A Work Project, presented as part of the requirements for the Award of an International Master Degree in Management from the NOVA – School of Business and Economics

LINKING EYE-TRACKING TECHNOLOGIES WITH THE PHYSICAL RETAIL SECTOR - A COMPREHENSIVE STUDY AND RECOMMENDATIONS FOR A MARKET APPROACH

ANTÓNIO CARDOSO DIAS CALDEIRA GUIMARÃES
NUMBER 3336

A Project carried out on the International Masters in

Management program, with the supervision of Professor

Leid Zejnilovic

and the collaboration of:

eyeware

JANUARY 3RD, 2018

Abstract

This study evaluates the value of Eyeware's eye tracking technology for commercialization in the retail industry.

Combining theoretical frameworks of technology adoption with first-hand feedback from retail experts and end-consumers, findings suggest that Eyeware's technology has value for retailers that understand the need for innovating, that have sufficient resources and whose needs fit with Eyeware's solution. To increase the market entry's success, it is recommended that the company engages in some kind of partnership or joint venture, as well as finds a way to avoid legal constrictions regarding data privacy, among other recommendations.

Table of Contents

1 - Introduction

Eyeware is a spin-off from the Idiap Research Institute Martigny, and it develops solutions based on proprietary algorithms for the detection of eye movement. As many firms that start with an interesting technology, Eyeware is struggling to determine the most profitable niche where they could flourish - a classic technology push situation. The management team has identified the retail sector as one of the key industries for their strategic focus.

Consequently, this work will study the application of the technology at hand in the retail sector, by identifying the strategic value and synergies inherent from this linkage; and study the optimal approach strategy to enter this market. For the approach, two scenarios will be compared - with and without partnerships - and the chosen scenario will be further explored.

The study will be based mostly on article review and framework application, since it is a still very untapped market, where historical information is not abundant. Still, the opinion of sector managers and leaders, as well as end-consumers, was sought to provide practical content to the recommendations.

Potential solutions and recommendations may be, for example, that the company should enter the technology as a component of an established ecosystem of technologies, targeting then the companies that own and sell this system; or that the company should use the technology as a stand-alone product, thus targeting the end consumers (the retailers).

2 – Context and Literature Review

2.1 – Company and the Technology

Eyeware is a young company that develops solutions based on proprietary algorithm for the detection of eye-gaze direction.

The idea first appeared in Arkathon Hacking Health 2015 as a project to develop a virtual computer mouse designed to help quadriplegics and other disabled people who can't use their arms. In 2016, it was incorporated in Switzerland as Eyeware Tech SA, and since then it has been developing the patent-pending 3D eye tracking software to enable human attention detection in different industries. These industries include Healthcare, Robotics, Advertising, Automotive, Social Studies, Gaming, Smart Home, Industry 4.0, and more recently, Retail.

Among other achievements, Eyeware won the Arkathon in 2015; won WITSA Emerging Digital Solution 2016 award; it was one of the 5 finalists of SwissICT awards in 2017; and later in that year it was nominated by a prestigious Portuguese online news app "Observador" as one of the "Top 10 startups" in Web Summit.

The competing systems (based on PCCR - pupil centre corneal reflection) have the limitations of using proprietary hardware to track only one user's attention to one 2D screen, with limited movement. On the other hand, Eyeware's 3D technology enables gaze tracking for multiple people at the same time in up to 40x larger volume, towards multiple objects, and all this using consumer hardware.

2.2 - Data Collection

Data collection, as in the activity of collecting information in a standardized and meaningful way, is more and more important in every day's life. It is a growing market, with its revenues increasing about 12% per year, and software is expected to have a bigger

weight on this revenues in the decades to come. Data volume collected by smart buildings, for example, is expected to grow 2,5x in the next three years, from 14.6 to 37.2 zetabytes (Statista, 2015)[1].

One of the major concerns about data collection, though, is the privacy issues. As data collection practices increase and companies rush to gather all kinds of data about customers, data collectors must be wearier of what is considered invasive or not. Consistently, everywhere around the world countries are changing regulatory constraints regarding data privacy, which can prove to be both a threat and an opportunity for new technologies (Wikipedia, 2017; Tucker, 2015; Parsons et al, 2015; Michalsons)[2, 3, 4, 5, 6].

2.3 - Technology Push

A technology-push, in its basic definition, happens when innovation is not driven by a specific market need, but only for the sake of innovating. The innovators then have to search for markets where their new product or service can be applied. The case of Eyeware is a good example of a Technology Push, since the company made developments in the area of Eye Tracking, and is now looking for markets where these developments may have value.

One of these potential markets for the application of the technology, identified by the Management team of the company, is Retail. The data collected by this new technology can have endless applications towards understanding consumer behavior, and one of the key objectives of this study is to understand if there is, in fact, any value in joining Eyeware with Retail; and if so, how should this connection be made.

2.4 - Retail

As defined in "Retailing Management" retail is "the set of business activities that adds value to the products and services sold to consumers for their personal or family

use"(Levy et al, 2012: 6)[7].

Retail is said to be one of the most important industries for the global economy, with huge revenues and weight on employment. According to Statista's predictions in 2014[8], total retail sales worldwide should amount to US$ 28.3 trillion in 2018, which accounts for approximately 34% of Global GDP's prediction for the same year.

2.4.1 - General trends in Retail

The trends in this market, hereinafter to be discussed, are important in the sense that it is key to understanding if there is a real problem that this technology solves, and what are the current conditions of the industry.

Retail, as we know it, is changing rapidly. Innovation in retail is driven by a rapid increase of competitive pressure (that in some cases even led to a rapid transition from quasi monopoly positions to hyper-competition) (Castaldo et al, 2013; Peng et al, n.d.)[9, 10], and traditional retailers are seeing the sales productivity of their brick-and-mortar stores decreasing, as they struggle to redefine the role of the store in a multichannel, millennial-led world (IBM, 2012)[11].

There are essentially two slightly distinct points of view for the future of physical retail: a pessimistic and an optimistic. The pessimistic authors, in general, recommend strategies that imply companies should either give up competing with the digital advent, or reinvent completely their formats (Lal et al, 2014)[12]. The optimistic writers, although agreeing that the formats must be changed, insist that saying that the physical retail is dead is greatly exaggerating, since most probable reasons for store closings and companies going insolvent is the excess, in number, of stores (Treadgold et al, 2016; Wahba, 2017)[13, 14], and the lack of perception of customer trends (Biggs, 2017)[15].

