



As stationary retail has not been able to maintain its market shares using conventional marketing, distribution, and logistics methods, in this paper innovative technological ways to conquer a unique concept will be emphasized. Due to the transformation of the existing structures being expensive, cost savings will be considered in the presentation of the proposed new ones. Correspondingly, there will be an assessment of how much of an effect the innovations would have on customers. Therefore, a survey is conducted to examine which technological new features customers would appreciate the most thus setting a course to which ones to implement.

Furthermore, the optimization of warehousing processes by technology is reflected upon as besides personnel costs, warehousing is considered one of the largest cost-bearing units in enterprises. (Siegfried, 2021a) For this, the innovative strategies of Amazon will be taken into consideration as well as the advantage for customers. A look into the further development of current technology will also be taken.

Thus, the objective of this paper is to design a new business model based on modern technology to combine the possibilities of automatization grants, to make the model as cost-efficient as possible, and to design the model only as technological as customers would be willing to accept. This business model shall improve the competitiveness of stationary retail against online retail by combining the strengths of both online and stationary retail, creating a powerful omnichannel instrument. By the usage of this concept, stationary retailers shall be enabled to ensure their persistence during the age of digitalization. (Siegfried, 2021b)

## **2. Technological Innovations and their potential Usage in Retail**

The progress in technology is rapidly advancing, especially regarding the Internet of Things (IoT). The IoT can be described as a system allowing different objects to interact by exchanging information. (Mukhopadhyay, 2014) This interaction is mostly based on Radio-Frequency Identification (RFID), the communication of a transponder connected to an object sending information like its location, and a device processing the information. RFID has been used since the Second World War and since been further developed. (Weber & Weber, 2010)

### **2.1. Near Field Communication Technology**

The currently widely used development originating from RFID is the Near Field Communication (NFC). Its most prominent innovation here is the possibility to use the information emitting device as an information processing device, too, while also allowing communication with other devices of the same kind. Unlike the RFID technology, however, NFC enables the purposeful emission of data as it can be initiated and terminated by a switch. For the usage in smartphones and similar mobile digital devices, the switch can be virtualized. As the range of NFC is, as its name indicates, limited to about 10 centimeters, it also qualifies to be used for the transmission of sensitive data, hence NFC is the most popular technology used for payments with the smartphone. (Kern, 2007)

Any random object can be equipped to communicate with others by adding a so-called tag to it which operates as the data emitting device, thus facilitating the communication between objects and computer programs using the NFC technology. This communication allows a plethora of different uses such as cars warning each other against traffic accidents, components in production sending status updates about their current phase of the production process, and the

transfer of money. For a retailer, NFC presents some interesting purposes. As currently already used, it allows smartphones to act like bank cards thus offering another payment method. A more innovative way to utilize NFC would be the communication between products offered on display in stores and customers' smartphones. Information on the product could be easily provided on demand if customers need additional details such as application, suitable accessories, and care instructions not described on the packaging or there is no salesperson available. In a rather radical approach, this way the provided information accessible via NFC could even as much as replace all the salespeople saving a retailer the personnel cost, usually one of the highest expenses for businesses.

Furthermore, NFC technology could be used to facilitate shelf maintenance. As the emitted information can be anything, an RFID tag could count the number of available products on a shelf which is, too, each equipped with an RFID tag and send out a note to the enterprise resource planning system. (Saadat et al. 2022) Like this, there would be no more out-of-stock situations thus increasing turnover. If the warehouse is also integrated into the enterprise resource planning system, the system could add up the total number of each product in stock and automatically place orders to prevent any product from ever running out of stock. Furthermore, shoplifting could be drastically reduced since all items are permanently sending information to the enterprise resource planning system. Thus, a missing item that has not been bought would immediately be recognized which could set off an alarm. This would, however, only work if the currently used business model of self-service retail was to be abolished as otherwise, the theft would only be recognized once the thief had left the store making the system useless. Another innovative usage of NFC could complement another technological solution, warehouse robots.

