (1993) explains customer-based brand equity as 'the differential effect of brand knowledge on consumer response to the marketing of that brand'.

This means that customer-based brand equity involves consumers' reaction to an element of the marketing mix for that brand or product in comparison with their reactions to the same marketing mix element attributed to a fictitiously named or unnamed version of the product or service. Customer-based brand equity arises when consumers develop promising associations to a particular product or service. According to Aaker (1991), consumer-based brand equity provides value to customers by enhancing their confidence in the purchase decision, interpretation and processing of information, and satisfaction. Likewise, Keller (1993) proposes that improving brand equity results in the ability to stimulate the customer information search, it improves marketing communication efficiency, licensing opportunities and command larger margins from consumers.

2.3.4. Conceptual framework

According to the hypotheses, the following framework can be made:
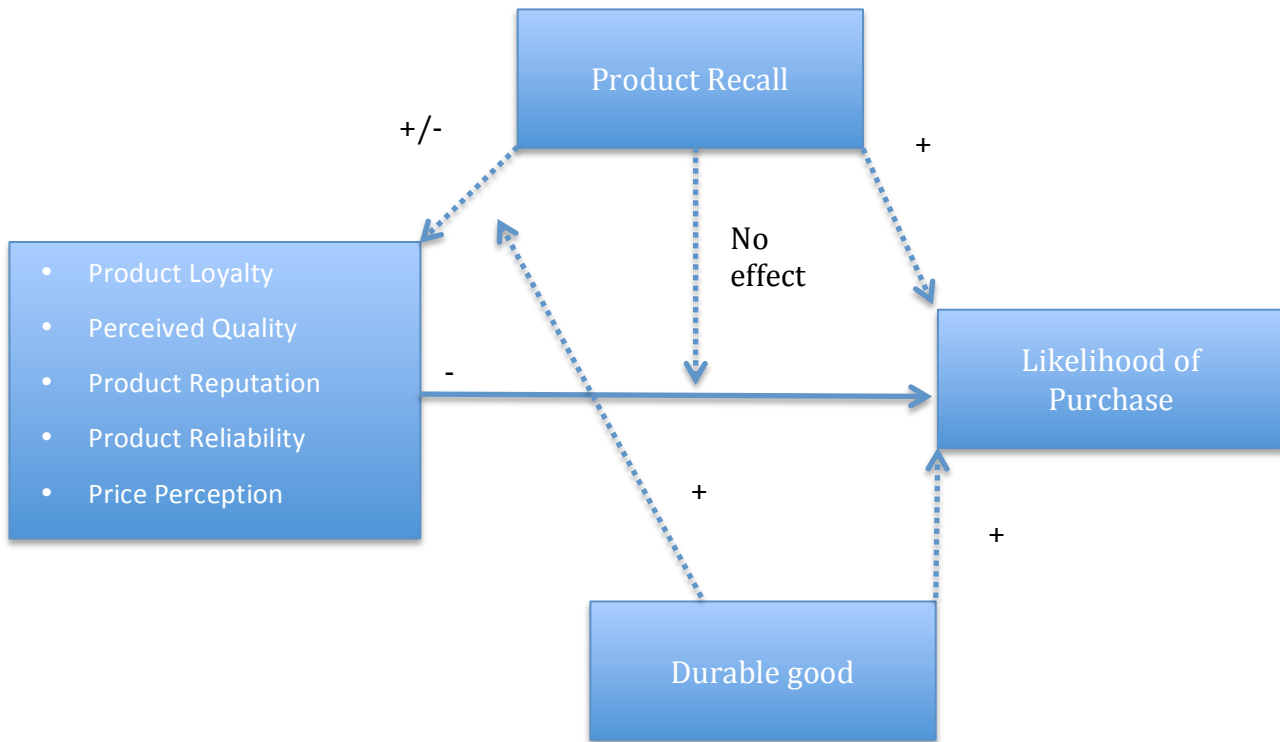
3. Method

Now it is clear where the research is about and the most relevant theory regarding the topics has been presented, the method of the research will be explained. This will be done by the explaining the research design, the way the research has been conducted and in how the sample size has been collected.

3.1 Experiment design

Until now, no research has been done about what kind of effect a product recall has on the likelihood of purchase between the product categories beer and telephones. The research design includes the way of measuring the effect of a product recall on the variables product loyalty, product reputation, product reliability, perceived quality and price perception. By measuring this effect the degree of impact on the likelihood of purchase can be derived. The same research will be done for both the telephone-, as the beer industry. In that matter it is possible to find a difference in the effect of a product recall between two product categories.

For this research six different questionnaires will be set up. Four out of six questionnaires include a product recall, the other two will be conducted as control questionnaires. This is needed in order to find a potential effect. The four product recall questionnaires are almost similar; the only thing that differs is the product category (beer/telephone) and the reason (mild/severe) for the product recall. On average, both products will be used on a regularly basis and they belong to different product categories; non-durable goods industry (beer) and durable goods industry (telephone). Beers will be consumed within a relatively short time, but the purchase frequency is high. For telephones it is the other way around. From a research perspective it would be interesting to see in what way the response of the respondents differs if you compare the questionnaires of both product categories.
The two control questionnaires will only differ in product category, no product recall scenario is included here. Below a more detailed description about the set-up of the different questionnaires is given.

In order to test the hypotheses 4a t/m 4e, the influence of a product recall on five derivative variables from likelihood of purchase on two different product categories have been tested. All the items relating the to be tested variables were selected on reliability as well as relevancy for this research. Discussed below are the various scales and their sources used to construct the survey. All items are rated using a seven-point Likert-type scale, ranging from strongly disagree to strongly agree. Questions for age and gender are also included in the questionnaire.

3.2 Measure instruments

Dependent variable

   Likelihood of Purchase can be defined as the desire that someone purchases one product instead of its equal competitor. Another commonly used definition of likelihood of purchase is "that it is the economic value that a consumer is willing to sacrifice in order to acquire a certain utility" (Shogren *et al.*, 1994). For companies that want to offer their products, the measurement of likelihood of purchase is an important analysis. The likelihood of purchase has been derivative in five independent variables, which are described below. These five independent variables together represent likelihood of purchase variable.

Independent variables

   Perceived Quality is defined as 'the consumer's judgment about a product's overall excellence or superiority' (Aaker, 1991). The perceived quality is subjective; it depends on consumers' evaluations of product quality. In this research the perceived quality of the non-durable and durable good after the influence of a product recall has been taken into account. A scale for perceived quality can be found in Yoo, Donthu and Lee (2000). This scale captures a consumers' general sense of a specified brand/product, in other words the perceived quality of that specific brand/product.

   Price Perception relies according to Lichtenstein *et al.* (1988) on 'their perception of its fairness'. Price fairness is considered, as the decision of a transaction is acceptable. (Bolton *et al.*, 2003). The price fairness concept incorporates two conceptually distinct components: social and economic components (Maxwell, 1995). Based on a social aspect, price is viewed as a tool of exchange that operates according to social rules and regulations; hence, a socially acceptable price is a fair price for consumers. On an economic theory, consumers will consider a price fair as long as the price is able to cover the cost of the benefits they will receive. In this research the price perception of the non-durable and durable goods after the influence of a product recall has been taken into account. A scale of price perception can be found in the article of Janiszewski and Lichtenstein (1999) where price perception will be measured according to the Range Theory.

   Product Loyalty is the attachment that a customer has to a brand/product (Aaker, 1991). It can also be seen as the consumer's commitment to repurchase or continue using the brand/product. True brand/product loyalty has been defined by Odin et al. (2001) as repeat purchase behavior under the condition of strong brand sensitivity.

28

This means that a measure for repeat purchasing behavior had to be included in the survey to draw some implications about true brand/product loyalty. Since this research focuses on repeating purchasing behavior instead of aiming at brand specific loyalty, the scale of Bruner et al. (2005) was used.

In this research the product loyalty of the non-durable and durable goods after the influence of a product recall was used.

Product Reputation is used in this research as an overall term to describe the way consumers view and judge the particular products involved. It also shows in what why the perception of product image has changed after the influence of the product recall. This has been done according to items that test the change in perception and associations of the consumer relating the particular products.

Product Reliability is defined as the confidence that one will experience as desire rather than what is feared (Deutsch, 1973). It represents the confidence that the relational party in an exchange will not exploit another's vulnerability. Accordingly, to trust a brand or product implicitly means that there is a high probability or expectancy that the brand/product will result in positive outcomes for the consumer. In this research the product reliability of the non-durable and durable good after the influence of a product recall was used.

To measure the effect of a product recall on the likelihood of purchase, particular items within the control questionnaire will be compared with the same items asked in the product recall questionnaire. By doing this, the research tries to find a significant difference between the answers given in order to measure an effect. In Appendix 1.3 an example of the specific items that represent the variable Likelihood of Purchase is presented. All questions, except question 3, are asked positively. The third question is asked negatively. Therefore, this question has been converted into a positively asked question.

The same method will be used to measure the effect of the fictive product recall reason on the likelihood of purchase for both the non-durable as the durable good product category. In the first place you can measure the effect of the different reasons (mild/severe) within a product category, for example beer. Secondly, you can compare the results of the beer category with the results of the telephone category. In that matter it is possible to find out if, for instance, harming the consumers' health plays a role in the perception change relating to the likelihood of purchase between the two product categories.

3.3 Survey experiment

Questionnaire (telephone): the first two durable good questionnaires include 55 items about a fictive telephone brand. In the beginning of the questionnaire a product recall announcement will be showed to the respondent. This announcement presents a fictive product recall about telephone brand X of company Callcell. After reading this announcement the respondent will be asked to fill out a couple of questions regarding their perception towards telephone brand X. These items will mainly focus on the variables product loyalty, -reliability, -reputation, perceived quality and price perception in order to find out if the product recall has an effect on the likelihood of purchase.

One questionnaire about telephones will include a fictive product recall with a mild reason for recalling the product. In this case the antenna does not work properly. For the company this is enough reason to recall the product, but it cannot harm the consumers' health.

The second questionnaire will include a fictive product recall with a severe reason for recalling the product. In this case the possibility exists that the battery could explode. Obviously, this could be harmful for the consumers' health. Both of the product recalls will occur within two weeks after purchase.

Below (figure 2) you will find an example of the product recall announcement presented in the durable good questionnaire:

Figure 2. Fictive product recall announcement

PRODUCT RECALL ANNOUNCEMENT

To our regret, within a limited number of telephones of brand X a potential problem with the signal has occurred. Due to this issue, Callcell cannot meet their quality requirements anymore. Therefore, we request you to check the information below. If the telephone meets the following specifications, we ask you not to use the telephone anymore.

The telephones of brand X purchased between the period February 1st and March 15th 2015 are involved. For all other X products, this call is not applicable.

For a full refund of the purchase price, cut the upper side of the package and send it before May 15th 2015 to: X recall, Freepost 124, 1122 AB Amsterdam. There is no need to put a stamp. Put in your letter your name, address and bank account number, so that the purchase price can be paid.

