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How scarcity principle affects consumers' attention in an online shop: an eye-tracking method

Master's thesis

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I have written this master's thesis independently. All viewpoints of other authors, literary sources and data from elsewhere used for writing this paper have been referenced.

(signature of author)

Abstract

This research focuses on Cialdini's scarcity principle and its influence on consumer attention in an online environment. The scarcity principle has been examined for more than 50 years, but it has not been studied thoroughly in an online environment. This research involves an experiment about how scarcity influences the attention and purchase decision of red French wines in an experimental online shop's product catalogue. The participants are young university students who belong to the most frequent online shoppers age group in Europe and in Estonia. The results of the study indicate that all scarcity labelled products are observed longer and are also one of the most selected ones compared to non-labelled wines.

Keywords: scarcity, Cialdini, online shopping, eye tracking, experiment

Introduction

There have been rapid developments in the technology, which have led to changes in people's everyday habits and traditions. One of the habits that has changed extensively is the shopping behaviour in general and moreover in an online environment. To illustrate that, the global retail e-commerce sales has nearly doubled since 2014 to 2017 ("Global retail e-commerce market size 2014-2021," n.d.). Another example is the leading e-commerce company Amazon which net sales revenue has tenfold in 10 years time ("Amazon," n.d.). The reasons indicating these changes are customers' convenience factor and providers' international and comprehensive reach to target audience (Amit & Zott, 2001; Ganesh et al., 2010; Li et al., 2019). The online environment offers different new approaches for selling and marketing strategies, which are also changing existing business models (Amit & Zott, 2001; Ganesh et al., 2001; Ganesh et al., 2010; Li et al., 2010; Li et al., 2010; Li et al., 2019). It is important for retailers, to stand out from others, which is why it is relevant to further investigate different marketing techniques.

This research concentrates on a specific long-standing marketing principle, scarcity, which has been in use for marketing purposes for more than 50 years, but has been less examined in an online environment. From all Cialdini's principle, scarcity is chosen because it is one of the most examined and studied principles, which is still frequently used. Scarcity is a promotional marketing technique, which implies to a product's limited availability (Cialdini, 1984; Deval et al., 2013; Lynn, 1991). Scarcity principle is relevant for persuading people to buy the product, because when people see that specific product is available for only limited time or there is few left of it, it makes the product more unique for them. Deval et al. research proved that scarcity is still very relevant in developing modern marketing strategies (Deval et al., 2013). The previous studies have mainly examined physical shops or used more traditional methods. According to author's best knowledge, there is a research gap in analysing limited-time and limited-quantity scarcity principle in an online environment. Also, in an online environment there are a lot more alternatives from which to choose, which is why this study will examine more thoroughly how scarcity affects attention in an experimental online environment. Therefore, the aim of this research is to find out if consumers' attention of online purchasing process is tilted by Cialdini's scarcity principle in an online product catalogue page. Research questions to achieve the aim are following:

- Q1: Will limited time labelled products catch more consumers' attention in an online environment?
- Q2: Will limited edition labelled products catch more consumers' attention in online environment?
- Q3: Will limited quantity labelled products catch more consumers' attention in an online environment?
- Q4: Will limited-quantity labelled products catch more consumers' attention than limited time scarcity in online environment?
- Q5: Is scarcity influencing people's decision into buying the product?

Scarcity related studies have usually been examined using experiment scenarios with questionnaires (Castro et al., 2013; Cook & Yurchisin, 2017; Deval et al., 2013; Inman et al., 1997; Koch & Benlian, 2015; Song et al., 2017; Steinhart et al., 2014; Yi et al., 2014), content analysis (Thompson et al., 2015) or qualitative methods such as interviews (Aggarwal et al., 2011; Gupta & Gentry, 2016). Furthermore, in the rapidly growing e-commerce field scarcity is a relevant principle to study. Therefore, eye-tracking method can reveal new results into scarcity's influence in an online environment. The results of this study will further extend the previous literature behind scarcity principle and will examine the principle in different environment. This is mainly because of the eye-tracking method used in the research. The results can be applied to when executing online marketing campaigns or changing the business model of a company. The research will contribute to managerial practice when the environment and shopping habits are rapidly changing. This study contributes to marketing communication as if scarcity also influences people's attention.

Literature review

Customers' buying behaviour in an online environment

Buying behaviour in an online environment is somehow similar to a regular shopping behaviour (Ganesh et al., 2010). Although, there are some reasons why people prefer

online shopping to regular or vice versa. From previous literature it has been found out that the most influential factor of converting from regular to online shopping is convenience behind the purchasing process, which is mostly related to decreased time spent on searching and purchasing (Amit & Zott, 2001; Chen & Hung, 2015; Ganesh et al., 2010; Girard et al., 2003; Szymanski & Hise, 2000). Another factor is the selection of products available online compared to a regular shop (Szymanski & Hise, 2000). From previous studies, it has been determined that for example person's income, age and other characteristics (younger and people with higher income are shopping more online) are also related to online shopping (Girard et al., 2003), but it is becoming more dubious as the environment is rapidly changing and people are more likely to keep up with the changes (Schultz & Block, 2015).

There are different reasons why people prefer online shopping to regular. One of the aspects what customers follow on online before buying, is other's evaluation, which is defined as ratings or reviews in an online environment (Kim et al., 2019; Lee & Pee, 2018; Li et al., 2019; Lim et al., 2016). Another is the availability and presentation of product information, which can be influential in the decision making process (Mosteller et al., 2014; Szymanski & Hise, 2000). Online shoppers are usually searching for different options before buying, because they can use the information available on the internet (Amit & Zott, 2001; Senecal et al., 2005). The online buying process can be more convenient for buyer if all these factors are taken into account compared to regular shopping.

As firms are using different new approaches for marketing online, the information flow makes it more convenient for companies (Li et al., 2019) and in the long term also to end customers. Companies can also gather data about customers' behaviour more easily in an online environment (Ertz & Graf, 2015). Due to reviews, feedback and data they can gather, sellers can use it as an advantage and make the online shop more convenient for the end customer. This results in more personalized offers, which helps firms to retain customers and customers to find products from one provider (Amit & Zott, 2001; Chopdar & Sivakumar, 2019). Another factor that firms can use in online environment is offering its customers different filters and categorization options, which will make the purchasing again more convenient for the customer (Szymanski & Hise, 2000). This again makes

online shopping more convenient and easier, which is one of the reasons why people prefer it to regular.