## **2.2. Warehouse Robots**

Warehouse robots are automatically moving conveyer vehicles organizing warehouse stock and handling the common tasks that arise in a warehouse. Online retail giants like Amazon and Alibaba (Geörg, 2018) already use them in their logistics centers to transport ordered products to and from their storage location. This decreases the frequency of injured warehouse clerks and grants the advantage of being able to act all day and night without increased salary costs due to night work surcharges. Warehouse robots receive the information on the ordered goods and independently pick them up to carry them towards the shipping department. They navigate by precisely calibrated mapping of the warehouse where each product has a fixed storage location. At Amazon, the robots identify their current location by Quick Response (QR) Codes on the ground spotting the robots in the warehouse thus defining their next destination. (Hofer, 2017) Amazon has been producing these robots with a 300-kilogram load capacity itself, using 80.000 of them in its warehouses in 2017, before looking to externalize the production. (Anzenhofer, 2019)

By implementing these robots into their warehouses, retailers could optimize their shelf care and logistics. Integrating them into the enterprise resource planning system and having them communicate with the shelves counting the stock of products could make the robots restock them automatically. They could also take over the goods receipt department. For this, the delivered goods would need to come equipped with an RFID tag so that the robots could count them and add them into the enterprise resource planning tool. Afterward, the robots could transport the goods to their fixed storage location and place them on the shelves.

Using this method, even warehouse clerks could become dispensable saving a significant sum of personnel cost.

Another possible use of warehouse robots could be the provision of goods. For this idea to work, customers need to be allowed to give the robot instructions. This could be realized with apps. Smartphones are NFC devices, so they could send shopping lists made in the app to the warehouse robots through a stationary user interface with another implemented NFC device. Through a series of transmitters, the signals could be sent to the robots which would be given the task to collect the items on the list and provide them in a collection area within a shopping cart. This process could be helpful especially for older or physically impaired customers as they would not have to pick up heavy items from a shelf themselves. It could also prevent customers who do not find the items they are looking for from leaving the store frustratedly, possibly shopping at a competing retailer.

An additional advantage of this method would be the provided security. To protect the shopping carts and their content to be stolen, they could only be made accessible after the items are paid. In a practical approach, retailers could design the user interfaces where the robots receive the input on which items to pick up would be the cash registers, saving personnel costs for cashiers while, due to their small size, simultaneously allowing a larger number of cash registers to operate parallelly without the need for breaks. As the robots would only then start to collect the items, a waiting area would have to be installed close to the collection area. While this would entail costs, it could also be regarded as a chance to improve the customer relations by designing the waiting area comfortable and relaxing. For extraordinarily large or heavy items, however, there could be another service added by making the robots deliver them to another collection area outside the store accessible by car to facilitate the loading of the items into the customer's car. To save space, this loading area could be designed as the road leading around the building with another user interface where customers can check-in using their smartphone. This way the robots would receive an order in which they need to provide the items. The loading area could be created like a parking lot along with the stores outside the wall. Within the wall, there could be rolling gates opened by one more user interface for the customers to interact with using their smartphones. To prevent the theft of the robots, the gates would only open once the items are placed to be picked up.

### **2.3. Artificial Intelligence**

In the future, Artificial Intelligence (AI) could be the successor technology in regards to navigating warehouse robots. While the NFC technology requires a lot of components, RFID tags, to function properly, AI could independently navigate the robots and monitor the items in the store. This could save the company a considerable amount of maintenance and material costs. Another advantage of AI in the modern wave of AI is mainly the analyzing ability based on deep learning from big data. Deep learning can be described as the artificial reconstruction of a neuronal network, so the simulation of a brain. Big data is an umbrella term for the gigantic mass of information that enterprises are flooded with every day. For retailers, this represents the possibility to install a system that optimizes itself and gets more efficient the longer it is active. This advantage can be used to speed up the collection process and the processes in the shipping department by optimizing routes of the robots, recognizing fast- and slow-moving products, and creating their

orders more efficiently thus saving money on committed capital, and reacting to trends rapidly by ordering the specific items early and stopping ordering them once the trend recedes. However, present prices for the development of a suitable AI are particularly high which would suggest another restructuring from NFC to AI technology once prices drop. (Teng xun yan jiu yuan et al., 2021)