For more information a special line is created at 0800 077 088.

Sorry for the inconvenience.
NB: other parties involved are informed correctly.

Questionnaire (beer): the first two non-durable good questionnaires include 56 items about a fictive beer brand. In the beginning of the questionnaire a product recall announcement will be showed to the respondent. This announcement presents a fictive product recall about beer brand X of company Beer4U. After reading this announcement the respondent will be asked to fill out a couple of questions regarding the perception of the customer towards beer brand X. The questions will mainly focus on the variables product loyalty, -reliability, -reputation, perceived quality and price perception in order to find out if the product recall has an effect on the likelihood of purchase.

One questionnaire about beer will include a fictive product recall with a mild reason for recalling the product. In this case the taste does not meet the companies' requirements. For the company this is enough reason to recall the product, but it cannot be harmful for the health of the customers. The second questionnaire will include a fictive product recall with a severe reason for recalling the product. In this case the possibility exists that the beer has been infected with the Salmonella bacteria.

Obviously, this could be harmful for the health of the customers. Both of the product recalls will occur within two weeks after purchase.

Control questionnaires: in order to find an effect two control questionnaires will be set up, where respectively 31 items will be asked in the telephone (durable good) questionnaire and 32 items in the beer questionnaire (non-durable good). These questionnaires will not include a product recall, but just ask the consumers' perception questions about either beer brand X or telephone brand X. Data from both the product recall as the control questionnaires will be collected and compared with each other in order to find an effect of a product recall on the likelihood of purchase between the two product categories.

Measuring the likelihood of purchase will be done according to Yoo and Donthu (2001), who built on the brand equity elements from Keller (1993) and Aaker (1991). All items will be evaluated with the seven-point Likert scale. The items consist of seven components: five likelihood of purchase components, one product recall component and one (non)-durable good component. After the product recall announcement the respondents will start with the likelihood of purchase component that will be measured via five variables derivative of likelihood of purchase. Following, the items related to the product recall will be asked and the questionnaire will end with the last five items about the consumers' perception regarding (non)-durable goods industry.

3.4 Respondents

For this research the respondents were targeted via social media and email. People varying from all ages and nationalities are able to fill out the questionnaires. Because the research is not limited to a particular market no limitations on this area are needed.

However, the majority of the respondents were Dutch and a small part of the sample representatives have a different nationality. The number of questionnaires has been equally divided over the six versions, in this way all the questionnaire would be filled out by approximately the same amount of respondents. The different versions of the questionnaires will be assigned randomly to respondents.

3.5 Independent t-test

The independent t-test compares the means between two unrelated groups on the same continues, dependent variable. In this research it is mainly used to find a significant difference between the several product recall scenarios and the product categories regarding their involvement in the effect of a product recall on the likelihood of purchase or a product recall on the five factors.

3.6 One and Two-way ANOVA analysis of variance

To better understand the influence of the product recall on the five variables that represent the likelihood of purchase between the two product categories and in what way the different product recall scenarios differ from one another regarding this influence a one-way and two-way ANOVA analysis of variances has been conducted.

Also, the same analysis of variance has been performed in order to find out what the direct impact of a fictive product recall is on the likelihood of purchase within the durable- and non-durable good product category. By comparing the average means of the different likelihood of purchase variables of the different groups it is possible to find a potential effect of the different product recall variations on the likelihood of purchase variable. Also a potential effect of the different product recall reasons can be found by comparing the likelihood of purchase average means of the durable goods and the non-durable goods category.

3.7 Regression analysis

The multiple regression will test what kind of impact a product recall scenario has on the likelihood of purchase, the five underlying factors of the likelihood of purchase. Additional, a three-way interaction has been conducted in order to test the influence of the product recall scenario on the relation between the five factors and the likelihood of purchase.

4. Data

This chapter gives an overview of the sample profile, normal distribution of the data and findings from the reliability test that was conducted. This in order to make sure that further analysis will be based on correct data. The analysis is performed in IBM SPSS Statistics, version 23.

4.1 Data analysis

Preparing data

In total 615 respondents started filling out one of the six questionnaires. Unfortunately, only 430 respondents fully completed the questionnaire, which means the data of 185 respondents was not useful for this experiment. The data of these respondents has been removed from the dataset. With a total of 430 respondents every questionnaire has an average of 70 respondents, assuming this was big enough for the sample size. Due to the fact that the respondent was mandatory to answer before proceeding to the next part of the questionnaire, no errors occurred. For the first control item and the last two demographic items the respondents could mark a nominal answer. For all the other items the seven-point Likert-scale (1 = strongly disagree / 7 = strongly agree) was used. In order to control if the respondent have filled out the questionnaire appropriately, one of the nine items that test the likelihood of purchase have been asked positively instead of negatively. This had to be reversed to prevent errors in the dataset and during the tests.

In case of the measuring scales recoding of several items needed to be done as well. The range of the seven-point Likert-scale went from 1 (strongly disagree) to 7 (strongly agree), but due to transferring the data to SPSS several items shifted to different values. Again, to prevent errors during the test and invalid results, all odd items needed to be recoded into the same values.

Finally, because the six different questionnaires were randomized sent out to the respondents, the data was collected in one database. In that matter, it was necessary to split up the compiled set into six different parts representing the six different questionnaires. By doing this a clear overview of the data of the different questionnaires was created. From this point the data was ready for testing.

4.2 Sample

Regarding gender, in all the six surveys males are overrepresented in comparison with females. Out of the 430 respondents, 276 males have participated. This is 64% of the total sample.

However, the remaining 36% (n=154) is still big enough to assume the sample size as valid. The distribution of males versus females in the six questionnaires is the following (see Appendix 2.3 for SPSS table):

Table 1. Distribution sample size - Gender

Situation	Males	Females	Total respondents
Six-pack beer (mild)	42 males (60.9%)	27 females (39.1%)	N = 69
Six-pack beer (severe	47 males (71.2%)	19 females (28.8%)	N = 66
Telephone (mild)	43 males (61.4%)	27 females (38.6%)	N = 70
Telephone (severe)	49 males (73.1%)	18 females (26.9%)	N = 67
Telephone general	43 males (56.6%)	33 females (43.4%)	N = 76
Beer general	52 males (63.4%)	30 females (36.6%)	N = 82

Overall, the distribution of males versus females is not equally divided; the males are in all questionnaires the dominant gender. In terms of total respondents, the average is 72 per questionnaire, which is a sample size big enough to gain your conclusions from.

Concerning age, if we create three age groups, 29 or under, 30 - 50 and 51 or over, they are not equally divided. The group with age <29 consists out of 105 respondents, which is 24% of the total. The middle group with age of 30-50 consists of 150 respondents, which is 35% of the total. The oldest group with the age of 51 or higher consists of 175 respondents, which is equal to 41% (Appendix 2.3). The oldest group is overrepresented, followed by the middle and the youngest group.

Reliability test

A reliability analysis exists of calculating the Cronbach Alpha of the relevant variables. In order to conduct a valid reliability analysis the means have been calculated. After deleting errors and items in the dataset the Cronbach Alpha of this dataset was significant. In general, the Cronbach Alpha has to be > 0.70. The reliability test includes the nine items, which represent the likelihood of purchase variable. After testing the variable Cronbach Alpha is 0.905 (Table 2). With this value we can conclude that the test is reliable and the data is reliable enough to work with. Since the items where used in previous research this result was expected. Furthermore, no items should be withdrawn from the list, because every Cronbach's Alpha will be lower (Appendix 2.1).

Table 2. Reliability test

Cronbach's Alpha	N of Items
.905	9

Normal distribution

In order to make sure that the right parametric tests are used, some assumptions need to be checked. One of these assumptions is that there is normally distributed data. When the sample data are approximately normal, then the distribution of the sampling will be as well. Especially with a rather small sample size per questionnaire, average 72 respondents, it is important to check normality.

For this study the producing histogram with a normal curve checks the normality of the likelihood of purchase variable. When the normality distribution tends to show possible Skewness or Kurtosis of > +/- 0.5, both Skewness and Kurtosis and their standard errors will be checked. Based on these results, the variables are either named non-parametric or normally distributed. This gives the following information about normality:

- **Likelihood of purchase total:** normally distributed
- **Normative evaluation:** the histogram shows a tendency for normative evaluation to be negatively skewed. Meaning that there is a pile-up of scores on the right side of the distribution. Statistics identify a Skewness of -0.467 and a Kurtosis of 0.241 (Appendix 3). This leads to the conclusion that indeed the likelihood of purchase variable is normally distributed and no it is not necessary to check the Skweness and Kurtosis and their standard errors.

All outcomes and histograms are displayed in Appendix 3.

5. Results

The following chapter presents the results that originate from the hypotheses and analysis in SPSS. Each section describes a hypotheses and the analysis that has been performed in order to reject or accept the hypothesis. All relevant SPSS output is presented in Appendix 4.

5.1 Influence product recall on likelihood of purchase

H1: *A product recall has a negative effect on the likelihood of purchase*

In order to test hypotheses H1, an independent t-test has been conducted. Within this test the control group has been compared to the combined mild/severe scenario groups regarding their influence on the likelihood of purchase.

Table 3. Independent t-test. Influence recall on LoP – control versus mild/severe group

Dependent Variable: *Likelihood of purchase*

Like	Levene's test for Equalty variances		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.060	.807	*.031**	.21149	.09781
Equal variances not assumed			.032*	.21149	.09800

*. Significant at the 0,05 level.

According to the table there is a significant difference between the no recall- and the combined mild/severe product recall scenarios in terms of influence on the likelihood of purchase. The Levene's test tells us that we can assume that the population variances are equal (.807 > 0.05). The *p*-value is .031, which is significant on a Sig. < .05 level. Checking the means, we can conclude that the more severe the recall, the higher the likelihood of purchase.

H1b: *The more severe the recall the more negative the effect on the likelihood of purchase*

A one-way ANOVA between groups analysis of variance has been conducted to explore the impact of a product recall on the likelihood of purchase. Subjects were divided into three groups; none, mild and severe.

The multi comparison table (table 4) shows that the product recall severe scenario and no product recall do significant differ from each other (p = .006) on Sig. < 0.05 level. Also, the difference between the mild and severe scenario can be seen as a significant difference, although on a Sig. < 0.10 level with a p – value of .054.

Table 4. One-way ANOVA of likelihood of purchase. Comparisons of severity of recall

Dependent Variable: *Likelihood of purchase*

(I) Recall	(J) Recall	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
None	Mild	-.0780	.11267	.768	-.3430	.1870
	Severe	-.3510	.11402	*.006***	-.6192	-.0829
Mild	None	.0780	.11267	.768	-.1870	.3430
	Severe	-.2731	.11752	*.054**	-.5495	.0034
Severe	None	.3510	.11402	*.006***	.0829	.6192
	Mild	.2731	.11752	*.054**	-.0034	.5495

*. Significant at the 0,10 level.
**. Significant at the 0.05 level

Checking the means in the descriptive table (severe = 5.1, no recall = 4.7) indicates that a product recall does not have a significance negative effect on likelihood of purchase, but a significant *positive* effect on the likelihood of purchase. Additionally, the more severe the recall, the more positive is the effect on the likelihood of purchase. Above mentioned results indicate that both hypotheses H1 and H1b are *rejected,* but point out that there is a direct positive effect of a product recall on the likelihood of purchase and that the severity has a positive influence as well.