There is a clear excess of physical stores for the customers' needs; people are spending more online; and people's needs are shifting from materialism to an increasingly shared society (Thompson, 2012 and 2017)[16, 17], but retailers are starting to realize that they must be agile and flexible (as well as use real-time data and analytics) to meet these shifting needs of consumers (Deloitte, 2011)[18], and to ensure physical retail's survival and its participation on multi-channel formats (Pantano et al, 2014)[19].

After understanding these two points of view regarding retail's future, it is important to understand what are companies going to do, because even though the circumstances are different, both sides agree that something must be done to ensure the physical retail's endurance. It is clear that innovation is imperative for long-term success in this situation (Berry et al, 2010; Haydock, 2014)[20, 21], and some general trends are easily identified:

Firstly, most knowledgeable people in the area believe that big data and analytics will be in the epicenter of strategies that work against the end of retail. Retail data analytics has the ability to help companies stay abreast of shopping trends, enabling retailers to apply data-driven strategies based on customer analytics, online shopping trends and in-store patterns (Virmani, 2017)[22]. Retailers that are embracing these data-first strategies are reaping dividends (Marr, 2015)[23], especially in data-driven areas like mass fashion, where stores using strategies based on data and analytics like H&M, Zara and Forever 21 are thriving while mass stores struggle (Schlossberg, 2015)[24]. An IBM's study on big data (2013)[25] presents some interesting findings: most organizations are in the early stages of big data planning; in retail, more than half survey respondents identify customer analytics as their organization's top priority; and the majority of retailers use internal data as primary source of big data within their organizations.

Secondly, many also talk about how multichannel store formats (where digital and physical work together) will be key to survive in a growing online world. This should be separated as a different trend since it involves basically implementing technologies that allow for the connection between the online and the offline. In IBM's "Reinventing Retailing" (2012), it is said that "As brick-and-mortar retailers prepare for battle with the online merchants, they must transform into truly seamless multichannel businesses. In doing so, there are several areas they can draw upon for competitive advantage.".

And thirdly, the creation of immersive experiences, with the objective of enhancing customers' experiences, is also referred multiple times. Given the current retail landscape, this sector "is forced to pursuit existing consumers and attract new ones" and "immersive technologies can be an efficient tool for pushing innovation in retailing."(Pantano et al, 2012)[26]. Exploring digital technologies to create immersive retail experiences is even more important since many brands are already jumping on this experiential retail trend (Reality Interactive, 2017)[27].

Many authors even refer already to eye tracking technologies or movement and path tracking in-store as an option for innovation in retail. A TechCrunch's article (Dickson, 2017)[28] exposes the different applications of eye tracking software. And among VR, PC gaming and medicine, the topic of physical advertisement is discussed: "In the physical world, however, eye tracking is already showing promise.", and quoting Dominic Porco, CEO at Impax Media, a digital advertising company, Dickson writes "Market research firms are experimenting with directly measured biometric data to precisely determine the composition of people in out-of-home media environments such as retail stores, for audience measurement purposes."

2.4.2 - Market Approach

After deciding whether the company should venture into data collection for the Retail industry, and if the decision is positive, the question that arises is on how it should be done. Two different major paths exist: in the first, the company enters as a service provider, alone, in the retail market, and tries to sell to as many clients as it can; in the second, the company joins resources with another bigger, or just different, firm, and takes advantage of this other company's resources.

The book "Marketing of High-Technology Products and Innovations" (Mohr et al, 2005)[29] proposes different reasons for partnering or not in different stages of the product life-cycle, and adapts a simplified version of the framework proposed in the article "Establishing a Standard: Competitive Strategy and Technological Standards in Winner-Take-All Industries"(Hill, 1997)[30] to define the best strategies to be leader on the market, through different variations of partnerships. It proposes a framework for deciding the best approach, when it comes to partnerships, for creating an industry standard, having in consideration major inputs: the presence of barriers to imitation (in High Technology, this usually implies the existence of a patent); the possession of complementary resources from the company in question (whether the company has access to all the resources it needs to thrive in the market); and the existence of capable competitors (competitors capable of imitating the technology of the firm, or developing their own, or with technologies that are able to provide more or less the same service).

In general, partnerships are formed as a cost-efficient manner of companies gaining access to resources that would cost too much time or money to develop on their own. In the emergence phase of the product life-cycle, substantial uncertainty surrounds the product, and one of the key reasoning for partnering is that the potential alliances are

valuable to establish standards that reduce uncertainty. Other reasons for partnering include: "Access resources and skills; Gain cost efficiencies; Speed time to market; Access new markets; Define industry standards; Develop innovations and new products; Develop complementary products; Gain market clout." As for the risks, the ones presented are: "Loss of autonomy and control; Loss of trade secrets; Legal issues and antitrust concerns; Failure to achieve objectives.".

For identifying the Core Competencies that enable Eyeware to create competitive advantages, the following criteria was used, based, once again, on "Marketing of High-Technology Products and Innovations": Core competencies must "make a disproportionate contribution to customer-perceived value"; capabilities "must be competitively unique"; and core competencies should "allow a firm to access a wide variety of very disparate market opportunities".

Another very important framework used from this book tests the viability of resources as competitive advantages, in two dimensions: One, regarding the superiority of the resource, has two tests: Customer value and resource rareness. The second dimension, to evaluate the sustainability of this superiority, also has two tests: durability and inimitability.

► **Customer Value** - "is the difference between the benefits that a customer realizes from using a product and the total life-cycle costs that the customer incurs in finding, acquiring, using, maintaining and disposing of the product";

► **Resource Rareness** - "resources are sufficiently rare that the competitors or producers of substitutes are not able to offer the same, or similar, set of benefits and life-cycle costs";

► **Durability** - "how rapidly a valuable resource becomes obsolete due to innovation by current or potential competitors. The longer it takes for a resource to be rendered obsolete, the more likely it is to be a sustained source of value";

► **Inimitability** - "is concerned with how easily a competitor can obtain a valuable resource either through internal development or purchase in the market", given that if a competitor can obtain the same service, the value creation is only temporary.

3 - Methodology

In order to complete this comprehensive overview on the potential application of Eye Tracking technologies on the physical retail market, this study firstly consulted publications on the retail market, more specifically on new technologies in retail, as well as on data collection and business intelligence for the same sector. Two different types of sources of information were used for this purpose: Text articles (mostly online journals and publications) for more current and practical information; and Books for more generic knowledge, such as definitions, frameworks and models.