The reasons behind online shopping are usually related to boredom or just entertainment what people seek. However, people are more likely to pay higher price for the products because of it (Chen & Hung, 2015). For persuading consumers into buying online, it is relevant to know their intentions (Pappas et al., 2017). It is easier to implement persuasion techniques in an online environment than in a physical store. Another factor to persuade people to buy from an online shop is the appearance of the online shop, which is highly important and may even be definitive in some occasions (Mosteller et al., 2014; Szymanski & Hise, 2000). As the online shopping has some disadvantages, such as consumers can not try or see the products in real life, online shops have to fill that gap by adding relative and easy to understand product information. It is relevant that the user experience is easy to follow in order to persuade people into buying.

There are some product types that used to be bought from stores mainly, but are now bought online more frequently due to various reasons. In one research it was found out that customers are now buying their groceries more online than before, because they do not feel the desire to buy junk impulsively like in a regular store (Hollis-Hansen et al., 2019). This means that if people buy online, they can control their consumption more easily. Books are also one of the products, which are more preferred to buy online because it is hard to determine whether the book will meet one's expectations before purchasing (Szymanski & Hise, 2000). In China, the most bought items from online are clothing, outdoor items and groceries (Li et al., 2019). In some cases, people check out the products first in a regular shop and then will order from online (Schultz & Block, 2015). Products that are easier to pick out online or that's quality can not be determined before the purchase decision are more likely to be bought online with alternatives to physical stores.

It can be concluded that shopping behaviour differs from regular shopping only because of the opportunities that the online environment offers to companies and therefore to end customers. Online selling process enables companies to use various solutions like providing customers with personalized offers, which therefore makes their purchase decision easier. It has been proven that when shopping online, people have more control over their purchase decisions and therefore control their consumption, which is the case for buying groceries online. Also, customers can narrow down their options more easily using categorizations, filters and offers that are generated for them personally, which again will make the purchase process more comfortable. Although, all these prove that online shopping can be made more convenient for shoppers, but they do not necessarily prove that general shopping behaviour in different environments is different. Since the purchasing process is similar or even the same in both environments, it will be examined if the principles which apply in a physical store will also apply in an online shopping environment.

Scarcity principle and categorization of scarcity principles

Scarcity is a principle that implies to a situation where there has been set a limit to a product or service, which in the study is also referred to as exclusivity (Deval et al., 2013). Scarcity is used in marketing as a tactic for restricting consumers, which purpose is to limit customers' freedom in the decision making process (Inman et al., 1997). The limit can be set to either time or amount of the product or service. Scarcity is defined by Cialdini as a situation where people value things that are limited to them (Cialdini, 1984), which is often perceived as a positive factor when buying products (Steinhart et al., 2014). Therefore, the principle can be defined multiple ways in marketing, depending on the condition and what marketers want to convey.

Scarcity is also influencing the attention the product or service will get. In Thompson et al. study it was pointed out that limited time and quantity scarcity mainly influence untargeted consumers' attention more than targeted (Thompson et al., 2015). This points out that scarcity is positively related to consumers' attention who are not yet familiar with the product or service, which also shows that scarcity is used in order to gain attention.

There are several ways to categorize scarcity. One of the most common categorizations is limited-quantity and limited-time messages (Cialdini, 2008). This means that the product can be scarce because of the limited promotional time the offer stands or its availability in amount would be limited (Cialdini, 2008; Inman et al., 1997; Jang et al., 2015; Mou & Shin, 2018). Another way of categorization is that scarcity can be referred to as differences in supply and demand side (Gierl & Huettl, 2010; Koch & Benlian, 2015). More specifically, dividing scarcity by supply and demand differences points that

there are unlimited amount of products because the production is limited or because the product is in high demand (Koch & Benlian, 2015). Furthermore, if the products' production is limited, the product is more one of a kind and if there is not enough products because of high demand, the product is popular (Castro et al., 2013; Koch & Benlian, 2015). Depending on the categorization, there is a different intention behind the purchase decision.

Limited-time scarcity is often implied to as "offer expires in X days" or expiration time when the offer expires (Aggarwal et al., 2011; Mou & Shin, 2018; Yi et al., 2014). For example on Piletilevi webpage has a timer that starts ticking after you have selected the tickets ("Piletilevi," n.d.). Limited-quantity therefore can be referred to as "3 per customer" or "only 3 items left" (Aggarwal et al., 2011; Jang et al., 2015; Song et al., 2017; Yi et al., 2014). Nowadays an example of limited-quantity scarcity can be "low in stock", which gives a general hinch that the product amount is limited but does not specify how much particularly ("Asos.com," n.d.). There is a relation that limited-quantity scarcity also creates psychological time restriction as there are limited items left of it (Aggarwal et al., 2011). In a previous research it was found out that limited-time and limited-quantity scarcity are not effective when implemented together or after one another (Coulter & Roggeveen, 2012). This means that when developing the most feasible marketing strategy, it is important to figure out which one will be more influential depending on company's customers and products (Aggarwal et al., 2011; Castro et al., 2013; Deval et al., 2013; Gierl & Huettl, 2010). To take that together, the two categorizations are related in a way, but they also may not be effective when used together.

Limited-quantity scarcity is often more difficult to promote as the seller benefits are limited (Aggarwal et al., 2011) and there should be demand for the products in order to influence people into buying. An example of limited-quantity scarcity can be "limited edition" products, where in reality both limited-quantity and limited-time scarcity apply because of the competition and the availability of the products (Aggarwal et al., 2011; Balachander & Stock, 2009). Another speciality that "limited edition" offers is that the promotion is for a specific target group (Balachander & Stock, 2009), which can also be referred to as reference group for other customers (Amaldoss & Jain, 2010). Limited-

quantity scarcity may be more difficult to promote compared to limited-time scarcity, but can be effective if the reference group itself is marketing the product afterwards.

Limited-time scarcity would be more beneficial if used on products that are inconspicuous (Jang et al., 2015). It is also easier to formalize the campaign about limited-time scarcity (Aggarwal et al., 2011). If limited time is used on the specific promotion, it quickens the purchase process (Aggarwal & Vaidyanathan, 2003). As limited time restriction sets an expiration date (Cialdini, 2008), it can make the product more appealing to also non-targeted audience (Cialdini, 2008; Thompson et al., 2015). This means, that restricting customers time on purchase process, can result in raising awareness for people who were not familiar with the product or brand before.