H2: *The durable goods industry has a lower likelihood of purchase than non-durable goods*

Table 5. Independent t-test. Durable versus non-durable effect on LoP

Dependent variable: Likelihood of purchase

Like	Levene's test for Equalty variances F	Sig.	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Equal variances assumed	.853	.356	*.018**	.22418	.0942
Equal variances not assumed			.018*	.22418	.0942

*. Significant at the 0,05 level.

According to table 5 there is a significant difference between the durable and the non-durable product category regarding their influence on the likelihood of purchase. The Levene's test tells us that we can assume that the population variances are equal (.356 > 0.05). The p-value is .018, which is significant on a Sig. < .05 level. According to the means (non-durable = 5.0, durable = 4.8) the non-durable goods have a more positive influence on the likelihood of purchase compared to the durable good category.

H3: *A recall has a more negative effect on purchase likelihood for non-durable versus durable goods*

According to the two-way ANOVA test (table 6) there is a statistically significant difference $p = 0.016$ with Sig. < .05 level between the two product categories relating the likelihood of purchase. However, table 6 does not show which of the two product categories has a significantly more negative likelihood of purchase. The profile plot (figure 1) shows that the likelihood of purchase line for the durable goods category is lower (average mean = 4.8) than the likelihood of purchase line for the non-durable goods industry (average mean = 5.0). This indicates that a recall has a more negative effect on the likelihood of purchase for durable goods compared to non-durable goods. This does not confirm the hypothesis and therefore this hypothesis is *rejected.*

Table 6. Two-way ANOVA of likelihood of purchase. Impact recall on durable/non-durable goods

Dependent variable: Likelihood of purchase

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	15.666[a]	3.133	.006
Intercept	10163.760	10163.760	.000
Recall	9.815	4.907	***.006**[*]*
ProductDurable	5.505	5.505	***.016**[*]*
Recall * ProductDurable	.504	.252	.765

*. Significant at the 0,05 level.

Figure 1 presents the impact of the different product recall scenarios for both product categories.

Figure 1. Impact product recall on LoP between two product categories
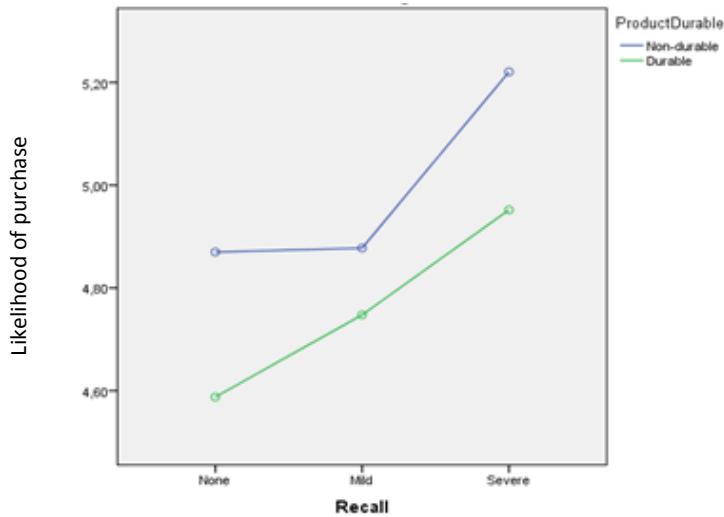
Based on figure 1 another test was done to see if there is a significance difference between the no recall- and the mild/severe scenarios for both product categories separately. To be more precise an one-way ANOVA after split file was conducted.

Table 7 shows that the difference between the no recall- and the mild/severe recall scenario for durable goods and non-durable goods is significant. For non-durable goods, the *p* – value is .056, which is not significant on a Sig. < .05 level, but is significant on a Sig. < .10 level. For the durable goods industry, the *p* – value is .081, which is also significant on a Sig. < .10 level.

These results indicate that the difference between the control- and mild/severe scenario regarding their influence on the likelihood of purchase for both product categories are significant.

Table 7. One-way ANOVA after split file on basis of product category

Dependent variable: Likelihood of purchase

ProductDurable		Sum of Squares	Mean Square	Sig.
Non-durable	Between Groups	5.535	2.768	*.056*[**]
	Within Groups	203.048	.949	
	Total	208.583		
Durable	Between Groups	4.728	2.364	*.081*[**]
	Within Groups	194.987	.929	
	Total	199.715		

**. Significant at the 0.10 level.

5.2 The effect of the five factors on the likelihood of purchase

In the first part of the analysis we have seen what the influence of the several product recall scenarios between the two different product categories was on the likelihood of purchase. Within the second part of the analysis the influence of underlying factors influence the likelihood of purchase will be tested.

The following hypotheses will be answered according to the analysis within this part.

H4a: *Perceived Quality has a positive effect on the likelihood of purchase*
H4b: *Product Reliability has a positive effect on the likelihood of purchase*
H4c: *Product Reputation has a positive effect on the likelihood of purchase*
H4d: *Product Loyalty has a positive effect on the likelihood of purchase*
H4e: *Price Perception has a positive effect on the likelihood of purchase*

N.B. Due to the missing control group relating the five factors all H4 relations cannot be tested properly. This could have led to unexpected results.

The correlation table (table 8) shows that there is a negative correlation between likelihood of purchase and all the five factors separately, which were all statistically significant. The strength of association between the dependent and independent variables is small, since the r – values lay all between -0.1 and -0.3.

Table 8. Correlation table between LoP and the five factors

		Lik	Quality	Reliability	Reputation	Loyalty	Price Perception
Lik	Pearson Correlation	1	-,177[**]	-,311[**]	-,379[**]	-,353[**]	-,198[**]
	Sig. (2-tailed)		,003	,000	,000	,000	,001
	N	430	272	272	272	272	272
Quality	Pearson Correlation	-,177[**]	1	,709[**]	,704[**]	,611[**]	,485[**]
	Sig. (2-tailed)	,003		,000	,000	,000	,000
	N	272	272	272	272	272	272
Reliability	Pearson Correlation	-,311[**]	,709[**]	1	,789[**]	,702[**]	,531[**]
	Sig. (2-tailed)	,000	,000		,000	,000	,000
	N	272	272	272	272	272	272
Reputation	Pearson Correlation	-,379[**]	,704[**]	,789[**]	1	,830[**]	,623[**]
	Sig. (2-tailed)	,000	,000	,000		,000	,000

		272	272	272	272	272	272
	N						
Loyalty	Pearson Correlation	-,353**	,611**	,702**	,830**	1	,623**
	Sig. (2-tailed)	,000	,000	,000	,000		,000
	N	272	272	272	272	272	272
Price Perception	Pearson Correlation	-,198**	,485**	,531**	,623**	,623**	1
	Sig. (2-tailed)	,001	,000	,000	,000	,000	
	N	272	272	272	272	272	272

**. Correlation is significant at the 0.01 level (2-tailed).

To measure what the influence of the five individual factors on the likelihood of purchase is, a multiple regression has been conducted. The following formula that represents the regression model can be made:

Likelihood of purchase $_i$ = b0 + b1 Product Reliability + b2 Product Reputation + b3 Product Loyalty + b4 Perceived Quality + b5 Price Perception + b6 ProductDurable + b7 RecallSevere + ε $_i$

Table 9. Multiple regression coefficients table - Five factors versus LoP

Dependent variable: Likelihood of purchase

Model		Unstandardized coefficients			
		B	Std. error	Sig.	VIF
1	(Constant)	5.452	.257	.000	
	ProductDurable	-.112	.024	*.308*	2.290
	RecallSevere	.325	.024	***.003****	3.094
	F1 - Quality	.067	.027	***.006****	4.873
	F2 – Reliability	-.022	.024	.370	3.536
	F3 – Reputation	-.089	.048	***.001****	1.769
	F4 – Loyalty	-.035	.109	.148	1.047
	F5 – Price perception	.049	.108	.305	1.024

*. Significant at the 0,05 level.

The R^2 indicates how much of the five factors account for the variation in the likelihood of purchase. This is .204, meaning that 20.4% of the variance in likelihood of purchase is accounted by the five factors. The ANOVA tells whether the model result is a significantly prediction of the outcome variable (Field, 2009). The significance level is 0.000 with Sig. $p < 0.001$, this means we can reject H0. The table shows that the independent variables statistically significantly predict the dependent variable.

The coefficients table (table 9) shows that if there is absence of any of the five factors, product recall severity and product category, and the model predicts that the chance of buying the product would be 5.452 (B-value constant). The VIF values are between 1 and 5, which indicate that the predictor variables are moderately correlated, therefore we can safely ignore multicollinearity.

The table tells us that the Perceived Quality (p = .006) and Product Reputation (p = .001) are statistically significant with Sig. < 0.05. In that matter, when the Perceived Quality increases with one unit, the likelihood of purchase will increase by .067. When the Product Reputation increases with one unit, the likelihood of purchase will decrease by .089. The remaining three factors do not have a statistically significance influence on likelihood of purchase.

Despite that the effect of the five factors on the likelihood of purchase did not clearly emerged, we will look at the effect of the recall and durability on the five factors in section 5.3.

H4a: *Perceived Quality has a positive effect on the likelihood of purchase*

According to the coefficient table the B-value of the Perceived Quality is .067. This indicates that with the increase of one unit of Perceived Quality the likelihood of purchase increases with 0.067. The *p*-value is .006, which is statistically significant with Sig. < .05 level. Therefore we can conclude that the *positive* effect of Perceived Quality on the likelihood of purchase is significant. According to this analysis we can also conclude that the hypothesis is *accepted.*

H4b: *Product Reliability has a positive effect on the likelihood of purchase*

According to the coefficient table the B-value of the Product Reliability is -.022. This indicates that with the increase of one unit of Product Reliability the likelihood of purchase decreases with .022. The *p*-value of is .370, which is statistically not significant with Sig. < .05 level. Therefore we *accept* the hypothesis.