A mixed-methods approach was applied, in the sense that, to better understand the retail sector and its needs, qualitative methods were applied and interviews to six field experts were conducted; and to better understand end customers, a web-based survey was distributed, and quantitative analysis methods were applied.

Many articles and books were consulted to seek the opinion of different authors on the feasibility of new technologies in retail. Both for the book and article search, the following keywords were used, in different combinations: "Technology"; "Innovation"; "Retail"; "Data"; "Eye-tracking"; and variations of these words.

The opinion of industry experts was also sought, through online in-depth interviews, to serve as confirmation of the hypothesis that there is strategic value in connecting the

company and the sector, and to understand how Eyeware can create value for Retailers and create sustainable competitive advantages. Two types of companies were contacted: Retailers (mainly discount stores and speciality stores) and Marketing Research companies. From the six respondents:

► Two work at the Business Intelligence department of a Portuguese Retail company;

► Three work at different Market Research companies (one of them Portuguese, the other two global companies, from which one works in research related to Technology in Retail);

► And the other interviewed works at a B2B service provider, managing only clients in the Retail and Start-ups sector.

These were assumed to be the most knowledgeable when it comes to data collection in retail, and the most suitable to provide insights. The interview was comprised of approximately 20 open questions, done with the objective of comprehending the general trends and needs of the retail sector when it comes to data collection, so that in the end all the answers could be aggregated in a list of facts that could be used to provide insightful recommendations for the company.

In addition, a survey was conducted to understand the general acceptance of this technology, when it comes to the end consumer of the retailers' activities. Data privacy concerns were the major focus, since it is the biggest hindrance to the company's activities, and the objective was to quantify the level of comfort/acceptance of end consumers when exposed to this technology, in different scenarios. The questionnaire was distributed through social media and email. As a result, a convenience sample of 250 observations was obtained, containing predominantly Portuguese students with age between 18 and 24 years old. The survey consisted in three major parts, where the first generally profiled respondents in terms of acceptance of standard data collection tools,

the second evaluated their level of comfort when confronted with tools such as Eyeware's, and finally the third part profiled respondents demographically (age, gender, nationality and profession).

4 - Results

4.1 - Qualitative Analysis

In order to understand if there was an actual viability of the technology in the retail market, the insights of industry experts were sought through interviews. The main insights retrieved from such research were the following:

► Major market trends identified, among others, included the growth of e-commerce platforms, globalization of retail, omnichannel platforms, more tech-savvy customers and augmented analytics applied to personalization and customization (meaning Cloud and Big data analytics, analyzed through Artificial Intelligence and Machine Learning across every aspect of the business);

► Data analytics is important for retail mainly because of the competitive landscape of the industry, the focus on the customer, the complex logistics and operations and it being a low-margin business. Quoting one of the interviewed experts, "players who don't apply data-based decisions and recommendation systems will lose the game". By applying data insights to day-to-day decisions and strategic planning, companies can better adapt their offer to changing customer demand;

► Biggest value creation comes from supporting strategic decisions, and more specifically through optimization of processes and expenses and the increase of customer satisfaction and conversion rates. More particularly, using data to determine product placement, price elasticity and price competition is key to create value;

► As data for analysis, companies mainly use data already available, such as searches and purchase transactions (from loyalty cards, for example), but also collect other information through observers/surveys and sensors, like traffic counters;

► Clear value creation is the most important data feature for retailers, followed by precision, real time information and easiness of implementing the technology;

► Retailers find it hard to invest in new data collection because it is very difficult to connect the costs (Salaries, servers, technology, opportunity costs, etc.) to benefits (value added in different areas, like costs, processes, customer retention, competitive factors, etc.). Also, some show preference for using the data already collected and not or badly analyzed, since it is less costly and there is still a lot of value in it;

► Interviewed experts believe there is plenty of value and a big need for behavioral data in retail;

► Privacy issues, as expected, are identified as the main concern for Eye tracking technologies.

4.2 - Quantitative Analysis

The biggest challenge regarding the entrance of Eyeware's technology in the retail industry, as said before, is understanding what is considered invasive or not for end customers. With fear of losing clients, retailers might avoid using technologies that are dubious in terms of how they work or how the data collected is used.

With this in mind, a study was developed to better understand where is the line that separates acceptable from invasive. An online survey was conducted, with a total of 250 answers, and the following are some of the conclusions we can gather from the results. Be aware that, given the age and nationality bias of the sample, no conclusions were made using the variables "Age", "Nationality" and "Occupation".

► Considering the level of comfort regarding different types of data, behavioral data related to consumer reactions and movements is the one where the respondents have shown most discomfort - mean value 2.312, and were less undecided - standard deviation 1.12, on a scale from 1 (extremely uncomfortable) to 5 (comfortable);

► There are more people thinking they are getting a low return from the data they provide than people considering the return just enough or that they are getting more than they should (mean of 2.35 on a scale from 1 "Lower than expected" to 5 "Higher than expected");

► People are generally uncomfortable with aggregate data collection through 3D cameras (mean value of 2.496 on a scale from 1 "Extremely uncomfortable" to 5 "Extremely comfortable");

► When faced with the possibility of discounts resulting from this data collection, one can observe a shift, as people are much more comfortable with the data collection - when performing an ANOVA, we can reject the null hypothesis of both means being the same, meaning there is a significant (positive) change in the results when we introduce the discount factor;

► People are less comfortable when their data is collected as a part of an aggregate data set (mean of 2.496) than when their information is individualized (mean of 2.659 on a scale from 1 "Extremely uncomfortable" to 5 "Extremely comfortable");

► Generally, people are likely to go to stores with this kind of data collection (mean value of 3.314, on a scale from 1"Extremely unlikely" to 5"Extremely Likely"). Still, 26% responded they wouldn't give this kind of data. The remaining were divided in terms of discount values, but a big part would only do it for discounts bigger than 30%.

5 - Findings

5.1 - Strategic Value

The model for understanding if there is, indeed, any strategic value, should have the following three assumptions:

► The first assumption relates to everything mentioned before concerning the retail landscape and trends. Being that Retail is a very competitive industry, and this competition only tends to rise due to constant pressure from e-commerce, retailers are always looking for ways to innovate, to create competitive advantages that puts them ahead of competitors;

► The second assumption relates to the fact that only retailers with a certain amount of capabilities, know-how, size and money will be able to invest in technologies such as Eyeware's;

► Finally, the third assumption is made considering that retailers do not always look for data analysis technologies to innovate, because this may not be the right fit for their needs. The results of the research done tell us that retailers look, in general, by either innovation that creates immersive experiences for the consumers; innovation that allows for multi-channel experiences in-store; and innovation that brings new data and data analysis techniques to the table. Only if retailers are looking for the latter, there will be any strategic alignment and hence any strategic value.