All the technologies described above can be used individually or combined to create an innovative retail business model, but innovation does not necessarily equal success. Customers need to embrace those innovations and be willing to engage in the use of them. Therefore, a survey should be conducted to identify the likes and dislikes of different demographic groups regarding modern technology. This way, companies with varying target groups would be enabled to specify which technologies to invest in. As the innovations are also quite expensive, this determination is necessary so that businesses do not lose money not only by the investment itself but also by customer churn because they are dissatisfied with the restructuring of the business model.

### **3. Survey**

As the transformation of business units to the latest technological standard requires a large cost expenditure, the investments should be aimed towards automatization that the customers would appreciate. This way a positive cost-value ratio could be achieved and cause the investment to be positively impactful.

To identify which of the presented technologies would truly be beneficial and which would not, a survey could allow insight into consumers' thoughts. Accordingly, a questionnaire to determine the customer's opinion on technology in retail in general, thoughts on digitality replacing salespeople, their appreciation of personal contact while shopping, and how much they would appreciate modern technology is to be developed.

#### **3.1. Survey Structure**

To be able to categorize the participants of the survey into relevant groups, the first questions asked the interviewees their age and their gender. The age groups to be chosen ranged from 18 to 30 years old, 30 to 50 years old, and older than 50 years. The choice of answers provided for the question for the gender the participants could select was male, female, diverse, and prefer not to answer.

Subsequently, the interviewees are asked to specify whether they shop online or in a store more often. This question enables the contextualization of the answers to the following questions and the regularity of the participant's shop in stores. The third choice of answers was offered for interviewees who did not have a preferred way of shopping.

The next survey item presented different possible applications for technological innovations. Participants were to choose which they would like to encounter the most in stores. Possible choices were the possibility to pay in an app instead of at a cash register, the availability of additional information on the products such as related parts, proper application, alternative products, and the like, the option to arrange a same or next day delivery in-store or in an app, recommended products based on formerly bought items, and digital user interfaces to select items and get them delivered to home or made available for collection after payment, and an app feature to interact with offered items via NFC to add them to the apps shopping cart and have them made available for collection after

payment. The information gained from this question can be used to identify technologies that customers desire and would attract to, likely causing a customer inflow from less modernized competitors with those same desires.

Afterward, the participants were asked whether they would shop in stores without any salespeople. Due to the analysis of the given answers, there can be deducted the level of automatization customers would feel comfortable with and thus potentially limit the amount of technology used in the restructuring of the business processes.

Next, the interviewees were to state how long of a delivery period they would be willing to accept. The choice of answers provided was one day at most, one to three days, three to seven days, and more than seven days. This question grants insight into the expectations of customers regarding logistical modernization. As customers do not have detailed knowledge about logistics and delivery processes, they cannot be asked how they would think about technologies affecting those business units. However, the delivery period represents the customer's sole touchpoint to a business's logistics. Therefore, the shorter the customers accepted delivery period is, the bigger is the need to improve the warehousing and logistical processes, for example by automizing them, to meet the customers' aspirations.

The next question was supposed to determine the importance of salespeople to customers by asking for relevant personal contact while shopping. The choice of answers provided was important, rather important, neutral, rather unimportant, and unimportant. Deducible from this question is the feasibility of a store concept without salespeople.

The following survey item serves the same purpose, to identify the customers' level of acceptance regarding a fully automated store. Here the approach is rather radical, asking the participants whether they feel disturbed by salespeople or not when they are shopping. The choice of answers provided is yes, no, and occasionally.

In the second to last survey item, the interviewees were asked to state how their customer experience would be changed by modern technology. They could choose from the options' great improvement, improvement, no influence, deterioration, and strong deterioration. The point of this survey item is to find out about customers' general willingness to expose themselves to new, modern technology and how much they trust those.