H4c: *Product Reputation has a positive effect on the likelihood of purchase*

According to the coefficient table the B-value of the Product Reputation is -.089. This indicates that with the increase of one unit of Product Reputation the likelihood of purchase decreases with .089. The *p*-value is .001, which is statistically significant with Sig. < .05 level. We can conclude that Product Reputation has a *negative* effect on the likelihood of purchase and that this effect is significant. According to this analysis we can conclude that the hypothesis is *rejected.*

H4d: *Product Loyalty has a positive effect on the likelihood of purchase*

According to the coefficient table the B-value of the Product Loyalty is -.035. This indicates that with the increase of one unit of perceived quality the likelihood of purchase decreases with .035. The *p*-value is .148, which is statistically not significant with Sig. < .05 level. We can conclude that Product Loyalty has a *negative* effect on the likelihood of purchase, but this effect is not significant. According to this analysis we can conclude that the hypothesis is *accepted.*

H4e: *Price Perception has a positive effect on the likelihood of purchase*

According to the coefficient table the B-value of the *Price Perception* is .049. This indicates that with the increase of one unit of Price Perception the likelihood of purchase increases with .049. The *p*-value is .305, which is statistically not significant with Sig. < .05 level. We can conclude that Price Perception has a *positive* effect on the likelihood of purchase, although the effect is not significant. Therefore we can conclude that the hypothesis is *rejected.*

5.3 Impact product recall on underlying factors likelihood of purchase

Within this section the influence of a product recall on the underlying factors of the likelihood of purchase variable will be explained. In order to find an effect of the two different product recall scenarios on each of the five factors between two different product categories, two independent t-test have been conducted. The first t-test has been executed to find a potential significance difference between the two product categories. The second t-test shows us if there is a difference in effect of the two recall scenarios on the five factors. Finally, a two-way ANOVA for all the five factors individually has been conducted to see if the interaction effect between the product category and the recall is significant.

The following hypothesis will be answered according to the analysis within this part:

H5a: *A product recall has a negative effect on the 5 underlying factors of purchase likelihood*

H5b: *The more severe the recall the more negative the effect on the 5 underlying factors of purchase*

H6: *The durable goods industry has a lower effect on the 5 underlying factors of purchase likelihood than non-durable goods*

H7: *a recall has a more negative effect on the 5 underlying factors of purchase likelihood for durable versus non-durable goods likelihood*

Perceived Quality.

Table 10 shows the independent t-test that indicates the difference between the durable and non-durable goods category regarding their influence on the factor Perceived Quality. The p – value is .320 on Sig. < .05 level. This is not significant, which implicates that there is no significant difference between the two product categories regarding their influence on Perceived Quality.

Table 10. Independent t-test non-durable/durable effect on Perceived Quality

Perceived Quality	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.502	.479	.320	-.409	.410
Equal variances not assumed			.320	-.409	.410

In order to see if there is a significant difference between the mild and severe scenario regarding their influence on the Perceived Quality, another independent t-test has been conducted. Table 11 shows the output of the t-test.

Table 11. Independent t-test mild/severe effect on Perceived Quality

Perceived Quality	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.558	.456	.364	-.374	.350
Equal variances not assumed			.364	-.374	.350

The table tells us that there is no significant difference between the mild and the severe scenario regarding their influence on Perceived Quality, p – value = .364 on a Sig. < .05 level.

To understand if there is a significant effect of the different product recall scenarios and the two product categories on the Perceived Quality an two-way ANOVA was done. According to table 12 there is no statistically significant effect of the recall on the Perceived Quality. Both the recall severity (p = .352) and product category (p = .295) do not have a significant effect on Perceived Quality.

However, there was a statistically significant interaction between the effects of product category and product recall on the Perceived Quality, *p* = .035. This implies that the more severe the recall in the durable goods industry, the higher the Perceived Quality. The opposite is true for the non-durable goods category.

Table 12. Two-way ANOVA table. Perceived Quality

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	71.716[a]	23.905	.098
Intercept	54817.342	54817.342	.000
Recall	9.808	9.808	.352
ProductDurable	12.444	12.444	.295
ProductDurable * Recall	50.872	50.872	***.035**[*]

*. Significant at the 0,05 level.

Below a figure that shows the effect of a recall on the Perceived Quality for both product categories.

Figure 2. Influence recall on Perceived Quality
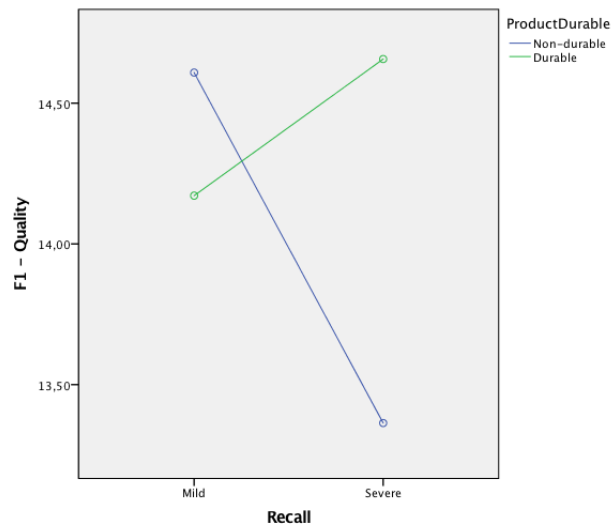
Product Reliability.

Table 13 shows the independent t-test that indicates the difference between the durable and non-durable goods category regarding their influence on the factor Product Reliability. The p – value is .252 on Sig. < .05 level. This is not significant, which implicates that there is no significant difference between the two product categories regarding their influence on Product Reliability.

Table 13. Independent t-test non-durable/durable effect on Product Reliability

Reliability	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.850	.357	.252	-.536	.467
Equal variances not assumed			.252	-.536	.467

In order to see if there is a significant difference between the mild and severe scenario regarding their influence on the Product Reliability, another independent t-test has been conducted. Table 14 shows the output of this t-test.

Table 14. Independent t-test mild/severe effect on Product Reliability

Reliability	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.011	.916	.588	-.245	.590
Equal variances not assumed			.588	-.245	.590

The table shows that there is no significant difference between the mild and the severe scenario regarding their influence on Product Reliability, p – value = .588 on a Sig. < .05 level.

To test the influence of both product recall scenarios on the Product Reliability between the two different product categories a two-way ANOVA has been conducted. According to the ANOVA (table 15) there were no statistically significant effects of the product recall severity and product category on Product Reliability. Although figure 3 shows that durable goods have a higher reliability when it comes to a product recall. Also, a declining line for both categories is noticed, which means that the more severe the recall, the less reliability a consumer in both product categories has.

Table 15. Two -way ANOVA table. Product Reliability

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	24.816[a]	8.272	.645
Intercept	50105.290	50105.290	.000
Recall	4.414	4.414	.587
ProductDurable	19.688	19.688	.251
ProductDurable * Recall	.925	.925	.803

Figure 3. Influence recall on Product Reliability
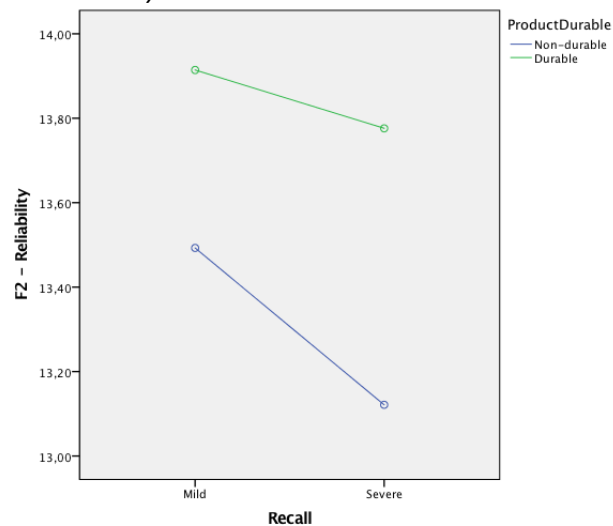
Product Reputation.

Table 16 shows the independent t-test that indicates the difference between the durable and non-durable goods category regarding their influence on the factor Product Reputation. The p – value is .109 on Sig. < .05 level. This is not significant, which implicates that there is no significant difference between the two product categories regarding their influence on Product Reputation.

Table 16. Independent t-test non-durable/durable effect on Product Reputation

Product Reputation	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	1.670	.204	.109	-.849	.746
Equal variances not assumed			.109	-.849	.746

In order to see if there is a significant difference between the mild and severe scenario regarding their influence on the Product Reputation, another independent t-test has been conducted. Table 17 shows the output of the t-test.

Table 17. Independent t-test mild/severe effect on Product Reputation

| Product Reputation	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.063	.428	.565	.199	.881
Equal variances not assumed			.565	.199	.881

The table shows that there is no significant difference between the mild and the severe scenario regarding their influence on Product Reputation, p – value = .565 on a Sig. < .05 level.

To test the influence of both product recall scenarios on the Product Reputation between the two different product categories a two-way ANOVA has been conducted. According to the ANOVA (table 18) there were no statistically significant effects of the product recall severity and product category on Product Reputation. Although figure 4 shows that durable goods have a higher reliability when it comes to a product recall.

Table 18. Two -way ANOVA table. Product Reputation

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	61.335[a]	20.445	.361
Intercept	40845.245	40845.245	.000
Recall	6.252	6.252	.567
ProductDurable	49.762	49.762	.107
ProductDurable * Recall	5.957	5.957	.576

Figure 4. Influence recall on Product Reputation
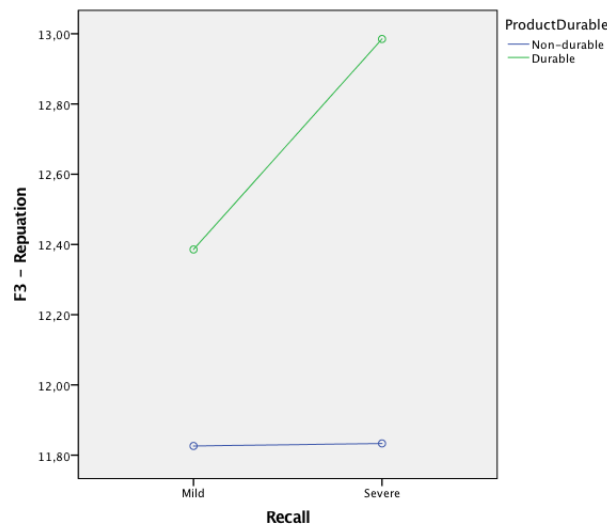
Product Loyalty.

Table 20 shows the independent t-test that indicates the difference between the durable and non-durable goods category regarding their influence on the factor Product Loyalty. The p – value is .005 on Sig. < .05 level. This is significant, which implicates that there is a significant difference between the two product categories regarding their influence on Product Loyalty. The durable goods category has a more positive influence on the likelihood of purchase compared to the non-durable category when it comes to a product recall.

Table 20. Independent t-test non-durable/durable effect on Product Loyalty

Loyalty	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.202	.653	*.005**	-1.396	.494
Equal variances not assumed			.005*	-1.396	.494

*. Significant at the 0,05 level.

In order to see if there is a significant difference between the mild and severe scenario regarding their influence on the Product Loyalty, another independent t-test has been conducted. Table 21 shows the output of the t-test.

Table 21. Independent t-test mild/severe effect on Product Loyalty

Loyalty	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.698	.404	.408	-.415	-.028
Equal variances not assumed			.408	-.415	-.028

The table shows that there is no significant difference between the mild and the severe scenario regarding their influence Product Loyalty, *p* – value = .408 on a Sig. < .05 level.