There have been several studies about how limited-quantity and limited-time messages influence purchase intention (Aggarwal et al., 2011; Inman et al., 1997; Jang et al., 2015). Aggarwal et al. research resulted in limited-quantity message as being more effective than limited-time because of consumers perception of the message (Aggarwal et al., 2011). Another study confirmed limited-quantity message effectiveness, where the comparison between limited-quantity and limited-time messages on limited edition products resulted in favor of limited-quantity message for being more influential in the purchase decision making (Jang et al., 2015). This also points out the effectiveness of limited edition products.

Previous studies have examined scarcity in different situations and industries. In general, latest studies have researched scarcity in retail, more specifically in fast fashion industry (Cook & Yurchisin, 2017; Gupta & Gentry, 2016), where the portfolio of products changes constantly and also in online retail industry via browsing a specific website (Coulter & Roggeveen, 2012; Jang et al., 2015; Mou & Shin, 2018; Song et al., 2017; Steinhart et al., 2013; L. Wu & Lee, 2016; W.-Y. Wu et al., 2012; Yi et al., 2014). Scarcity has also been observed in food industry and grocery stores (Campo et al., 2004; Castro et al., 2013; Inman et al., 1997; Parker & Lehmann, 2011). Recently, Mou & Shin used eye-tracking method in order to examine how social proof and limited-time scarcity principle affect consumers decision when buying healthcare products (on-body vs off-body products) on mobile application (Mou & Shin, 2018). They confirmed their hypothesis that time scarcity can highly draw consumers' attention to a specific product on a mobile

app (Mou & Shin, 2018). Taking that into account, it would be interesting to find out how time and quantity scarcity principle will shape buyers' attention when in a regular online shop. To take previously analyzed literature into account, three of the hypotheses is defined which will be tested:

- *H1: limited time labelled products catch more attention than non-labelled products*
- H2: limited edition labelled products catch more consumers' attention than nonlabelled
- H3: limited quantity labelled products catch more consumers' attention than nonlabelled
- *H4: limited quantity labelled products catch more consumers' attention than limited time products*

The influence of scarcity on the decision making process

The purchase decision process in online and in an physical shop is similar. In Karimi et al. study, the process of purchase decision-making is defined on figure 1. In the figure, at first customer comes up with a need and after that starts to search for the product or service which will meet the needs and requirements the product or service have to have. The longest and most definitive step in the research process is searching and decision making, which can end with postponing or not making the purchase. One step that is different in physical and online purchasing process is the research part – in online it can be more transparent and customers have more information made available in the internet. (Karimi et al., 2015)

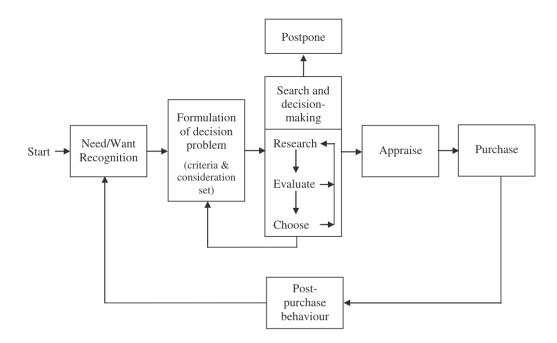


Figure 1. Customer purchasing decision-making process (Karimi et al., 2015)

In this customer purchasing process, more specifically in the research and evaluation step purchase intention comes into consideration. There are several influential factors behind why people buy scarce products. This indication can be explained by using people's naive economic theories in purchasing process, which are established opinions based on their previous experiences and beliefs (Deval et al., 2013; Lynn, 1992). All these beliefs and opinions are influencing people to buy products when there are only few left of them. Scarcity can have different kind of impact: purchasing products because it is preferred by others or because people want to feel exclusive.

People have a desire to look different from others, therefore scarcity may imply to owning something that is unique and therefore a person will feel more exclusive (Amaldoss & Jain, 2005; Deval et al., 2013; Hwang et al., 2014; Lynn, 1991; Simonson & Nowlis, 2000; Steinhart et al., 2014; Tian et al., 2001; W.-Y. Wu et al., 2012). One way of implying that product is scarce, therefore unique, is to promote "limited edition" portfolio of products (Amaldoss & Jain, 2010; Balachander & Stock, 2009; Jang et al., 2015), which may change the value of the product by changing the purpose of the product (Lynn, 1991). One area where scarcity principle is often used is obtaining luxury goods, which results in people wanting to spend more money on getting the product that is unique

(Hwang et al., 2014). Lynn also pointed out that because of the unique feeling that scarcity offers, scarce products are automatically perceived as desirable products (Lynn, 1991). "Limited edition" products can be seen as more valuable to people, which is one of the reasons why it has been widely used.

If products are promoted as rare, it may lead to competition between consumers. Lynn uses scarcity as an competition factor in consumers' behaviour, which can lead consumers to behave in a way that they desire owning the product (Lynn, 1992), therefore it will be profitable for the company who is selling the product (Aggarwal et al., 2011). The competition between consumers and their personal characteristics may lead to consumers not recommending the products they like to others (Cheema & Kaikati, 2010). As the scarcity raises the competition, there also is a fear related to that, which is fear of missing out the opportunity to purchase the specific product (Cialdini, 2008). The need of being exclusive arises the competition between consumers and therefore they could feel fear of not acquiring the product.

In Castro et al. study the experiment of scarcity principle was performed in a grocery store environment, which showed that when people see that the shelf has only few products left, people perceived the product being in high demand and therefore the principle will lead to higher probability of them purchasing the product (Castro et al., 2013). In one fast fashion related study the scarcity principle was proved to agitate a risk-averse behaviour which appears because people are afraid that the product will run out, therefore they are keeping the items in one's hand or hiding them (Gupta & Gentry, 2016). Consumers who appreciate scarce products also like to buy products that are scarce and would be more likely to buy impulsively (Akram et al., 2018; Cook & Yurchisin, 2017). Therefore, the scarcity principle can be used in marketing as a selling point strategy (Steinhart et al., 2013). As the scarcity influences consumers' decision making in a physical shop environment as found in previous literature, it is important to study their behaviour in an online environment more thoroughly.