5.2 – Options for market approach

The approach to this market, in the perspective of the company, has two major different paths, that will be further explained: Entering the market as a stand-alone service/product, selling directly to retailers; and entering the market as a component of a service, meaning

entering the market as a part of an ecosystem that provides a service to retailers, thus basically targeting the ecosystem.

Entering the market as a stand-alone product

If the company decides to enter the market alone and sell its services to retailers directly, it is clear that potential revenues will be much higher, but the adjacent risk will be higher too, assuming that entering alone brings more volatility and uncertainty to the company and process.

In this scenario, the company would contact each retailer separately and sell its services to each one, meaning that it would be able to provide a personalized service to customers (adapting the technology to client's requests and needs).

Major challenges would concern to the company's reputation. Entering a market alone, as a start-up, will signal to clients an uncertainty on the ability to deliver results. Also, new companies like Eyeware are prone to a lack of resources such as capital, time, knowledge/skills, directions and planning, and are usually subject to huge information overloads and poor marketing; and entering alone in the market will worsen this.

In summary, potential advantages of this strategy are:

► Easier to focus on end customers;

► Higher profitability (higher margins);

► The company can decide their vision, values and strategy, and won't be affected by other companies' decisions or bad publicity;

► The company can choose their own clients strategically.

On the other hand, disadvantages are:

► The company will have to look for their own clients and create their own know-how and network;

► Higher initial investment; and higher cost of failure (bigger downside);

► Have to create their own reputation, and reaching clients may be challenging;

► May be in disadvantage, if close competitor decides to partner with a big player.

Entering with partnerships, joint ventures or an ecosystem

According to "Marketing of High Technology Products and Innovation"[21], relationship marketing "refers to the formation of long-term relationships with customers and other business partners, which yield mutually satisfying, win-win results. In high tech fields, several forces exist that necessitate the use of partnerships and alliances." Among these forces, there is the need to bring a complete, end-to-end solution to the market. Eyeware, in this approach, would target either service companies that work on collecting data (like SAP, Microsoft, Huawei, Sonae, etc.); or companies that have already established or are establishing smart stores or any other kind of ecosystem of technologies where Eyeware would have a part (like Farfetch, Amazon, etc.).

Entering the market with the help of others encompasses a trade-off: the company will experience a reduction in margins and in control of the activities for resources that can include initial capital, know-how, client base/access to network, etc.

Partnerships can be divided into Horizontal (competitors and complementors) and Vertical (with companies in other levels of the supply chain).

Potential advantages are:

► Access to already existing customer base and partners' know-how;

► Presents customers with a more complex and developed service;

► Potential synergies from other technologies that belong to partnership or that have partnership with partners;

► Possibility of benefiting from technologies of scale or scope, with the access to partners' resources;

► Potential access to other markets other than retail, thus enlarging potential market;

► Can be an advantage when comparing with competitors.

Potential disadvantages are:

► Obligation to submit to partner's or ecosystem's vision, strategy and values;

► Other firms may appropriate Eyeware's know-how in an opportunistic fashion;

► Losing the possibility of a monopolistic position, having to share revenues;

► Dependence on partner's reputation and public relations.

Comparison and choice

Considering that the company has high barriers to entry (patent pending); lacks critical competitive resources (like client access, capital, management capabilities, reputation, end-to-end solution, etc.) and there are potential competitors (some with similar technologies, and others that may develop their own similar technology); the competitive strategy most applicable to the situation, according to the framework in "Establishing a Standard"(Hill, 1997)[30] is the "Selective Partnering" strategy, consisting in entering into an alliance with one or few other enterprises, in order to jointly (and aggressively) promote the firms' technology as a new industry standard.

Also, when evaluating the advantages and disadvantages of both options, one can see that not only partnering has much more valuable advantages; but also, that its disadvantages can be avoided, mostly through thorough due diligence and strict partnership contracts.

When it comes to the types of companies Eyeware should partner with, and since the objective should be to bring an end-to-end solution to the market, the focus should be on companies that have technologies that complement the firm's service: mainly horizontal

integration, such as complementors or even competitors that have similar technologies, and whose advantages differ from Eyeware's (companies already in the data collection business); or vertical integration with, for example, market research firms.

Regarding this decision of performing selective partnering, there are some risks to have in consideration. The loss of autonomy and control, for example, is a given risk since it is the trade-off that makes companies want to partner with Eyeware. Companies will only partner if they see there is value, and value for other companies usually comes attached to some kind of control. Some adjacent risk is also present in the fact that the company has to share information about processes, the technology, and "trade secrets". The appropriation of the technology or processes by a bigger firm is a threat and must be conditioned by tight confidentiality agreements and by limiting transparency with partners. Antitrust issues must also be dealt with, but for the emergence stage of the company, it shouldn't be that much of a problem.

5.3 – Privacy Concerns

As expected, the results of the survey showed that people are generally concerned with the privacy issues of this technology, but most will accept the data collection when given the right incentives. For some, discounts and coupons are enough, while for others nothing will make them accept this technology. It should be top priority for the company to understand who are these people that won't provide the data, what makes them uncomfortable in providing this data and at what type of retailers have a client base that is less subject to this problem.

5.4 - Creating sustainable competitive advantages: Technical and Business advantages

"Competitive advantage exists when the firm possesses resources and competencies that

enable it to provide superior benefits to customers or give it a cost advantage, are rare and difficult to imitate." (Mohr et al, 2005: 82)[29].

Although it is clear, from what has been seen previously, that the technology has potential in the retail sector, one question that is important to answer and to understand is "How does this company create value for the customers?". Generically, we have that collecting behavioral data helps retailers understand consumer preferences. This, in its place, can bring value by allowing companies to: Gain competitive intelligence on future market conditions; target customers more successfully; optimize operations, supply chains and shelf display; and personalize outreach.

Eyeware, in particular, can bring all this value through the following core competencies (set of procedures at which the company excels): Real-time information; non-invasive way to collect information; no very specific hardware needed, just a standard 3D camera (relevant especially when comparing with similar technologies in the market); ability to track multiple people at a time; does not require a closed environment to collect relevant information; and in-store collection ("no ad block").