The survey concludes with the question of whether the participants would rather maintain the status quo or embrace a technological restructuring by asking if the interviewees would prefer to shop at stores with salespeople or with the latest technology. There is also a third choice for customers without a clear preference labeled as no preference.

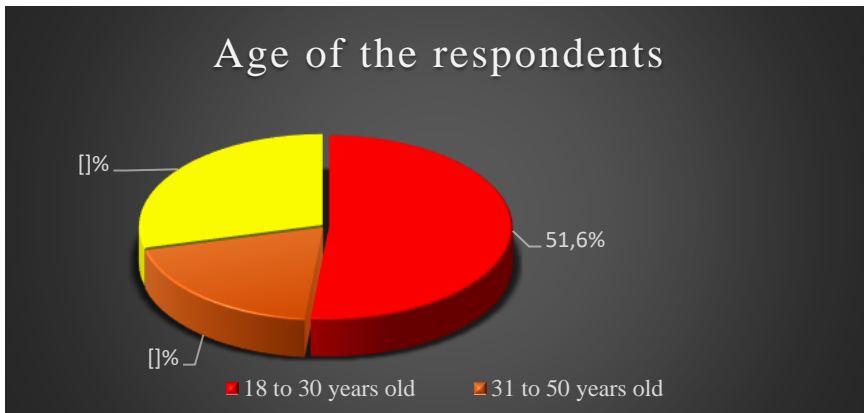
### **3.2. Implementation of the Survey**

After finalizing the questions of the survey, it was inserted to Google Documents, where an explanatory introductory text was added to allow the participants a grasp of the topic of the survey. Google Documents also allows the creation of a design to make the survey easier to read. To ensure every participant could understand every question and choice of answers, the survey was set out in German, too, as the interviewees are all native German speakers. The survey has been available from February 2<sup>nd</sup>, 2022, to February 13<sup>th</sup>, 2022, via a link sent to selected people of various ages, social backgrounds, and levels of education with

the permission to forward the link to more people to represent as many social classes as possible.

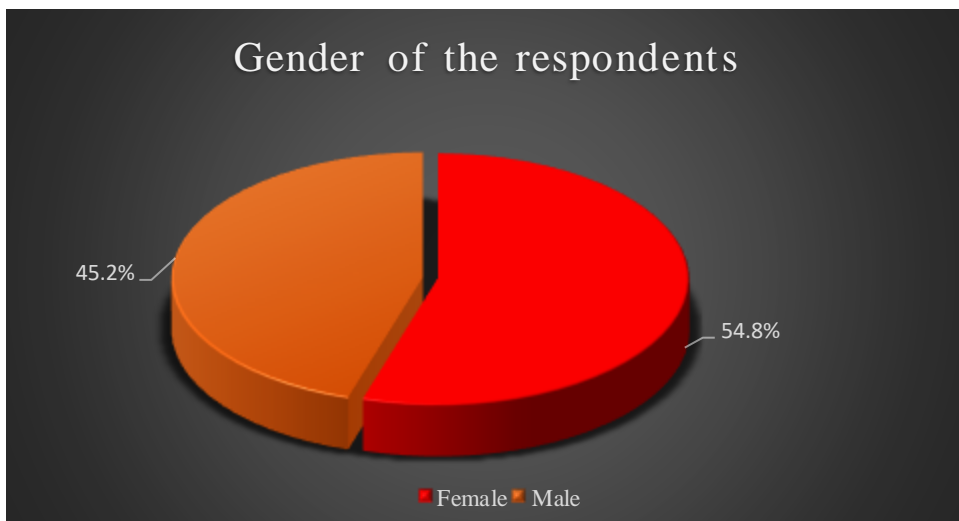
**3.3. Analysis of the Survey**

A total of 31 people took the time to participate in the survey which should be regarded as a sample. This group can be subdivided by age as the first survey item asked the respondents for their age group. 16 participants, or 51.6%, belong to the age group of 18- to 30-year-olds, six interviewees, or 19.4%, stated to be between 31 and 50 years, and the remaining 29%, in total nine participants, indicated to be 51 years old or older.