Scarcity can cause rushed decisions into buying, because the principle restricts customers to buy the product later (Aggarwal & Vaidyanathan, 2003; Gupta & Gentry, 2016; Lynn, 1992; Steinhart et al., 2013), which also limits customers' freedom in the decision making process (Inman et al., 1997). As restricting customers' choice in the matter, can increase

buying products impulsively (Verplanken & Sato, 2011) and therefore can result in negative emotions after buying the product (Cook & Yurchisin, 2017). Another study referred to restrictions that may be invisible for customers, which may not be fair from customers' perspective (Sinha et al., 1999). Therefore, as scarcity can reveal negative consequences after buying, it persuades people to make a purchase decision they may not have made without this tactic being used.

Sellers and marketers have usually more information, such as limitations on availability, and they can use it as an advantage over customers (Sinha et al., 1999). Scarcity can be used by marketers for the purpose of attracting customers into buying a product (Inman et al., 1997; Sinha et al., 1999; Steinhart et al., 2013). Setting the limitations for buying a product usually have positive consequences as consumers will have higher intention to buy the product, but sometimes it can work against the retailer because of the cost of promotion (Campo et al., 2004). Specially for limited-quantity advertisements, the promotion costs are high (Aggarwal et al., 2011). In an online environment, showing products as scarce or rare is easy to implement, which makes it more convenient for marketers (Steinhart et al., 2014). Because of customers' lack of information, they have to depend on the information that seller offers to them, whereas in online shop it is rather easy to exploit with information.

From previous studies, there are different factors that shape the influence of scarcity. Firstly, scarcity influence on consumers also depends on the product itself. Mou & Shin studied on-body and off-body products differences, whereas Castro et al. studied ingestible and non-ingestible product differences (Castro et al., 2013; Mou & Shin, 2018). In Steinhart et al. study, results showed that functional products were chosen when they were socially popular and self-expressive products when they were rare, therefore scarce (Steinhart et al., 2014). Secondly, brand awareness is playing also relevant and positive role in affecting scarcity influence (Jung & Kellaris, 2004). Last but not least, the intention behind the buying affects scarcity impact, the popularity rule is more favorable if a person is purchasing for someone else and scarcity if the person is buying for themselves (L. Wu & Lee, 2016). There are several factors that influence scarcity's role in the purchase decision, but this study will focus on one specific product type in order to compare if and to what extent scarcity principles influence and also differ from each other.

Considering all the factors why people buy scarce products, the reasons behind the purchase decision are effective in different ways. The reason why people buy scarce product can vary from trying to look different from others to being afraid that the product will run out. As previous studies have implied, marketers use scarcity in order to attract customers and hurry them into buying decisions. In an online shop, it is easy to implement different strategies and principles, which is why this research will execute scarcity principle on a specific product in order to find out if scarcity principle is also relevant in an online environment. As there are not many studies, which have examined if there is a connection between attention and decision making, this study will focus on that and the previous literature review raises next hypothesis to be tested out:

H5: scarcity labelled products are more selected than non-labelled products

Methodology

Experiment overview

Previous studies have mostly researched the principle in a regular shop or in an online shop using questionnaires. Taken into account previous literature on how and where scarcity principles are examined, this research will take three different scarcity categorizations and compare them in an experimental online shop's products catalogue using eye-tracking method. This method will help to interpret what actually attracts consumers' attention. The research will take red wine as a product which will have at least one or all three scarcity labels in order to compare their effect on consumers' attention and how it influences their purchase decision. In order to find out if the theory is related to practice hypotheses from previous literature were raised:

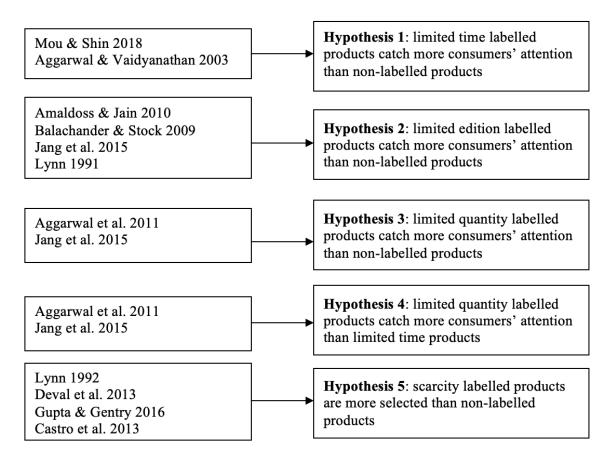


Figure 2. Hypotheses overview based on previous literature

From previous literature Aggarwal & Vaidyanathan study came to conclusion that limited time quickens the purchase and Mou & Shin study confirmed that the limited time scarcity worked on drawing attention to the labelled product (Aggarwal & Vaidyanathan, 2003; Mou & Shin, 2018). Different previous studies have found out that limited edition is influential factor in a purchase process which is why hypothesis 2 about its influence on attention is involved in the experiment (Amaldoss & Jain, 2015; Balachander & Stock, 2009; Jang et al., 2015; Lynn, 1992). Hypothesis 4 comes from Aggarwal et al. and Jang et al. studies where the results show that limited quantity is being more effective in the decision making process than limited time scarcity (Aggarwal et al., 2011; Jang et al., 2015), which therefore raises hypothesis 3 that limited quantity labelled products catches more attention than non-labelled products. The last hypothesis 5 is a more general hypothesis, which raises question if scarcity labelled products are giving positive results compared to regular products (Lynn, 1992; Deval et al. 2013; Gupta & Gentry, 2016; Castro et al. 2013).

Experimental online shop products catalogue were created in order to see what people notice there. Online shop products catalogue pictures and text were from Bestwine online shop products catalogue in order for the experiment to look realistic (Bestwine.ee, n.d.). Participants were aware that the pictures they see are product catalogues of an experimental online shop. All together eight different product catalogues with two different settings of products were presented.

This study used red wine as the product of the experiment. Wine was chosen because it is one of the products what people buy because of labels and appearance. All the products presented were French red wines in 10-15 euro price range in order to diminish the country of origin, taste preference and price sensitivity bias. In order to decrease the position bias, labelled wines were placed into different positions. The first six pages included one wine with one of the scarcity principles and regular ones in two different catalogue settings. The last two pages contained all of the scarcity principles (3 wines) in two different settings. Two different settings were chosen in order to reduce the influence of a position on a product page. The last pages that contained all scarcity principles were examined in order to conclude which caught the most attention and which was most chosen in the experiment.