To test the influence of two product recall scenarios on the Product Loyalty between the two different product categories a two-way ANOVA has been conducted. According to the ANOVA (table 22) there was a significant effect of the product category on Product Loyalty (*p* = .005) with Sig. < 0.05. This implies that people are significantly more loyal to durable goods compared to non-durable goods.

Table 22. Two -way ANOVA table. Product Loyalty

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	152.278[a]	50.759	.029
Intercept	30326.109	30326.109	.000
Recall	11.534	11.534	.406
ProductDurable	133.920	133.920	*.005*[*]
ProductDurable * Recall	8.048	8.048	.488

*. Significant at the 0,05 level.

Figure 5. Influence recall on Product Loyalty
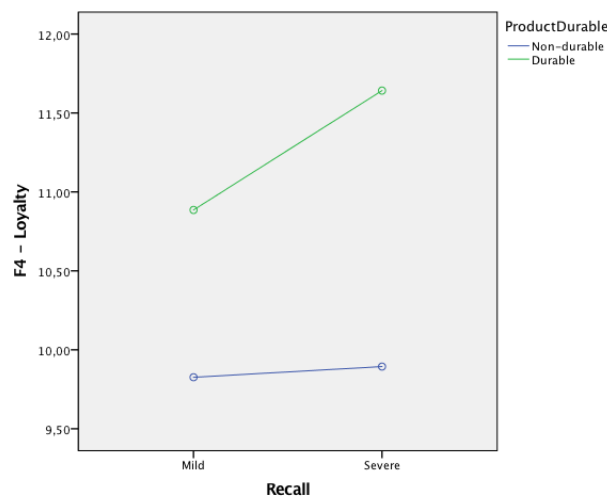
Price Perception.

Table 23 shows the independent t-test that indicates the difference between the durable and non-durable goods category regarding their influence on the factor Price Perception. The p – value is .009 on Sig. < .05 level. This is significant, which implicates that there is a significant difference between the two product categories regarding their influence on Price Perception.

Table 23. Independent t-test non-durable/durable effect on Price Perception

Price Perception	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.593	.442	*.009*[*]	-.470	.178
Equal variances not assumed			.009[*]	-.470	.178

*. Significant at the 0,05 level.

51

In order to see if there is a significant difference between the mild and severe scenario regarding their influence on the Price Perception, another independent t-test has been conducted. Table 24 shows the output of the t-test.

Table 24. Independent t-test mild/severe effect on Price Perception

Price Perception	Levene's test		Sig. (2-tailed)	Mean Difference	Std. Error Difference
	F	Sig.			
Equal variances assumed	.062	.804	.320	-.180	.140
Equal variances not assumed			.320	-.180	.140

The table shows that there is no significant difference between the mild and the severe scenario regarding their influence Price Perception, p – value = .320 on a Sig. < .05 level.

To test the influence of two product recall scenarios on the Price Perception between the two different product categories a two-way ANOVA has been conducted. According to the ANOVA (table 25) there was a significant effect of the product category on Price Perception (p = .009) with Sig. < 0.05. This implies that the consumers' Price Perception is significantly higher for durable goods compared to non-durable goods.

Table 25. Two -way ANOVA table. Price Perception

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	17.497[a]	5.832	.046
Intercept	4479.041	4479.041	.000
Recall	2.167	2.167	.317
ProductDurable	15.091	15.091	***.009**[*]
ProductDurable * Recall	.313	.313	.703

*. Significant at the 0,05 level.

Figure 6. Influence recall on Price Perception
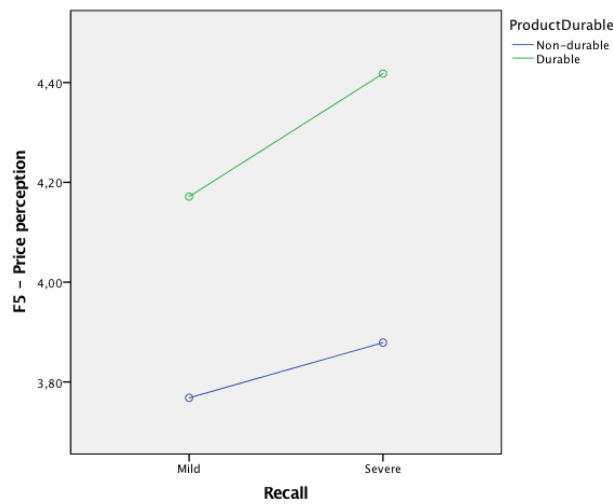
H5a: *A product recall has negative effect on the five underlying factors of purchase of likelihood*

According to the two-way ANOVA conducted for all five factors, none of the five factors have been statistically influenced by the product recall. The p-values for the five factors respectively were Perceived Quality (p = .352), Product Reliability (p = .587), Product Reputation (p = .567), Product Loyalty (p = .406) and Price Perception (p = .317). Although there is not a strong significant effect on the five factors, three (Loyalty, Price Perception and Reputation) out of the five factors has been influenced slightly positive by the recall. Perceive Quality and Product Reliability have been influenced more negatively. Overall, we can conclude that a recall does not have a significant positive nor negative effect on the five factors, and therefore this hypothesis is *rejected.*

H5b: *The more severe the recall the more negative the effect on the five factors*

The two-way ANOVA tables have showed that the two product recall scenarios have statistically influenced none of the five factors. But the means and the plots shows that for durable goods all factors, except Product Reliability (average mean mild = 13.7, severe = 13.5) and Perceived Quality (average mean mild = 14.4, severe =1 4.0), the more severe the recall the higher the Product Reputation (average mean mild = 12.1, severe = 12.4), Product Loyalty (average mean mild = 10.8, severe = 10.4) and Price Perception (average mean mild = 4.0, severe = 4.2). For non-durable goods the recall did influence the Product Reliability and Perceived Quality in a negative way. The other factors were not or less influences by the recall. Three out of five factors have been influenced positively; therefore the hypothesis will be *rejected*.

H6: *The non-durable goods industry has a lower effect on the 5 underlying factors of purchase likelihood than durable goods*

According to the independent t-test the difference between the two product categories for Product Loyalty (*p* = .005) and Price Perception (*p* = .009) were significant. In general, the figures (1 t/m 5) conducted out the two-way ANOVA analysis shows that the non-durable goods industry scores lower for all the five factors. When the severity increases Perceived Quality and Product Reliability even decreases further, the opposite is true for Product Loyalty and Price Perception. Product Reputation stays equal as the severity increases.

Overall, the non-durable goods industry scores on average 0.5 lower compared to the durable goods industry regarding their impact on the five factors. Therefore we can conclude that the non-durable goods industry has a lower effect on the five underlying factors, which means that the hypothesis is *accepted.*

H7: *A recall has a more negative effect on the five factors for non-durable versus durable goods*

According to the independent t-tests and the two-way ANOVA tables both Product Loyalty (*p* = .005) and Price Perception (*p* = .009) differ significantly from each other regarding the two product categories. In this case the more severe the recall the more negative effect on the non-durable goods category. Also Product Reliability and Perceived Quality will be influenced negatively for non-durable goods after being exposed to a more severe recall, however this effect is not significant. For Product Reputation the severity of recall stays equal. Four out of five factors will be influenced more negatively relating the non-durable product category when the recall becomes more severe, in that way this hypothesis is *accepted*.

Now we have seen what kind of influence the product recall has on both the likelihood of purchase and the underlying five factors of the likelihood of purchase it will be interesting to find out if a product recall has an effect on the relation between the five underlying factors and the likelihood of purchase. Therefore the multiple regressions used for hypothesis 4a t/m 4e has been executed with a three-way interaction. Below the coefficient table of this test has been presented.

Table 26. Three-way interaction - coefficients table

Dependent variable: Likelihood of Purchase

Model		Unstandardized coefficients		Sig.
		B	Std. Error	
1	(Constant)	4.857	.095	.000
	F1 - Quality	.057	.030	*.058*[*]

F2 - Reliability	-.042	.036	.241
F3 - Reputation	-.075	.036	*.035***
F4 - Loyalty	-.012	.035	.735
F5 - Price perception	.036	.069	.604
ProductDurable	-.120	.111	.281
RecallSevere	.332	.109	*.003***
F1c_severe	.044	.053	.408
F2c_severe	.036	.050	.469
F3c_severe	-.045	.057	.428
F4c_severe	-.040	.049	.411
F5c_severe	.022	0.97	.823

*. Significant at the 0.10 level.

**. Significant at the 0.05 level.

Table 27. Three-way interaction – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate	R Square Change	Sig. F Change
1	.416	.173	.157	.89520	.173	.000
2	.451	*.204*	.183	.88172	.031	.007
3	.462	*.213*	.177	.88495	.009	.689

H8: There is no effect of recall on the relation between the five factors and the purchase likelihood

According to the coefficients table (table 26) none of the interaction results is significant. This was expected looking at the model summary. The R-square in the model summary (table 27) already indicated that this model explains only 0.09% (0.213 - 0.204) more by the independent variable compared to model 2 without the interaction effect. This means that the product recall does not have an appointment effect on the relation between the five factors.

The relevant output of the hypotheses presented in this section can be found in Appendix 4.

6. Discussion

This chapter discusses the results as found in the chapter 5. Each sub section represents the outcome of one variable. The analysis of the first five hypotheses have been split up into two parts in order to give a broad insight in the influence of the different product recall scenarios on the five independent variables. The first part analyses the direct influence of the different product recall scenarios on the five separate independent variables. The second part analyses the moderating influences of the product recall scenarios on the relation between the five independent variables and the dependent variable likelihood of purchase.

6.1 Interpreting results

First of all, the influence of a product recall on the likelihood of purchase has been tested. Unexpected was the result that the more severe the recall, the higher the likelihood of purchase. Especially in the non-durable goods industry. This result could be clarified by fact that the respondents have more trust in the durable goods industry in the situation of a product recall compared to the non-durable goods industry. They could expect that the durable products become better after the recall than before. In the Tylenol and Nokia case the same thing occurred as well. Another explanation could be the fact that consumers switch much easier between substitutes within the non-durable goods industry compared to the durable goods industry Heerde *et al.* (2007). This in combination with the higher buyer frequency of non-durable goods could imply that consumer do care less about a product recall occurring in the non-durable goods industry. The more severe the recall, the more motivated they are to purchase a substitute product. In the durable goods industry it is much more difficult to switch between substituted products, since the buy frequency is much less. Besides, the fictive product recall announcement in the questionnaire handled the recall in an adequate and a compassionate way. The particular company cared about the customer and immediately admitted their fault. This could have positively influenced the respondent and increased the confidence. This is an interesting result, since it indicates that the way of handling the recall does have an influence on the customers' perception. Including the course of action regarding a product recall as a parameter could be a valuable addition for future research.

In terms of difference in effect of a product recall between the two different product categories, two results are worth mentioning. First, there was a statistically significant difference between the two product categories regarding their likelihood of purchase after being exposed to a product recall. The non-durable goods category significantly differs regarding their influence on the likelihood of purchase compared to the durable goods category. It could be that the respondents have more faith in the non-durable goods industry, since they have more experience with product recalls and the requirement in this product category from governments and health authorities are stricter. Hence, health is a dominant factor in this product category.