**Figure 1. Age of the respondents**

Out of all the participants, none identify their gender as diverse, and no one rejected to specify their gender. With 17 female and 14 male respondents, the ratio is 54.8% female to 45.2% male interviewees.



**Figure 2. Gender of the respondents**

For a company with a specific target group, these survey items should be put together to find out the context of age group and gender regarding the following questions in the survey. As this paper does not serve the purpose to conceptualize a business model for a specific branch but for retailers with a wide range of products, a type of retailer which can be found in most branches, this step is not target-oriented and therefore not conducted.

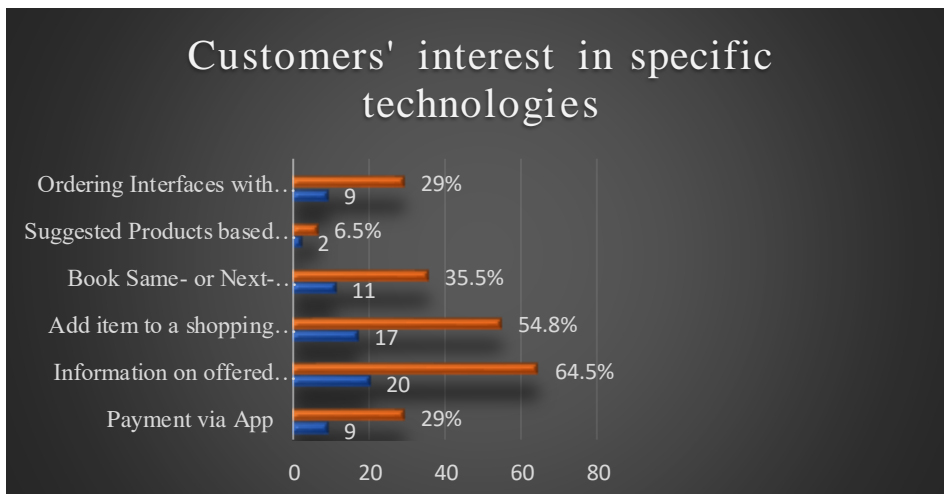
The first research-related survey item asked the participants for their preferred way of shopping. Here, 13 or 41.9% of the interviewees stated they do not have a preferred way of shopping. 32.3%, in total ten, of the respondents would rather shop in a store than online, the opposite is true for 25.8%, in total eight, of the participants.



**Figure 3. Preferred way to shop**

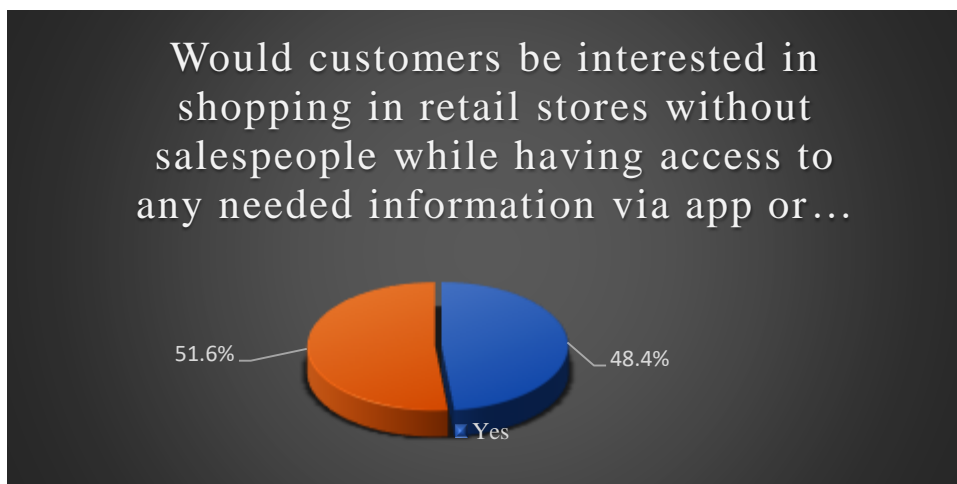
The following survey suggested some of the presented technologies that would impact the customers. Participants of the survey could choose which of the suggested innovations they would like to encounter in retail.