This study used eye-tracking method in order to track what was observed longer therefore got most attention and what they chose while shopping online. The method is helpful for minimizing the bias what people want others to think and what actually attracts their attention. There are several metrics that the eye-tracker measures during the experiment, but this study examines two of them: total fixation duration and mouse clicks count. Total fixation duration is examined because it will show how long people observed a specific product. Mouse clicks count were also analyzed in order to compare which products people chose from the shop. There were several analyses made to find out if the observation time and selection was somehow related.

Participants overview

Participants for the experiment were chosen amongst both men and women. The reason for choosing both is to perceive different angles in the buying process. Altogether, 62 people participated in the experiment, out of which 33 (53%) were women and 29 (47%) men. The experiment was held in University of Tartu Library, so the participants were mainly university students. The purpose of that was to involve the most frequent online buyers to the experiment. All participants were aware of the experiment.

Most frequent groups of online buyers in Europe in the past 5 years is individuals aged 16 to 24 and 25 to 34 (see appendix A). The percentage of shoppers online has also increased throughout the years for both cases. In Estonia, the leading age group of online buyers is also one of the age groups mentioned, 25 to 34 years old individuals (see appendix B). Moreover, the percentage of online buyers has increased from 77% in 2014 to 88% in 2018 (see appendix B). In this experiment, university students make up a good sample because they are above 18 years of age, which was one of the requirements for participating, and the group consists of individuals aged between 18 to mid-thirties who are most frequent online buyers.

Experiment took place in a closed room environment, where there were no other distractions and participants were invited to participate. Prior to the experiment every participant was defined to meet the age group necessary and explained the procedure. After the explanation, the participants had to go through the product catalogue, read the labels and then click on the product they would like to buy. The average time for one

experiment was 5 minutes. After the experiment, all participants were explained the purpose of the research and the usage of data gathered.

Results

Eye-tracking data analysis

In the experiment there were three labels used for scarcity: limited edition, which referred to exclusivity, limited time scarcity and limited quantity scarcity. Limited edition scarcity was labelled as "limited edition" (LE), limited time scarcity as "offer expires in 3 days" (OE) and limited quantity as "only 3 items left" (Q). The purpose of the experiment was to compare the labelled products with regular ones, which is why the experiment was built up as following: regular wine bottles were set aside with one or more labelled bottles (limited edition, limited time or limited quantity) (see Appendices C to J). The first six product pages did not include more than one labelled bottle, but the last two product pages included all three different scarcity labelled bottles and five regular ones in different settings (see Appendices I and J).

In the study there were two metrics examined: average total fixation duration and count of mouse clicks. Average total fixation duration and count of mouse clicks are taken in order to compare how long the product was observed (how much attention it got) and how many times it was actually chosen (the more the better). The relation between the average total fixation duration and mouse click is brought out in order to compare if the observation time affects the decision of what was purchased. What is more, time to first fixation metric was firstly analysed in order to find out if the scarce product was noticed quicker than others, but this metric was more dependent on the position rather than the scarce labelling.

The first analysis concentrated on the metrics that eye tracker measured. More specifically, the means of total fixation duration in two different settings and then mouse clicks count was analyzed in order to find out what was most selected wines. In addition to those analyses, ANOVA test was also conducted in order to find out if and how the means of total fixation duration differs between scarce and regular bottles. ANOVA tests also show if the difference between means is statistically significant.

Setting I	Name	Mean	Sequence I	Setting II	Mean	Sequence II
1	Le Petit	2	6	4	1,13	6
2	Paul Jaboulet	2,42	1	6	1,02	7
3	Pierre Merlot	2,4	2	8	0,97	8
4	Pierre Cabernet	2,24	3	1	1,26	3
5LE	Père	2,11	5	7	1,26	3
6	Marrenor	1,87	7	2	1,31	2
7	Laurent	2,24	3	5	1,26	3
8	Grand	1,46	8	3LE	1,83	1

Table 1. Mean of total fixation duration (LE="limited edition")

From table 1 it can be pointed out that "limited edition" labelled product was observed the longest in the second setting. In the first setting "limited edition" labelled wine was 5^{th} and was 3^{rd} in the second setting without label. For comparison, wine named Grand, which was observed the shortest period in the first setting was observed the longest when it was labelled "limited edition". This shows that hypothesis 2 is rejected for Père and accepted for Grand (*H2: limited edition labelled products catch more consumers' attention than non-labelled*). In general there is not enough proof to accept nor reject the hypothesis 2.

Table 2. Count of mouse clicks

Setting I	Name	Mouse clicks	Setting II	Mouse clicks
1	Le Petit	6	4	12
2	Paul	3	6	3
3	Pierre Merlot	6	8	6
4	Pierre Cabernet	9	1	7
5LE	Père	10	7	7
6	Marrenor	12	2	9
7	Laurent	10	5	5
8	Grand	6	3LE	13

From table 2 it can be concluded that "limited edition" labelled products are one of the most selected ones in general. More specifically, in the first setting it is second most selected and in the second setting it is the most selected. If looking the same wines with and without labels, it shows that Père got 3 more clicks with label and Grand clicks count

was doubled because of the "limited edition" labelling. This actually shows, that limited edition can be helpful in marketing in order to sell more of that product.

Comparing the results of table 1 and 2, it can be concluded that in the second setting limited edition labelled Grand is the wine that got the most attention and was also one of the most selected one. This shows that there could be relation between average total fixation duration and the decision making. Furthermore, it can give an input to hypothesis 5 that scarce products are more selected than regular ones.

Setting I	Name	Mean	Sequence I	Setting II	Mean	Sequence II
1	Le Petit	1,52	2	40E	2,2	1
2	Paul	1,23	4	6	1,29	7
3	Pierre Merlot	1,02	7	8	1,17	8
4	Pierre Cabernet	1,1	6	1	1,62	5
5	Père	1,25	3	7	1,8	3
6OE	Marrenor	2,01	1	2	2,01	2
7	Laurent	1,16	5	5	1,68	4
8	Grand	0,99	8	3	1,51	6

Table 3. Mean of total fixation duration (OE="offer expires in 3 days")

From table 3 it can be concluded that limited time scarcity is observed the longest in both settings, which can also refer that it catches more consumers' attention. Although, comparing these specific wines with and without labels, the difference of sequence is only one point higher with label. It can be summarized from the results that hypothesis 1 (*H1: limited time labelled products catch more attention than non-labelled*) can be accepted and that limited time labelled catch more attention than non-labelled products.