56

It could also confirms the above argument that respondents are able to switch easier between non-durable product brands, which explains the fact that the perception of reliability and perceived quality of the involved product decreases when the recall becomes more severe. Product loyalty stays equal in this case. An important aspect of this result could be the way of handling the product recall. In this case both the beer as the telephone company came immediately into action and did not take any risk regarding their customers.

This could have influenced the respondents' perception in a positive way and emphasizes that the way of handling a recall is also an important factor. In short, a recall influences their purchasing behavior of non-durable goods in a positive way.

Second, if we interpret the results of the influence of the product recall on the five underlying factors, the opposite is true. All the factors except reliability increases for durable goods when the recall becomes more severe. This could be explained by the fact that the consumer lost trust in the particular product, but expects that the quality of the product after the recall becomes better than before. This will automatically increase the perception of loyalty, price and reputation of the product as well. Interesting to see is the fact that the respondents have significantly more trust in the durable goods category when it comes to handling a product recall compared to the non-durable goods category.

This could be a consequence of the appearance of higher prices is this category, which automatically causes higher expectations of a product (Heerde *et all,* 2007).

Regarding the perceived quality, the interaction effect between the durable goods and the non-durable goods category is significant. This means that the more severe the recall, the lower gets the perceived quality of non-durable goods. For the durable goods category the opposite is true. The more severe the recall, the higher the perceived quality. This can be clarified by the assumption that consumers expect higher quality of durable goods compared to non-durable goods, and therefore expect a higher quality product when the recall has been finished.

Any product recall scenario did not have a significant influence on the relation between the five independent variables and the dependent variable likelihood of purchase.

A possible explanation could be that the respondents do not feel any difference in their purchase behavior after a product recall between a non-durable and durable goods, since they have never been involved in a product recall with either a non-durable or a durable good. In that way it is difficult for the respondents to empathize in this situation. Another explanation could lay in the presentation of the product information in the survey. The information about the product was limited, which made it even more difficult for the respondent to identify themselves with both products and really could attach value to it. This ensured that for the respondents felt kind of the same about both product and did not made a big distinction between the fact that it concerned a durable- or non-durable good.

In that way the researcher recommends another study, where the respondent will be informed with more details about the products, for instance the features of both products, their yearly sales and amount of money spend on advertising.

 Concluding, the overall result that the likelihood of purchase and Perceived Quality, Product Reputation, Product Loyalty and Price Perception increases after the product recall become more severe is either interesting as unexpected. A potential reason for this result could be the fact that less people have ever been exposed to a particular product recall situation. Therefore it is difficult to create a realistic situation via an experiment. Consequently, the empathy level for the respondents is low, what makes it hard for the respondent to 'feel' the quality- or health reasons that cause the several product recalls. This could have led to the results presented. Based on the case study as discussed in chapter 2, the way of handling and communicating the product recall as a company is an important factor in re-winning the trust and reputation, two important builders for product loyalty, -reliability and –reputation. Since this is just partly included in the experiment, the result could have been influenced by this factor as well.

1.2 *Academic implications*

In an academic sense, this study enriched the present literature with a new created value for the dependent likelihood of purchase variable. Besides, this research included for the first time the influence of different product recall scenarios on both the durable goods as the non-durable goods industry. Although this research presents that the impact on both product categories is low or not existing, it forms a base for further research. Section 6.4 will explain in more detail some recommendations for future research.

1.3 *Managerial implications*

Besides that on an academic ground this research enriches the literature and findings that already have been done over the past years, this study is also useful on a managerial ground. Firstly, the research gives an insight in what the most important factors are that influence the product loyalty, product reputation and product reliability. The way of handling and communicating the recall appeared to be crucial in both the durable- as the non-durable goods industry. It provides useful information about the most effective and efficient way of handling a product recall and it also provides information about the most crucial ways of influencing the consumer after a harm crisis. Therefore durable- and non-durable goods companies can use this research to gain information about the best way of handling and communicating a product recall on big scale.

Second, this research has also showed the influence of several product recalls scenarios on the likelihood of purchase between two product categories. A main finding here was that the negative influence of a product recall within the durable goods industry caused due to potential health issues on product loyalty and in a lesser extent on product reputation.

This is useful information for managers in crisis teams that are operating in the durable goods industry, they know that extra attention in their communication to their consumers is advised in order to minimize the loss in product loyalty. Thirdly, also price perception will be negatively influenced by a durable goods severe scenario, this is an indication for durable goods retailers to lower the price of the involved product recall product. According to the results of this study, the next recommendations are made:

- For the non-durable goods industry, the likelihood of purchase increases when the recall becomes more severe. Consumers tend to trust the non-durable goods industry more, so it is advised for companies operating in the non-durable goods industry to prevent any risk, consumers do believe in a proper way of handling. In that way the companies minimize the chance that consumer choose for the competitor

- Companies operating in the durable goods industry are advised to handle in a way that the consumer re-wins trust in the product again. All other factors increase with a recall, so they believe that the product becomes better after the recall, but they need trust to purchase it again.

- Now it is clear that a product recall caused due to potential health issues has a negative influence on product reliability and to a lesser extent on perceived quality, it is advised to crisis management teams within, especially the non-durable goods category, to emphasize these aspects and to give it extra attention in their way of handling the recall.

- In general, a product recall has a positive effect on the likelihood of purchase in both the non-durable as the durable goods industry. Moreover, the non-durable goods industry has a significantly more positive effect on the likelihood of purchase compared to the durable goods industry. Therefore it is advised to crisis management teams to immediately come into action when a product has to be recalled. Do not hesitate or deny your fault, because the consumer expects to get a better product in return after the recall.

1.4 Limitations and further research recommendations

Several limitations influenced the research process. A first limitation lays in the execution of the experiments. As already mentioned in a previous section, the presented information about the products was too limited. The information presented could be more realistic and more detailed about the products involved. For instance, information about yearly sales, features about products and budget. In this way the respondents can identify themselves better with the product, which will lead to more adequate results. Also, the questionnaires included a minimum of 45 questions, which is quite long. This could play a role in the difficulty to empathize themselves in the products as well.

A second limitation is the fact that there was no control group regarding the influence of a product recall on the five underlying factors. Therefore it was only possible to compare the mild and severe product recall scenarios. This could have led to inappropriate results regarding the hypotheses 4a t/m 4e.

A third limitation could be the lack of including brands within the research. Dawar and Pilluta (2000) did a research about the effectiveness of different approaches. They found that when consumers have strong reputations about a brand or company, they easier accept lack of information, including information about product harm. This is less likely for a brand or company where the consumer have no strong expectations off. Reputation in this case is a very important determinant in terms of likelihood of purchase. By not using brands, it is difficult for respondents to create a reputation of a product. This in combination with the fact that the respondents need to empathize themselves in a product recall situation together with a product they do not know, could have caused the insignificant results.

Finally, the last limitation could be the naturally difference between the durable goods- and non-durables goods industry. In the study some significant differences between both categories have been found, which could be obtained due to some existing differences in for example the buying frequency of both products categories.

In general, the buying frequency of non-durable goods is much higher compared to durable goods. This could have influenced the respondent and partly caused the difference in the likelihood of purchase for both product categories.

Furthermore, the researcher recommends doing this research again, where the focus should be on the same variables as well, but an important adaption that should be made is to reduce the questionnaire to make it more efficient. By defining the research in the way it has been done in this study, there is still room to extent this study with an extra factor. For example, including world-wide known brand names can be an interesting factor to let the consumers' mind easier empathize with the products. Also the influence of how the particular companies handle the recall should be taken into account as well. Previous research and also this study confirms that the influence of the involved companies on the perception of the customer plays an important role in a recall situation. Therefore a research obtained over a longer period of time including the brand and company variable would be an useful addition. Where the results of this study were not always as presumed, doing this research again with the advised addition could lead to even more interesting results.

1.5 Conclusion

This research tested the impact of several product recall scenarios on the likelihood of purchase between two different product categories. Directly was tested what the influence of the product recall (scenarios) on the likelihood of purchase and the five underlying factors between the two product categories was. Indirect was tested what kind of influence the product recall scenarios has on the likelihood of purchase via the independent variables product reputation, product reliability, product loyalty, perceived quality and price perception. In order to come up with a straight forward answer the following research question has been set up:

"What is the effect of a product recall on the likelihood of purchase between a durable and a non-durable product category?"

Based on the outcomes of this research the answer is that there is a significant difference between the effect of a product recall on the likelihood of purchase in the durable goods industry versus the non-durable goods industry. A product recall has a significantly positive influence on the likelihood of purchase within the non-durable goods category compared to the durable goods industry.

Concerning the five factors, only product reliability has been negatively influenced by a product recall within the durable goods industry, for the non-durable goods industry all the five factors decreases or kept the same. Since there was no significant effect of the product recall on the relation between the five underlying factors and the likelihood of purchase these results are plausible.

In general, a product recall in the durable goods industry has a more negative effect on the likelihood of purchase than a product recall occurring within the non-durable goods category. Therefore we can conclude that the perception of the consumer does change in a positive way after a recall. This is an interesting result, since it was unexpected. This research will mainly be useful for managers of crisis management teams operating in durable- and non-durable goods companies, who are able to influence or reach the consumers after being exposed to product recall situation. Focus on trust, try to maintain that at all time, and the rest will come soon enough.

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1.1 Cases discussed in the subchapter 2.3

<u>Tylenol</u>

In 1982, Johnson & Johnson's Tylenol medication commanded 37 % of the US over-the-counter analgesic market - representing 15% of the company's profits. Unfortunately, at that point one individual succeeded in lacing the drug with cyanide. Seven people died as a result, and a widespread panic ensued about how widespread the contamination might be. Within a short amount of time the general public knew that Tylenol was associated with the scare. The company's market value fell by $1bn as a result (New York Times.com).

In 1986 the same situation happened again, the company had learned its lessons well. It acted quickly - ordering that Tylenol should be recalled from every outlet around the country, and not just those in the state where it had been tampered with. Not only that, but the company decided the product would not be re-established on the shelves until something had been done to provide better product protection. As a result, Johnson & Johnson developed the tamperproof packaging that would make it much more difficult for a similar incident to occur in future.

In addition to the impact on the company's share price when the crisis first hit, the lost production and destroyed goods as a result of the recall were considerable. However, the company won praise for its quick and appropriate action, which resulted in a 70% recovery of its market share for the drug after five months. The fact this went on to improve over time showed that the company had succeeded in preserving the long-term value of the brand. There is even evidence that it was rewarded by consumers who were so relieved by the steps taken that they switched from other painkillers to Tylenol.