In order to understand if and which of these competences can, in fact, create sustainable competitive advantages, four parameters were used:

► **Customer Value** - The core competencies above described provide their customers with value by providing insightful information that will allow them to make well-grounded strategic decisions which will enable better efficiency of operations, better predictability of consumption and stock and better customer retention. As it was seen through the experts' insights, a clear value creation, precision, real-time feedback and easiness to implement are the most valuable features of data collection, and it is easy to see that the core competencies of the company can help fulfilling these features;

► **Resource Rareness** - The patent that the company has filed will provide the protection it needs from imitation, not letting competitors provide the exact same service. Still, competitors can develop a similar technology with similar advantages. The advantage the company has, with this core competencies, is that no other technology can provide a service with all these features combined. A software that provides insightful real-time information through non-invasive sensors, is able to track multiple people at a time and doesn't need a specified hardware is rare and unlikely to be imitated (RFID technology, for example, has the problem of being intrusive in the way that the tags linger on after the item is purchased; and of not being precise because it can be easily disrupted or jammed);

► **Durability** - Given that what the company provides is a service, and this service composes of real-time information on consumer preferences (which are always changing) there will be value creation as long as there are customers going to physical stores;

► **Inimitability** - There is, in fact, the risk that competitors get their hands on a similar technology. What is important to note here though, is that Retail is a very competitive industry, and companies will gain value even if it is only for a short period, and if they don't invest in such technologies they will be left behind.

6 - Conclusion

6.1 - Final Recommendations

As it could be seen throughout this study, Retail is a very promising, and big, opportunity for Eyeware. It is a shifting market, with a plenty of uncertainty regarding the future of physical stores, and because of this and the competitive nature of the market, companies are looking for new ways of creating competitive advantages. There is strategic value in connecting both Eyeware and the Retail market, but as the company pushes the technology into the market, it must understand all the challenges and constraints it

encompasses. With this end in mind, the following recommendations are given, thus summarizing the study.

When it comes to the entrance in the Retail industry, Eyeware should do it as soon as the retailer (potential client) is aware of the need to innovate, and has this prioritized; the client has the sufficient resources to invest in such technologies; and there is a strategic fit between the needs of the retailer and Eyeware's technology. Also, the company should develop strategic partnerships, with one or few other players, in order to access their resources and be able to provide a more end-to-end solution to the market. Partners can range from complementors, indirect competitors or vertical players such as market research companies. Examples of potential companies for these partnerships are Farfetch or Amazon (since both are investing in technologies for physical stores); Huawei or Microsoft (both sell services and platforms for data collection in retail); IHL Group (a global research and advisory firm for the retail and hospitality industries) or other kind of market research companies that are working actively with retail; etc..

One major concern should be the legal implications of using the technology, as countries around the world are tightening regulation concerning data privacy. Also, there is a significant part of people, according to the study conducted, who affirm that they wouldn't provide this data for anything. This may reveal to be a blockage to the acceptance of this technology, since retailers won't want to risk their customers' loyalty. Only when this problem is completely solved will the retailers consider using eye tracking technologies. The suggestion is for the company to find a way either to work around this problem, using the technology to only study behavior on small scale, controlled environments; or to make sure everyone agrees to the usage of the technology. For the latter scenario, the company could find a way to reward people for allowing this data to

be collected, since value creation for the end customer is highly valued, and it was observed that the level of comfort of the end customer regarding this type of data collection increases significantly when exposed to some kind of tangible reward.

When developing the end-product and designing the positioning statement, Eyeware should be aware that clear value creation is the feature in data collection procedures that Retailers most value. Precision, real-time analytics and collection methods easy to implement are also highly valued. A proof of concept would be helpful, if the company could connect their technology to real value added in a practical example.

7 - References

1. IDC. March 2017. Revenue from big data and business analytics worldwide from 2015 to 2020 (in billion U.S. dollars) idc.com http://www.statista.com/statistics/551501/worldwide-big-data-business-analytics-revenue/ ; Wikibon. March 2015. Big Data Vendor Revenue and Market Forecast, 2011-2026, page 3 and 6 http://www.statista.com/statistics/255959/share-of-big-data-factory-revenue-by-type/ ; Website (comfyapp.com). May 2016. Volume of data collected by smart buildings worldwide from 2010 to 2020 (in zettabytes). comfyapp.com. http://www.statista.com/statistics/631151/worldwide-data-collected-by-smart-buildings/

2. "General Data Protection Regulation." Wikipedia, Wikimedia Foundation, 1 Dec. 2017, en.wikipedia.org/wiki/General_Data_Protection_Regulation#Discussion_and_challenges.

3. "Information Privacy Law." Wikipedia, Wikimedia Foundation, 30 Oct. 2017, en.wikipedia.org/wiki/Information_privacy_law#Europe.

4. Tucker, Duncan. "Latin America's Complex Data Protection Laws Not Cause For US Firms to Reshore." Nearshore Americas, 21 April 2015, www.nearshoreamericas.com/latin-americas-complex-data-protection-laws-causing-firms-reshore-work/.

5. Parsons, Mike, and Peter Colegate. "2015: The Turning Point for Data Privacy Regulation in Asia?" HL Chronicle of Data Protection, Hogan Lovells, 18 Feb. 2015, www.hldataprotection.com/2015/02/articles/international-eu-privacy/2015-the-turning-point-for-data-privacy-regulation-in-asia/.

6. "Data Protection Laws of Africa." Michalsons, www.michalsons.com/focus-areas/privacy-and-data-protection/data-protection-laws-africa.

7. Levy, Michael and Weitz, Barton A. 2012. *Retailing Management 8th edition.* New York: McGraw-Hill/Irwin. 6

8. eMarketer, 2014. Total retail sales worldwide from 2013 to 2018 (in trillion U.S). https://www.statista.com/statistics/443522/global-retail-sales/

9. Castaldo, Sandro, Monica Grosso, and Katia Premazzi. 2013. "Retail Innovation" In *Retail and Channel Marketing, 56.* Cheltenham, UK: Edward Elgar Publishing.

10. Peng, Daven, and Lodovica Biagi. "Retail & Trade." Statista, www.statista.com/markets/423/retail-trade/.

11. IBM, 2012. Retail 2020: Reinventing retailing – once again. IBM and New York University Stern School of Business. Thought Leadership White Paper. IBM Sales and Distribution. http://public.dhe.ibm.com/common/ssi/ecm/en/rew03013usen/REW03013USEN.PDF

12. Lal, Rajiv, José Alvarex and Dan Greenberg. 2014. *Retail Revolution – Will Your Brick-and-Mortar Store Survive?.* 23-25; 78-119. Self published, Harvard Business School.