Table 4.	Count	of mouse	clicks
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Setting I	Name	Mouse clicks	Setting II	Mouse clicks
1	Le Petit	12	40E	2
2	Paul	4	6	13
3	Pierre Merlot	5	8	6
4	Pierre Cabernet	7	1	12
5	Père	8	7	13
60E	Marrenor	14	2	2
7	Laurent	9	5	9

8 Grand	3	3	5
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From table 4 it can be marked out that limited time scarcity labelled has different results in the settings. In the first setting it is the most clicked one and in the second setting it is the least clicked one. In order to look if limited time scarcity influences purchase decision further research will be needed. This means that the relation between total fixation time and mouse clicks is positive for the first setting and negative for the second setting.

Setting I	Name	Mean	Sequence I	Setting II	Mean	Sequence II
1	Le Petit	1,39	3	4	0,9	5
2	Paul Jaboulet	1,4	2	6	0,72	8
3	Pierre Merlot	1,21	6	8	0,85	7
4	Pierre Cabernet	1,23	5	1	0,93	4
5	Père	1,23	5	7	1,2	2
6	Marrenor	1,2	7	2Q	1,66	1
7	Laurent	1,37	4	5	0,88	6
8Q	Grand	1,98	1	3	1,13	3

Table 5. Mean of total fixation duration (Q="only 3 items left")

From table 5 it can be concluded that limited quantity labelled product is observed the longest in both settings. This shows that the limited quantity label catches attention and that hypothesis 3 (*H3: limited quantity labelled products catch more consumers' attention than non-labelled*) is valid. Comparing the wines with and without labels, with Marrenor wine the difference is more than with Grand wine, but it has got more attention with labels in both settings.

Table 6. Count of mouse clicks	
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Setting I	Name	Mouse clicks	Setting II	Mouse clicks
1	Le Petit	11	4	6
2	Paul	3	6	3
3	Pierre Merlot	7	8	10
4	Pierre Cabernet	2	1	3
5	Père	10	7	9
6	Marrenor	12	2Q	12
7	Laurent	6	5	8
8Q	Grand	11	3	11

From table 6 it can be pointed out that limited quantity scarcity labelled products were one of the most chosen ones in both settings, even the most clicked one in the second setting. This shows that consumers read the signs carefully and if there is limited amount of product available, it may indicate that consumers are more willingly to buy the product. Although again, the difference of the same wine bottle with and without the labels is almost non-existent, which may infer that the limited quantity scarcity may not be definitive in this situation.

Setting I	Name	Mean	Sequence I	Setting II	Mean	Sequence II
1	Le Petit	1,03	4	40E	1,79	1
2	Paul	0,83	7	б	0,72	7
3	Pierre Merlot	0,84	6	8	0,7	8
4	Pierre Cabernet	0,86	5	1	0,8	6
5LE	Père	1,22	3	7	0,97	4
60E	Marrenor	1,42	2	2Q	1,25	3
7	Laurent	0,72	8	5	0,92	5
8Q	Grand	1,55	1	3LE	1,44	2

Table 7. Mean of total fixation duration from eye tracking analysis (with all labels)

Table 7 shows that all products labelled with scarcity principle have been observed longer than regular ones in both settings. In both of the settings the sequence of different scarcity labelled products is different. In the first setting, limited quantity labelled product is observed the longest and in the second setting, limited time is the longest observed one. This means that hypothesis 4 (*H4: limited quantity labelled products catch more consumers' attention than limited time products*) will be rejected, because it can not be proved and it may depend on other issues such as position, wine mark or other.

Table 8. Count of mouse clicks (with all labels)

Setting I	Name	Mouse clicks	Setting II	Mouse clicks
1	Le Petit	6	40 E	14
2	Paul	1	б	4
3	Pierre Merlot	5	8	4
4	Pierre Cabernet	9	1	4
5LE	Père	20	7	8

60E	Marrenor	10	2Q	11
7	Laurent	4	5	5
8Q	Grand	7	3LE	12

From table 8 it can be summarized that all the products which have scarcity labelling are the ones that are most clicked. This proves the fact that scarcity influences purchase decision in a positive way and hypothesis 5 (H5: *scarcity labelled products are selected more than non-labelled products*) can be accepted. In the first setting, limited edition product is most selected and in the second setting, limited time product. When comparing these results with total fixation duration, it can be concluded that the wines that got the most attention (labelled ones) also were selected. Furthermore, in the second setting the bottle which had limited time label was also the one that was the most selected one. The table also illustrates that limited time and limited edition offering increases mouse clicks more than two times.

For more thoroughly analyzing the difference between scarce and regular wine bottles, ANOVA tests are taken. ANOVA tests give more insight about the significance of the relation. ANOVA is used for every hypothesis in order to compare the results with previous results. The hypotheses for the first ANOVA test (table 9):

 H_0 : mean of total fixation duration is the same for "limited edition" and non-labelled bottles

 H_1 : mean of total fixation duration is not the same for "limited edition" labelled and nonlabelled products

Table 9. One-way ANOVA test results of comparing "limited edition" and regular bottles

 means of total fixation duration

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	0,177	1,000	0,177	0,564	0,481	5,987
Within Groups	1,884	6,000	0,314			
Total	2,061	7,000				

*SS – Sum of squares

*df – degrees of freedom

*MS – mean square

*significance level=0,05

In table 9 it can be pointed out that the means of "limited edition" and non-labelled bottles are not significally different from each other as the significance level of the test is higher

than the 0,05, which means that H_0 will be accepted (H_0 : mean is the same for "limited edition" and non-labelled bottles). This shows that the average of total fixation duration of "limited edition" wines difference is not statistically significant compared with non-labelled total fixation duration and does not support the hypothesis 2 of the study (H_2 : limited edition labelled products catch more consumers' attention than non-labelled products).