<u>Toyota</u>

Since early 200, Toyota has recalled around 20 million vehicles and sold 18.7 million. In 2009 Toyota was forced to recall 4 million cars due to a problem with loose-floor mats that could lead to trapped accelerators. In 2001 Toyota recalls an additional 2.17 million vehicles for gas pedals that become trapped on floor hardware. And in October 2012 it was forced to call back 7.43 million cars due to a power window problem that poses a fire risk (Bowen & Zheng, 2014). The financial impact of those several recalls for the company only are immense. In 2009, the event has had a significant impact on Toyota. It has estimated that its losses will be upwards of £1 billion in costs and lost sales due to the recall, though the reported braking issues with the Prius and Lexus models could push this figure still higher. January 2010 it reported a 16% drop in sales, with monthly sales dropping below 100,000 for the first time in over a decade.

But there is also the damage that has been inflicted to its reputation and consumer trust. From 2010 the company faced an impact of more than $5 billion over the next year, due to increased incentive campaigns, litigation costs and marketing efforts by the embattled carmaker.

Nokia

Nokia India, which controlled a strong 67 per cent share in the Indian handset market in 2007, recalled 46 million BL-5C batteries of Nokia manufactured by Matsushita. Nokia issued a warning over its BL-5C batteries across the world, stating that these batteries may be overheated while charging. It then started a damage control campaign using mediums like advertisement, SMS and an online helpdesk. It also roped with its dealers to manage the crisis by communication with consumers on ground. The affectivity of methods for receiving complains during product recall was very well-organized nevertheless on same side effectiveness of information elements provided during product recall, behavior of company persons and clarity and transparency during product recall was not tapped. Being a strong brand, the challenges to handle recall incidence was challenging for a company. Nokia responded masterfully since discovering that its batteries could potentially pose a shock. Nokia has taken control of the story at the outset and demonstrated that consumer safety is its top priority. Nokia has also taken the critical step in quelling consumer anxiety – and done so as soon as it materialized. By sharing information about the root cause at the earliest possible point, Nokia was perceived as being in control of the situation, even if it has not articulated how it will ensure that similar problems never arise again. Being a strong brand, the challenge to handle recall incidence was challenging for Nokia. However they responded in the right way. Nokia immediately took control of the story and demonstrated that consumer safety is its top priority and took away consumer anxiety. Nokia started an effective advertising campaign that not only reached, but also motivated consumer to bring their device back to the store. Besides, Nokia set up a. well organized distribution action to ship all the batteries out and replacing them for new ones. This was mainly a success because of close contacts with several delivery companies in the region (Desai & Patel, 2014). Due to an organized product recall plan Nokia minimized the impact and even created sympathy with consumers. They only neglected to record the effectiveness of information elements provided during product recall, behavior of employees, consumers or third parties (NYtimes.com). As of January 1st 2008, 95% of all batteries replacements had been completed and initial customer surveys showed that Nokia's reputation for reliability was bouncing back to its usual high level (Desai & Patel, 2014).
Nokia did not have any experience with a product recall on this scale, but acted immediately according to their crisis protocol.

<u>Coca Cola</u>

On 14 June 1999, in a move that was to cost more than $200 million in expense and lost profits and cause damage to the brand image of the trade-marked products of The Coca-Cola Company (CCC), the Belgian Health Ministry ordered that Coca-Cola trademarked products be withdrawn from the Belgian market and warned Belgians not to drink any Coca-Cola trade-marked products they had in their homes. Later, France, Luxembourg and The Netherlands also banned or restricted the sale of Coca-Cola products. The Coca-Cola Company, in cooperation with the Belgian Health Ministry, withdrew its products from Belgian stores, as a result of two ''unrelated'' matters. In the first case, some consumers complained of an irregular taste and odor in bottled products. In the second, more than 100 consumers (students at six schools) became ill after reporting an unpleasant odor on the outside of canned products. Symptoms of the reported illnesses included headaches, stomach-aches, shivering and nausea, and were severe enough to lead to hospitalization of students in some cases. The Company did identify and publicly admit that there had been manufacturing mistakes. However, according to some observers, Coca-Cola stumbled repeatedly, exacerbating the situation. For example, an apology to consumers came more than a week after the first public reports of illness (KO now, 1999). It took ten days after the first child became dizzy and nauseated for top executives to arrive in Belgium and Coca-Cola's initial response attempted to minimize the number and severity of the illnesses (Hayes *et al.*, 1999). A senior CCE official, Phillippe Lenfant, did state that the scare had been mishandled, that communication was inadequate, and that the Company was unprepared for a crisis of this magnitude (The Los Angeles Times, 1999). Tests conducted in Europe found that the products did not contribute to illnesses and that the symptoms were psychosomatic. These findings brought clarity and closure to the incident. They further stated that the recall was a humbling experience – a wake-up call from which we learned to be ever vigilant in our concern for our consumer and the quality of our products (Unger, 2000). In spite of these assurances, damage to Company image, reputation and prestige has yet to be completely alleviated. Subsequent events continue to affect the Company as is illustrated by the sudden resignation of their CEO. In order to re-win the trust of their consumers Coca-Cola was putting an aggressive marketing campaign in Europe. In Belgium alone, promotional activities included ''the Coca-Cola Beach Party'' with California beach music, dancing, and 20 tons of ''imported'' sand; ''Belgium's annual Coca-Cola Summer Tour'' where Coca-Cola brand products were presented at over 90 locations throughout the country; and ''the Originals Promotional Campaign'', where over 72,000 consumers won premiums. By the beginning of August, research indicated that core users of Coca-Cola brand products reported the same intent-to-purchase levels as before the crisis.

1.2 Limitations analysis

At some points the comparison between the four cases is not completely generalizable. For example, the buy frequency of the non-durable goods compared to the durable goods differs significantly. A car and a telephone are products that people purchase once every few years, and a product of Tylenol and Coca-Cola are bought on average once a month. This means that the involvement of the customers in the non-durable good product recall scenario is automatically stronger, since they come more frequently in contact with the products involved. If you compare this with the durable good cases, the likelihood of purchase in this product category is much less, which means that the chance of customers involved or feeling attracted to the recall is much lower as well. Therefore there is a big involvement difference between those two product categories. Another difference between the two product categories is the fact that it is much easier for customers of non-durable goods to switch to a substitute product of a competitor. For instance, in the article of Heerde *et al.* (2007) the leading product is peanut butter; if a peanut butter brand recalls its product it is a matter of course that the customer switches to another competitive brand. In that way people tend to be less loyal in this case, since the threshold to choose another brand does not exist. Maybe the customer switches for a couple of months, but it could also be for the long-term. This contradicts with the durable good recall cases, because it is much more difficult to switch between cars or telephones. Factors like purchase frequency, previous experience, price and product value and -loyalty play a more dominant role in the durable goods industry. In that matter the threshold to switch to a competitor is higher and does not happen often. A factor that is generalizable is the way of handling a product recall from a companies' perspective. No matter what the product of a company is the main steps are similar for each company involved in a harm crisis.

1.3. Example survey questions – Likelihood of purchase items (non-durable good)

Likelihood of purchase (non-durable good)							
	Strongly disagree					*Strongly agree*	
Q1. I would try this brand of beer	O	O	O	O	O	O	O
Q2. I would recommend a six-pack of brand X to my friends	O	O	O	O	O	O	O
Q3. I consider the price of a six-pack of brand X as high	O	O	O	O	O	O	O
Q4. A six-pack of brand X appears to be reliable	O	O	O	O	O	O	O
Q5. A six-pack of brand X is safe	O	O	O	O	O	O	O
Q6. I expect a six-pack of brand X contains high quality	O	O	O	O	O	O	O
Q7. The decision to buy a six-pack of brand X is wisely	O	O	O	O	O	O	O
Q8. Brand X would be a brand I like	O	O	O	O	O	O	O
Q9. I think brand X is a satisfactory brand	O	O	O	O	O	O	O

Appendix 2.

2.1 Reliability

Cronbach's Alpha	N of Items
.905	9

2.2 Reliability test – Total item statistics

Questions	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
->I would try this brand of beer	34.89	58.26	.690	.895
->I would recommend a six-pack of brand X to my friends	35.40	60.18	.639	.898
->I consider the price of a six-pack as high	34.74	65.51	.371	.919
->A six-pack of brand X appears to be reliable	34.75	60.62	.739	.890
->A six-pack of brand X is safe	34.87	61.63	.718	.892
->I expect a six-pack of brand X contains high quality	34.45	61.25	.690	.894
->The decision to buy a six-pack of brand X is wisely	35.05	61.29	.780	.888
->Brand X would be a brand I like	34.98	59.920	.806	.886

->I think brand X is a satisfactory brand	34.91	60.894	.808	.887

Descriptive results

2.3 Respondents

Gender

Questionnaire	Frequency respondents	Male	Female	Percent of total
Beer (mild)	69	42 *(60.9%)*	27 *(39.1%)*	16%
Beer (severe)	66	47 *(71.2%)*	19 *(28.8%)*	15.3%
Telephone (mild)	70	43 *(61.4%)*	27 *(38.6%)*	16.3%
Telephone (severe)	67	49 *(73.1%)*	18 *(26.9%)*	15.6%
Control telephone	76	43 *(56.6%)*	33 *(43.4%)*	17.7%
Control beer	82	52 *(63.4%)*	30 *(36.6%)*	19.1%
Total	**430**	**276**	**154**	**100.0%**

Age

Age range	*Frequency*	*Percent of total*
17 or under	*24*	*5.6%*
18 – 28	*104*	*24.1%*
29 – 39	*58*	*13.5%*
40 – 50	*95*	*22.1%*
51 – 61	*116*	*27%*
62 or over	*33*	*7.7%*
Total	*430*	*100%*

Appendix 3

3.1 Test of normality
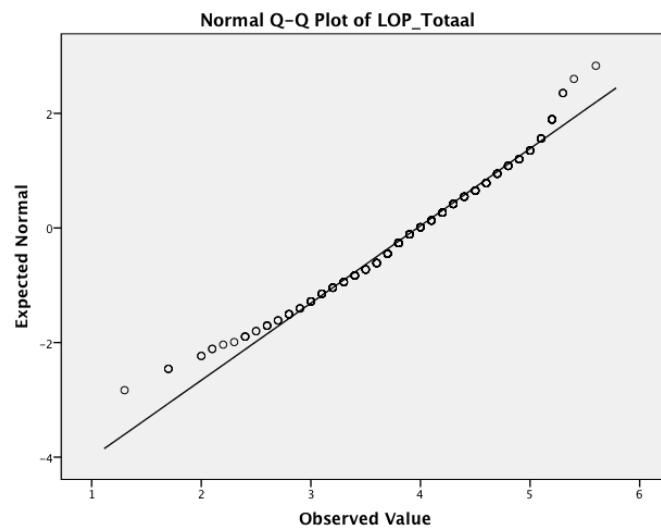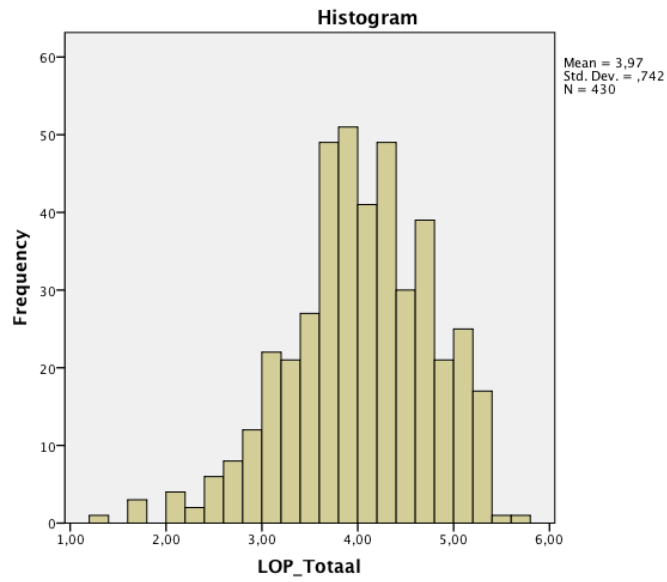
3.2 Skewness & Kurtosis