13. Treadgold, Alan, and Jonathan Reynolds. 2016. *Navigating the New Retail Landscape – A Guide for Business Leaders,* Oxford, UK: Oxford University Press. 1; 151 – 175.

14. Wahba, Phil. "The Death of Retail Is Greatly Exaggerated." Fortune, Fortune, 9 June 2017, fortune.com/2017/06/09/retail-store-closings-ecommerce/.

15. Biggs, John. "The Death of Retail Is Greatly Exaggerated." TechCrunch, TechCrunch, 21 Apr. 2017, techcrunch.com/2017/04/21/the-death-of-retail-is-greatly-exaggerated/.

16. Thompson, Derek. "What in the World Is Causing the Retail Meltdown of 2017?" The Atlantic, Atlantic Media Company, 10 Apr. 2017, www.theatlantic.com/business/archive/2017/04/retail-meltdown-of-2017/522384/.

17. Thompson, Derek. "Is It Really the End of Retail?" The Atlantic, Atlantic Media Company, 20 Apr. 2012, www.theatlantic.com/business/archive/2012/04/is-it-really-the-end-of-retail/256187/.

18. Deloitte, 2011. Deloitte Store 3.0TM. Planning Tommorrow's Store Today. Deloitte Group. Available at http://www.cfs.purdue.edu/richardfeinberg/csr%20406%20e-retailing/top%20500/deloitte/us_Retail_Store%203.0%20Marketing_092110.pdf

19. Pantano, Eleonora and Harry Timmermans, 2014. *What is smart for retailing?* Procedia Environ. http://dx.doi.org/10.1016/j.proenv.2014.11.010

20. Berry, Leonard L., Ruth Bolton, Cheryl Bridges, Jeffrey Meyer, A. Parasuraman and Kathleen Seiders, 2010 "Opportunities for Innovation in the Delivery of Interactive Retail Services." Journal of Interactive Marketing, Elsevier, 24 Apr. 2010, www.sciencedirect.com/science/article/pii/S1094996810000125.

21. Haydock, Michael P. "Big Data Can Help Prevent 'Showrooming' at Retail Stores." The Atlantic, Atlantic Media Company, 10 Mar. 2014, www.theatlantic.com/sponsored/ibm-big-data/big-data-can-help-prevent-showrooming-retail-stores/100/.

22. Virmani, Ashish. "How Big Data Is Transforming Retail Industry." Simplilearn, Simplilearn, 23 Feb. 2017, www.simplilearn.com/big-data-transforming-retail-industry-article.

23. Marr, Bernard. "Big Data: A Game Changer In The Retail Sector." Forbes, Forbes Magazine, 10 Nov. 2015, www.forbes.com/sites/bernardmarr/2015/11/10/big-data-a-game-changer-in-the-retail-sector/#2a0445da9f37.

24. Schlossberg, Mallory. "How Data Is Saving the Retail Industry." Business Insider, Business Insider, 23 Nov. 2015, www.businessinsider.com/how-data-is-saving-the-retail-industry-2015-11.

25. IBM, 2013. Analytics: The real-world use of big data. IBM and Said Business School. IBM Global Services. https://www-935.ibm.com/services/multimedia/Analytics_The_real_world_use_of_big_data_in_Financial_services_M ai_2013.pdf

26. Pantano, Eleonora, and Giuseppe Laria. "Innovation in Retail Process: From Consumers' Experience to Immersive Store Design." Journal of Technology Management & Innovation, Journal of Technology, Management & Innovation, 17 Sept. 2012, jotmi.org/index.php/GT/article/view/art276.

27. "How Big Brands Are Creating Immersive Retail Experiences." Reality Interactive, 11 Jan. 2017, realityi.com/2017/01/11/how-big-brands-are-creating-immersive-retail-experiences/.

28. Dickson, Ben. "Unlocking the Potential of Eye Tracking Technology." TechCrunch, TechCrunch, 19 Feb. 2017, techcrunch.com/2017/02/19/unlocking-the-potential-of-eye-tracking-technology/.

29. Mohr, Jakki, Sanjit Sengupta and Stanley Slater. 2005, 2001. *Marketing of High-Technology Products and Innovations 2nd edition.* Upper Saddle River, New Jersey: Pearson Education, Inc. 51-57; 82-97.

30. Hill, Charles W. L. "Establishing a Standard: Competitive Strategy and Technological Standards in Winner-Take-All Industries." JSTOR, Academy of Management, www.jstor.org/stable/4165389?seq. Vol. 11, No. 2 (May, 1997), pp. 7-25

8 - Appendices

Appendix 1 - Interview Draft

"My thesis was developed to understand the viability of a software company in the Retail market. At this point, I need to collect relevant insights of this market, to serve as validation for my work. The questionnaire won't take long, and please be aware that there are no wrong answers.

1 - What option best describes your current situation?

○ Work in retail

○ Work as a service provider for retail companies

○ Other

2 - Company

<u>Service Providers and Others</u>

For simplification purposes, you can try to think about a particular retailer you are used to work with and that you find representative of the others' behaviors, and use it as a basis for answering the following questions:

3 - Can you identify a few trends that you think will change the Retail market and its business models?

4 - How do you think Data analytics and business intelligence are important for the physical retail sector?

5 - How do companies in Retail usually create value with data collection? And what are the major drivers of value?

6 - Do companies in retail usually outsource market research/data analytics?
7 - Usually, how is data collected in Retail? What technology and data do they use? What new data sources you think have potential in the retail sector?
8 - Which features you think are lacking most in retail companies' data collection strategy?

9 - Which features you consider most important about the data companies collect?
Order the features in the rank you consider most appropriate, from 1 - "most important", to 9 - "less important"
_____ Real-time
_____ Precision
_____ Methods are easy to implement
_____ Easy to analyze
_____ Clear value creation
_____ Non intrusion
_____ Ability to track multiple people at a time
_____ Reputation of service provider
_____ Collects data in-store

10 - Do you think the retail industry should have an interest for behavioral data? For what would the companies use this kind of data? How could collecting this kind of data add value to a Retailer?

11 - Do you think in-store data collection and real-time consumer analytics would be/are useful for a retail company? Why?

12 - What do you consider as the major trade-offs of investing in data analytics for you? What do companies have to abdicate to be able to invest in this kinds of solutions?

Retailers

3 - Can you identify a few trends that you think will change the Retail market and its business models?