For study hypothesis 1, comparison between means of limited time and non-labelled products next ANOVA hypotheses are tested:

 H_0 : mean of total fixation duration is the same for "offer expires in 3 days" and nonlabelled bottles

 H_1 : mean of total fixation duration is not the same for "offer expires in 3 days" labelled and non-labelled products

Table 10. One-way ANOVA test results for comparing "offer expires in 3 days" and non-labelled bottles means of total fixation duration

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	1,110	1,000	1,110	9,395	0,022	5,987
Within Groups	0,709	6,000	0,118			
Total	1,819	7,000				

*SS – Sum of squares

*df – degrees of freedom

*MS – mean square

*significance level=0,05

From table 10 it can be marked out that the differences of these means are statistically significant as the significance level of the test was lower than 0,05 and F statistic is greater than F critical value, which means that H_1 will be accepted (H_1 : mean is not the same for "offer expires in 3 days" labelled and non-labelled products) and also hypothesis 1 of this study (H_1 : limited time labelled products catch more attention than non-labelled products) can be accepted as the means are statistically significantly different.

In order to compare limited quantity and non-labelled products next ANOVA hypotheses are tested:

*H*₀: *mean of total fixation duration is the same for "only 3 items left" and non-labelled bottles*

 H_1 : mean of total fixation duration is not the same for "only 3 items left" labelled and non-labelled products

Table 11. One-way ANOVA test results for comparing "only 3 items left" and non-labelled bottles means of total fixation duration

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	0,800	1,000	0,800	11,701	0,014	5,987
Within Groups	0,410	6,000	0,068			
Total	1,210	7,000				

*SS – Sum of squares

*df-degrees of freedom

*MS – mean square

*significance level=0,05

Table 11 points out that the mean difference between those groups is statistically significant, because the significance level is lower than 0,05 and the F statistic is greater than F critical value. This leads to rejecting the hypothesis 0 and accepting H1 (H_1 : mean is not the same for "only 3 items left" labelled and non-labelled products). This can show that limited quantity labelled products got more attention than non-labelled products, which accepts study hypothesis 3 (H_3 : limited quantity labelled products catch more consumers' attention than non-labelled).

As one of the study hypothesis also pointed out that there can be difference in limited time and limited quantity scarcity, another ANOVA test is conducted in order to compare their means of total fixation duration. For that next hypotheses are tested:

*H*₀: mean of total fixation duration is the same for "offer expires in 3 days" and "only 3 items left"

*H*₁: mean of total fixation duration is not the same for "offer expires in 3 days" and "only 3 items left"

Table 12. One-way ANOVA test results comparing "offer expires in 3 days" and "only3 items left" means of total fixation duration

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	0,120	1,000	0,120	1,183	0,319	5,987
Within Groups	0,609	6,000	0,102			
Total	0,729	7,000				

*SS – Sum of squares

*df – degrees of freedom *MS – mean square *significance level=0,05

From table 12 it can be pointed out that the significance level is higher than 0,05, so the difference between those groups are not statistically significant, which means that it can not be proved if the means are different or not and therefore it can not be proved with this study that limited quantity gets more attention than limited time product.

For the next ANOVA following hypotheses are tested:

*H*₀: mean of total fixation duration is the same for "limited edition", "offer expires in 3 days", "only 3 items left" and non-labelled bottles

 H_1 : mean of total fixation duration is not the same for "limited edition", "offer expires in 3 days", "only 3 items left" labelled and non-labelled products

Table 13. One-way ANOVA test results comparing "limited edition", "offer expires in 3days", "only 3 items left" and non-labelled bottle means of total fixation duration

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	0,680	3,000	0,227	6,227	0,055	6,591
Within Groups	0,146	4,000	0,036			
Total	0,825	7,000				

*SS – Sum of squares

*df – degrees of freedom

*MS – mean square

*significance level=0,05

From table 13 it can be seen that as the significance level of that test a bit higher than 0,05 the differences between one of the groups are not statistically significant. This means that H_0 is accepted and the means are the same when comparing those groups.

Another ANOVA for all the values can be conducted, where all the scarce labelled products are aggregated as one and compared with regular bottles group means. In order to test study hypothesis 5, following hypotheses are tested for ANOVA:

*H*₀: *mean of total fixation duration is the same for scarcity principle labelled and nonlabelled bottles*

*H*₁: mean of total fixation duration is not the same for scarcity principle labelled and nonlabelled products **Table 14.** One-way ANOVA test results comparing scarce labelled and non-labelled bottle means of total fixation duration

Source of Variation	SS	df	MS	F	p-value	F crit
Between Groups	0,277	1,000	0,277	213,368	0,005	18,513
Within Groups	0,003	2,000	0,001			
Total	0,280	3,000				

*SS – Sum of squares

df - degrees of freedom

*MS – mean square

*significance level=0,05

From table 14 it can be concluded that the difference of mean of total fixation duration is statistically significant for scarce labelled and non-labelled products (significance level lower than 0,05 and F statistic higher than F critical value). Furthermore, hypothesis 1 will be accepted (H_1 : mean is not the same for scarcity principle labelled and non-labelled products), which means that scarcity labelled products total fixation duration average was different than average of non-labelled products. This will also confirm that as the scarce products average time for observation was different from non-labelled products average time for observation states analysis show that scarce products were more clicked than non-labelled, there is a positive relation between the most observed and most clicked products. Therefore, study hypothesis 5 (H5: scarcity labelled products) can be accepted.

All these results confirm that study hypotheses 1, 3 and 5 will be accepted using previously made analyses. As also Mou & Shin pointed out in their study that limited time labelled product catches more attention (Mou & Shin, 2018), the results of this study also confirmed it twice that limited time labelled products do catch more attention compared to non-labelled products. Aggarwal et al. and Balachander & Stock brought out in their studies that limited edition labelled products catch more attention because of the competition it raises (Aggarwal et al., 2011; Balachander & Stock, 2009) and this study's results can be concluded that limited edition labelled products. Furthermore, in two studies it was pointed out that limited quantity message is more effective than limited time message (Aggarwal et al., 2011; Jang et al., 2015). The results from this study did not confirm that limited quantity is more effective compared to limited time labelling, although it confirmed that limited quantity is more observed than non-labelled products. Deval et al.

and Lynn study results showed that scarce products tend to direct people to buy something that is rare because of people's naive economic theories and this study confirmed the fact that scarcity labelled products are selected more than non-labelled products.

Discussion and conclusions

This research focused on Cialdini's scarcity principle and how the principle affects attention and purchase decision in an experimental online shop product catalogue. In order to test the aim of the research, hypotheses were constructed relying on previous research results and findings. This research analyzed the principle attention effect by eye tracking method which was held in University of Tartu Library in order to get university students as a sample.