LoP_Totaal	Mean	3.97	.036
	95% Confidence Interval for Mean	Lower Bound 3.90 Upper Bound 4.04	
	5% Trimmed Mean	3.9	
	Median	4.0	
	Variance	.550	
	Std. Deviation	.742	
	Minimum	1.30	
	Maximum	5.60	
	Range	4.30	
	Interquartile Range	.90	
	Skewness	-.467	.118
	Kurtosis	.241	.235
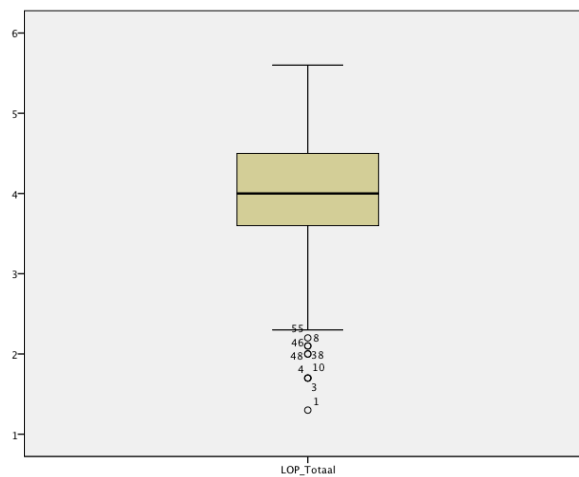
Hypothesis H1 and H1b

4.1 T-test control group vs. mild/severe group – Group Statistics
   Dependent variable: Likelihood of purchase

Recall	N	Mean	Std. Deviation	Std. Error Mean
Lik Mild/Severe	272	4.95	.975	.059
Lik Control	158	4.73	.982	.078

4.2 Model Summary – Multiple Regression
   Dependent variable: Likelihood of purchase

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.177	.031	.020	.965

4.3 ANOVA – Multiple Regression

Dependent variable: Likelihood of purchase

Model	Sum of Squares	Mean Square	Sig.
1 Regression	8.054	2.685	***.036****
Residual	249.674	.932	
Total	257.728		

*. Significant at the 0,05 level.

Hypothesis H2 and H3

4.4 T-test non-durable/durable product category – Group Statistics

ProductDurable	N	Mean	Std. Deviation	Std. Error Mean
Lik Non-durable	217	4.98	.983	.067
Durable	213	4.75	.971	.067

4.5 Descriptive statistics table Impact durable-/non-durable goods on LOP

Dependent variable: Likelihood of Purchase

Recall	ProductDurable	Mean	Std. Deviation	N
None	Non-durable	4.8699	.97614	82
	Durable	4.5877	.97420	76
	Total	4.7342	.98233	158
Mild	Non-durable	4.8776	.87575	69
	Durable	4.7476	.92032	70
	Total	4.8122	.89759	139
Severe	Non-durable	5.2205	1.06494	66
	Durable	4.9519	.99517	67
	Total	5.0852	1.03528	133
Total	Non-durable	4.9790	.98268	217
	Durable	4.7548	.97059	213
	Total	4.8680	.98201	430

4.6 One-way ANOVA after split – Descriptives table

Dependent variable: Likelihood of purchase

ProductDurable		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Non-durable	None	82	4,8699	,97614	,10780	4,6554	5,0844	1,33	6,44
	Mild	69	4,8776	,87575	,10543	4,6672	5,0880	2,00	6,44
	Severe	66	5,2205	1,06494	,13108	4,9587	5,4823	1,78	6,67
	Total	217	4,9790	,98268	,06671	4,8475	5,1105	1,33	6,67
Durable	None	76	4,5877	,97420	,11175	4,3651	4,8103	2,00	6,78
	Mild	70	4,7476	,92032	,11000	4,5282	4,9671	2,44	6,67
	Severe	67	4,9519	,99517	,12158	4,7092	5,1946	2,89	7,00
	Total	213	4,7548	,97059	,06650	4,6237	4,8859	2,00	7,00

4.7 Levene's test - Impact durable-/non-durable goods on LOP

Dependent variable: Likelihood of purchase

F	df1	df2	Sig.
.327	5	424	.897

*. Significant at the 0,05 level.

Hypotheses 4a t/m 4e

4.8 Multiple Regression – Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.416[a]	.173	.157	.89520
2	.451[b]	.204	.183	.88172

4.9 Multiple Regression – ANOVA table

Dependent variable: Likelihood of purchase

Model		Sum of Squares	Mean Square	Sig.
1	Regression	44.558	8.912	.000[*]
	Residual	213.170	.801	
	Total	257.728		
2	Regression	52.488	7.498	.000[*]
	Residual	205.240	.777	
	Total	257.728		

*. Significant at the 0,05 level.

Hypotheses 5 t/m 7

4.10 Two-way ANOVA's

Perceived Quality

Levene's Test of Equality of Error Variances

Dependent Variable: Perceived Quality

F	df1	df2	Sig.
1.853	3	268	.138

Dependent variable: Perceived Quality

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	71.716[a]	23.905	.098
Intercept	54817.342	54817.342	.000
Recall	9.808	9.808	.352
ProductDurable	12.444	12.444	.295
Recall * ProductDurable	50.872	50.872	.035[*]
Error	3026.755	11.294	
Total	57990.000		
Corrected Total	3098.471		

*. Significant at the 0,05 level.

Product Reliability

Levene's Test of Equality of Error Variances – *Product Reliability*

Dependent Variable: Product Reliability

F	df1	df2	Sig.
.334	3	268	.801

Dependent Variable: Product Reliability

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	24.816[a]	8.272	.645
Intercept	50105.290	50105.290	.000
Recall	4.414	4.414	.587
ProductDurable	19.688	19.688	.251
Recall * ProductDurable	.925	.925	.803
Error	3991.404	14.893	
Total	54184.000		
Corrected Total	4016.221		

*. Significant at the 0,05 level.

Product Reputation

Levene's Test of Equality of Error Variances – *Product Reputation*

Dependent variable: Product Reputation

F	df1	df2	Sig.
1.406	3	268	.241

Dependent variable: Product Reputation

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	61.335[a]	20.445	.361
Intercept	40845.245	40845.245	.000
Recall	6.252	6.252	.567
ProductDurable	49.762	49.762	.107
Recall * ProductDurable	5.957	5.957	.576
Error	5102.650	19.040	
Total	46030.000		
Corrected Total	5163.985		

Product Loyalty

Levene's Test of Equality of Error Variances – *Product Loyalty*

Dependent Variable: Product Loyalty

F	df1	df2	Sig.
.440	3	268	.725

Dependent Variable: Product Loyalty

Source	Type III Sum of Squares	Mean Square	Sig.
Corrected Model	152.278ª	50.759	.029
Intercept	30326.109	30326.109	.000
Recall	11.534	11.534	.406
ProductDurable	133.920	133.920	***.005*** *
Recall * ProductDurable	8.048	8.048	.488
Error	4462.659	16.652	
Total	34961.000		
Corrected Total	4614.938		

*. Significant at the 0,05 level.

Price Perception

Levene's Test of Equality of Error Variances – *Price Perception*

Dependent Variable: Price Perception

F	df1	df2	Sig.
1.313	3	268	.270

Dependent Variable: Price Perception

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17.497ª	3	5.832	2.706	.046
Intercept	4479.041	1	4479.041	2078.364	.000
Recall	2.167	1	2.167	1.006	.317
ProductDurable	15.091	1	15.091	7.003	***.009*** *
Recall * ProductDurable	.313	1	.313	.145	.703
Error	577.562	268	2.155		
Total	5076.000	272			
Corrected Total	595.059	271			

*. Significant at the 0,05 level.

Hypothesis 8

4.11 Three-way interaction – Regression coefficient table

Dependent variable: Likelihood of Purchase

Model		Sum of Squares	Mean Square	Sig.
1	Regression	44.558	8.912	*.000*[*]
	Residual	213.170	.801	
	Total	257.728		
2	Regression	52.488	7.498	*.000*[*]
	Residual	205.240	.777	
	Total	257.728		
3	Regression	54.895	4.575	*.000*[*]
	Residual	202.833	.783	
	Total	257.728		

*. Significant at the 0,05 level.

Dependent variable: Likelihood of Purchase

	Unstandardized Coefficients				
Model	**B**	**Beta**	**Beta**	**Sig.**	**VIF**
1 (Constant)	4.946	.054		.000	
F1c	.061	.024	.211	*.013*^{**}	2.272
F2c	-.026	.025	-.104	.287	3.075
F3c	-.082	.027	-.369	*.003*^{**}	4.841
F4c	-.036	.025	-.152	.144	3.463
F5c	.052	.049	.079	.282	1.748
2 (Constant)	4.843	.094		.000	
F1c	.067	.024	.232	*.006*^{**}	2.290
F2c	-.022	.024	-.087	.370	3.094
F3c	-.089	.027	-.397	*.001*^{**}	4.873
F4c	-.035	.024	-.150	.148	3.536
F5c	.049	.048	.075	.305	1.769
ProductDurable	-.112	.109	-.057	.308	1.047
RecallSevere	.325	.108	.167	*.003*^{**}	1.024
3 (Constant)	4.857	.095		.000	
F1c	.057	.030	.199	*.058*[*]	3.587
F2c	-.042	.036	-.166	.241	6.569

F3c	-.075	.036	-.337	*.035***	8.347
F4c	-.012	.035	-.051	.735	7.343
F5c	.036	.069	.054	.604	3.568
ProductDurable	-.120	.111	-.062	.281	1.072
RecallSevere	.332	.109	.171	*.003***	1.028
F1c_severe	.044	.053	.104	.408	5.237
F2c_severe	.036	.050	.099	.469	6.151
F3c_severe	-.045	.057	-.137	.428	9.834
F4c_severe	-.040	.049	-.123	.411	7.284
F5c_severe	.022	.097	.023	.823	3.433

*. Significant at the 0,10 level.
**. Significant at the 0.05 level