4 - How do you think Data analytics and business intelligence are important for your company and the physical retail sector?

5 - Where do you see your company in terms of data analytics, comparing to competitors?

6 - How do you think the data you collect and analyse creates value for your company? And what are the major drivers of value?

7 - Do you outsource market research or data analytics?

8 - How do you/they collect data? What technology and data do you/they use? What new data sources you think have potential in the retail sector?

9 - Which features you think are lacking most in your company's data collection strategy?

10 - Which features you consider most important about the data your company collects?
Order the features in the rank you consider most appropriate, from 1 - "most important", to 9 - "less important"
_____ Real-time
_____ Precision
_____ Methods are easy to implement
_____ Easy to analyze
_____ Clear value creation
_____ Non intrusion
_____ Ability to track multiple people at a time
_____ Reputation of service provider
_____ Collects data in-store

11 - Do you collect behavioral data? Do you have interest in this kind of data? For what would you use behavioral data? What kind behavioral data would you be interested in? How do you think collecting behavioral data could add value to your business?

12 - Do you think in-store data collection and real-time consumer analytics would be/are useful for a retail company? Why?

13 - How much do you spend, on average, on data collection and consumer analytics?

14 - What are the major trade-offs of investing in data analytics for you? What do you have to abdicate to be able to invest in this kinds of solutions?

<u>Company – Same questions for both Retailers and Service Providers</u>

Eyeware is a sofware company that has patented an eye tracking technology that works with simple 3D cameras, and is able to track multiple eye movements and provide real time feedback on this information. The technology is currently being applied to robotics and healthcare, and the company decided to study the alternative of pushing this technology to the retail market as well.

13 - Have you ever used or seen a technology like this one? What technology?

14 - Do you think this technology could have potential in the retail sector? How?

15 - What innovative features you think this technology brings to the table for retail? What are the features you find most relevant in this company? And what are the major challenges you think this company will face?

16 - In a scale from 1 (low price) to 5 (high price), when compared to similar technologies and processes, how much do you think should be paid for Eyeware's services?

17 - Any comments?

18 - If you want more information or are interested in contacting the company, please leave an email address below

Thank you for the cooperation!
Best regards
António Guimarães"

Appendix 2 – Data Features Question from Interview – Ranking

	Features
1st	Clear value creation
2nd	Precision
3rd	Real time
4th	Methods easy to implement
5th	Easy to analyse
6th	Collects data in-store
7th	Ability to track multiple people at a time
8th	Non intrusion
9th	Reputation of service provider

Appendix 3 - Privacy and Information Sharing – Survey Script

"Start of Block: Default Question Block

Privacy and Information Sharing
This questionnaire was made with the purpose of understanding where people stand on data collection and giving away their data. Please be aware that the answers are confidential and that there are no wrong answers. It will only take about 5 minutes, and thank you for answering!

End of Block: Default Question Block
Start of Block: Questions for profiling

1 - How much of the personal information you give to companies you think is used for analytical purposes?
(In a scale of 0 "None" to 5 "Everything")

2 - What kind of data do you think is collected about you?
(You can choose more than one option)
☐   Internet navigation/Browser history (1)
☐   Social Network activity (2)
☐   Location (3)
☐   Medical records (4)
☐   Education (5)
☐   Address (6)
☐   Cash balance (7)
☐   Others: (8) _____

3 - How comfortable are you on sharing your personal information, according to each type of data?
(In a scale of 1 "Extremely uncomfortable" to 5 "Extremely comfortable")
• Demographic information (age, gender, nationality, etc.)
• Professional information (income, work place, education level, etc.)
• Interests and preferences (social media activity, browser history, favourite brands, etc.)
• Behavioral data (reactions, movements, etc.)

4 - Do you consider the return you get from providing your personal data to be:
(In a scale of 1:"Lower than expected"; to 3:"Just right"; to 5:"Higher than expected")

5 - Do you have the Location Services enabled on your phone?
o   Yes (1)
o   No (2)
o   I don't know (3)

6 - Do you usually read "Terms and Conditions" when creating accounts with your personal information?
o   No, I never read them (1)
o   I read them when it's sensitive data (2)
o   I read the relevant parts (3)
o   I read them always (4)
o   Other: (5) _____

7 - How much do you usually spend on an average trip to any kind of retail store?
o   0-19€ (1)

o   20 - 49€ (2)
o   50 - 99€ (3)
o   100 - 149€ (4)
o   More than 150€ (5)

End of Block: Questions for profiling
Start of Block: Presentation of the Company

Eyeware is a software company that collects real-time data about what people are looking at in a confined space, with the use of 3D cameras. This company is thinking about joining the Retail industry, where information about consumer preferences could be collected and analyzed to understand trends in consumption.

End of Block: Presentation of the Company
Start of Block: Questions 1

8 - How comfortable would you feel if companies used a software like Eyeware's to collect aggregate data on people's eye movements in general, without individualizing anyone?
(In a scale of "Extremely uncomfortable" to "Extremely comfortable")

9 - How comfortable would you be if this data could be used to provide clients with discounts on the products they are interested in?
(In a scale of "Extremely uncomfortable" to "Extremely comfortable")

End of Block: Questions 1
Start of Block: Questions 2

10 - How comfortable would you be if stores used a software like Eyeware's to collect the data on "what you look at", as an individual, to provide you with a more personalized service?
(In a scale of "Extremely uncomfortable" to "Extremely comfortable")

11 - How likely are you to consider going to a store knowing that it would maybe give you discounts or coupons on the things you like, based on the data collected in-store?
(In a scale of "Extremely unlikely" to "Extremely likely")

12 - What would make you willing to allow stores to collect your individual visual data?
(You can choose more than one option)
☐   Nothing, I would never provide this kind of data (1)
☐   I don't mind giving this kind of data, so I would do it for nothing in return (2)
☐   Discounts (up to 10%) (3)
☐   Discounts (up to 30%) (4)
☐   Only discounts bigger than 30% (5)
☐   Coupons (6)
☐   Store points (for stores with loyalty cards) (7)
☐   Other (8) _____

End of Block: Questions 2
Start of Block: Identity

Age

o   Under 18 years old (1)
o   18 - 24 years old (2)
o   25 - 34 years old (3)
o   35 - 44 years old (4)
o   45 - 54 years old (5)
o   55 - 64 years old (6)
o   65 years or older (7)

Gender
o   Male (1)
o   Female (2)
o   Prefer not to say (3)

Country
▼ Afghanistan (1) ... Zimbabwe (1357)

Which statement best describes your current employment status?
o   Working (paid employee) (1)
o   Working (self-employed) (2)
o   Student (8)
o   Not working (temporary layoff from a job) (3)
o   Not working (looking for work) (4)
o   Not working (retired) (5)
o   Not working (disabled) (6)
o   Not working (other) (7) _____

End of Block: Identity
Start of Block: Thank you

Thank you for your cooperation! Your time is appreciated
Anything you want to comment?