The main results of previous literature review were that scarcity principle was one of the most examined principles of Cialdini's in physical shops with methods such as questionnaires, interviews and content analysis and the most studied industry for the principle is retail. Scarcity is known as a principle limiting the product or service by time or amount: limited time and limited scarcity principle. This study also takes this categorization into account in the experiment. From previous literature scarcity messages such as "limited edition" which implies to exclusivity, "offer expires in 3 days" which is an example of limited time scarcity and "only 3 items left" which shows limited quantity of the product, are chosen to the experiment.

Products that are limited by scarcity principle are used in order to cause exclusive feeling, higher demand or even competition between consumers. Presenting the products as scarce is made easy in an online environment, which is one of the reason why it is important to examine how people see it and if it is as effective as in previously studied physical shops. The online environment itself is making consumers lives more convenient, but the buying process itself is the same, which is why the principle can also have the impact online.

The experiment was focused on online environment, which is the reason why the results of this study can be generalized to work in there. More specifically, the experiment involved online shopping process in an experimental wine online shop, where participants could choose from red French wines. The purpose of the experiment was to find out if scarcity labelled products were observed longer, clicked and if these metrics had any relation. For analyzing, metrics such as total fixation duration and count of mouse clicks were used. The total fixation duration was analysed as a metric that showed how much attention the product got. To generalize, with most cases total fixation duration was positively related with purchase decision.

The results of the experiment showed that limited time scarcity was the most observed therefore got the most attention and was positively related with purchase decision in an online environment. From previous literature it was proved that limited edition brings out competition between consumers, but this study did not prove this statement. The results about testing if limited time and limited quantity labelled products catch more consumers attention than non-labelled products brought positive results: they are more noticed than non-labelled ones in online. The hypothesis which compared limited time and limited quantity scarcity was not confirmed by this study because there was no significant difference between the means of these groups. The last hypothesis and research question was about scarcity labelled products are more selected compared with non-labelled products. Therefore, the results of this study confirm that consumers' attention is tilted by Cialdini's scarcity principle in an online environment if it is limited time or limited quantity scarcity.

All these results are relevant for marketing, managerial practice and businesses in order to keep up with the changes, opportunities and challenges that online environment brings. It is relevant for consumers to know what is actually behind what marketers want to accomplish. As there are more principles of influence, all of them can be monitored and examined more thoroughly analyzing their influence to new markets or environments. In addition, it would be interesting to recreate the experiment in an operating online shop in order to make the online environment more accurate for participants.

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Appendices

Appendix A.

Age group/year	2014	2015	2016	2017	2018
Individuals 16 to 24 years old	61	66	67	70	72
Individuals 25 to 34 years old	68	70	72	75	78
Individuals 35 to 44 years old	60	62	65	68	70
Individuals 45 to 54 years old	50	53	55	58	60
Individuals 55 to 64 years old	35	38	41	43	45
Individuals 65 to 74 years old	23	25	27	28	30

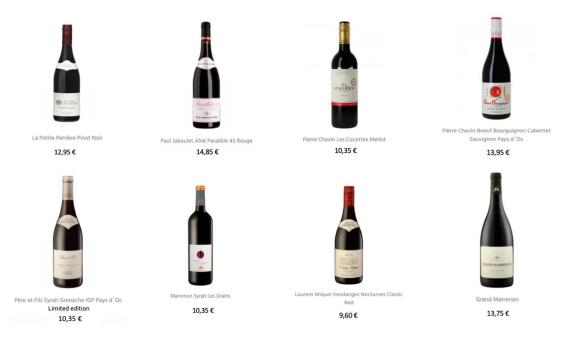
Percentage of individuals who have purchased online in the last 12 months by age groups in Europe (Eurostat, n.d.)

Appendix B.

Age group/year	2014	2015	2016	2017	2018
Individuals 16 to 24 years old	67	76	77	75	80
Individuals 25 to 34 years old	77	83	83	83	88
Individuals 35 to 44 years old	58	74	70	74	79
Individuals 45 to 54 years old	44	58	54	54	59
Individuals 55 to 64 years old	25	35	31	36	36
Individuals 65 to 74 years old	11	17	14	17	18

Percentage of individuals who have purchased online in the last 12 months by age groups in Estonia (Eurostat, n.d.)

Appendix C.



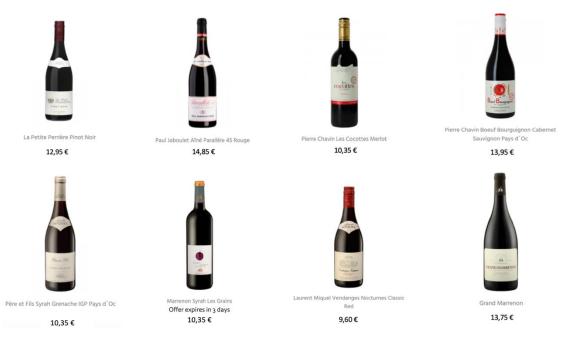
Setting I with "limited edition" label (Bestwine.ee, n.d.)





Setting II with "limited edition" label (Bestwine.ee, n.d.)

Appendix E.



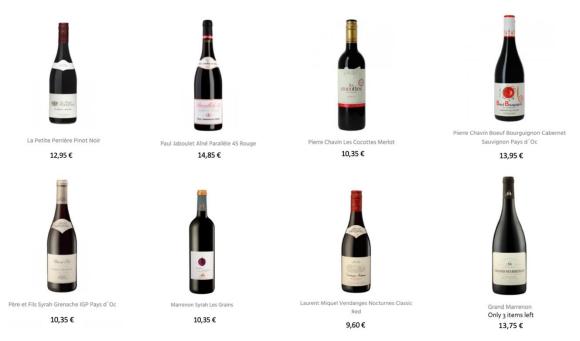
Setting I with "offer expires in 3 days" label (Bestwine.ee, n.d.)

Appendix F.



Setting II with "offer expires in 3 days" label (Bestwine.ee, n.d.)

Appendix G.



Setting I with "only 3 items left" label (Bestwine.ee, n.d.)

Appendix H.



Setting II with "only 3 items left" label (Bestwine.ee, n.d.)

Appendix I.



Setting I with "limited edition", "offer expires in 3 days" and "only 3 items left" labels (Bestwine.ee, n.d.)



Setting II with "limited edition", "offer expires in 3 days" and "only 3 items left" labels (Bestwine.ee, n.d.)

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