End of Block: Thank you"

Appendix 4 – Survey Responses

Q3

		Demographic	Professional	Preferences	Behavioural
Average		3,624	2,68	2,752	2,312
Std. Deviation		1,166217929	1,134348707	1,120499028	1,118777302
		Demographic	Professional	Preferences	Behavioural
Extremely Uncomfortable	1	12	36	33	67
Somewhat Uncomfortable	2	38	92	81	91
Neither Comfortable nor Uncomfortable	3	48	51	66	48
Somewhat Comfortable	4	86	58	55	35
Extremely Comfortable	5	66	13	15	9

Level of Comfort Across Different Types of Data
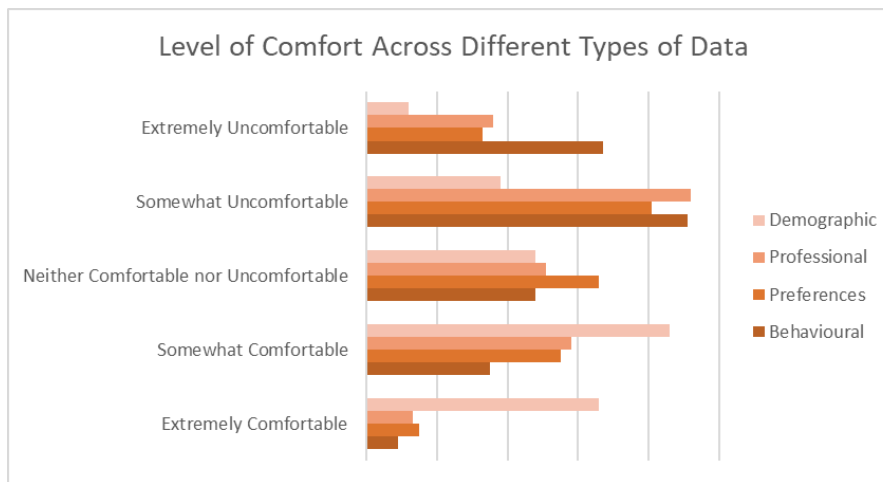
Q4

Return of providing data	
Average	2,348
Std. Deviation	0,97091
Lower than Expected	48
-	104
Just Right	65
-	29
Higher than Expected	4

Return of Providing Data
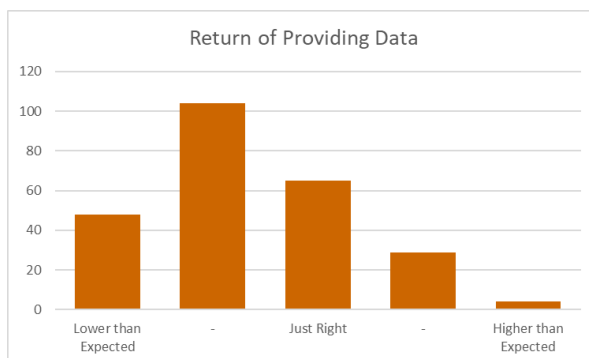
Q8, Q9, Q10 and Q11

	General Data Collection	General Data Collection with Discount	Individual Data Colllection
Average	2,496	3,174672489	2,659388646
Std. Deviation	1,1965412	1,186571614	1,212928012
1	58	25	53
2	84	54	73
3	49	52	42
4	44	88	73
5	15	31	9
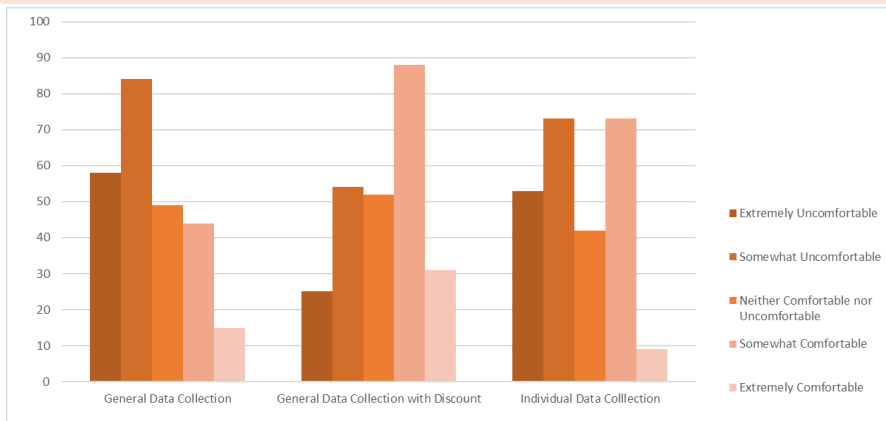
	Likelyhood with Discount
Average	3,31441048
Std. Deviation	1,157285173
1	25
2	38
3	51
4	104
5	32
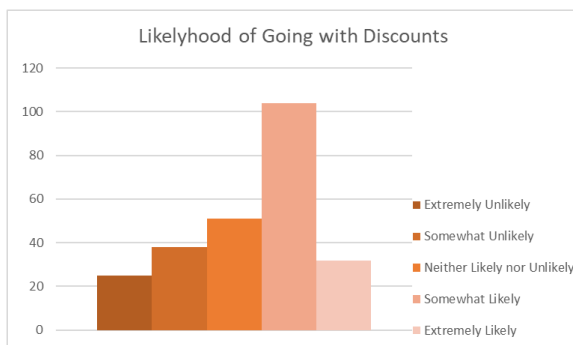
Q12

	Count	%
Wouldn't Give	66	26,40%
Others	184	73,60%
Total	250	100,00%

# Field	Choice	Count
1 Nothing, I would never provide this kind of data	17%	67,00
2 I don't mind giving this kind of data, so I would do it for nothing in return	7%	28,00
3 Discounts (up to 10%)	11%	43,00
4 Discounts (up to 30%)	18%	68,00
5 Only discounts bigger than 30%	22%	83,00
6 Coupons	14%	52,00
7 Store points (for stores with loyalty cards)	10%	39,00
8 Other	1%	4,00