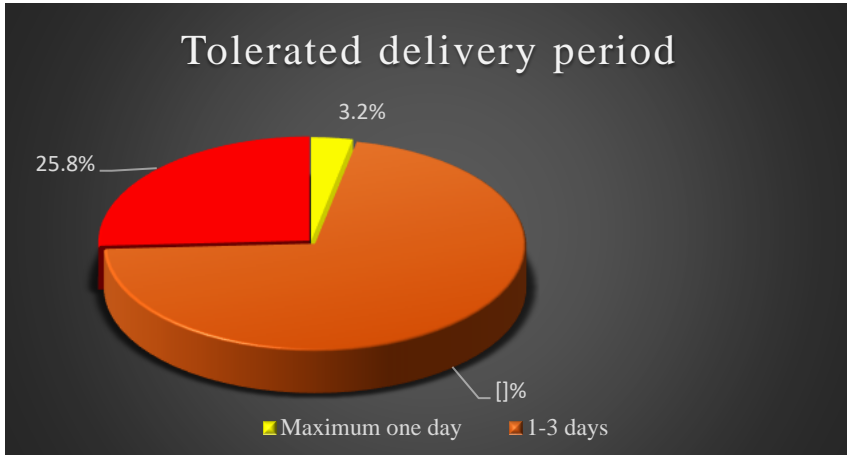
**Figure 4. Customers' interest in specific technologies**

Next, interviewees were asked whether they would consider shopping in a business that is run without salespeople. 16 respondents, that is 51.6%, would not be interested to buy in such a retail store as opposed to 15 participants, that is 48.4%, claimed to be interested in.



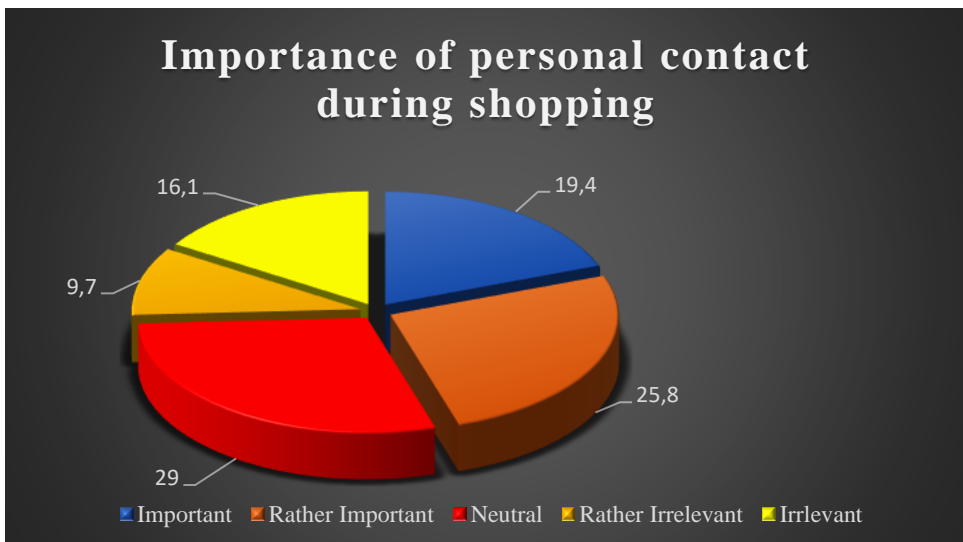
**Figure 5. Would customers be interested in shopping in retail stores without salespeople while having access to any needed information via app or sample**

The results of the survey item asking what delivery duration customers would be willing to accept revealed, that with 71% or 22 interviewees most of them would accept a delivery period of one to three days. Another eight respondents were more patient and would tolerate a delivery period of three to seven days. One participant represented as 3.2% would only be willing to book a delivery if it takes one-day maximum. No respondent would be accepting a delivery period of more than seven days.



**Figure 6. The tolerated delivery period**

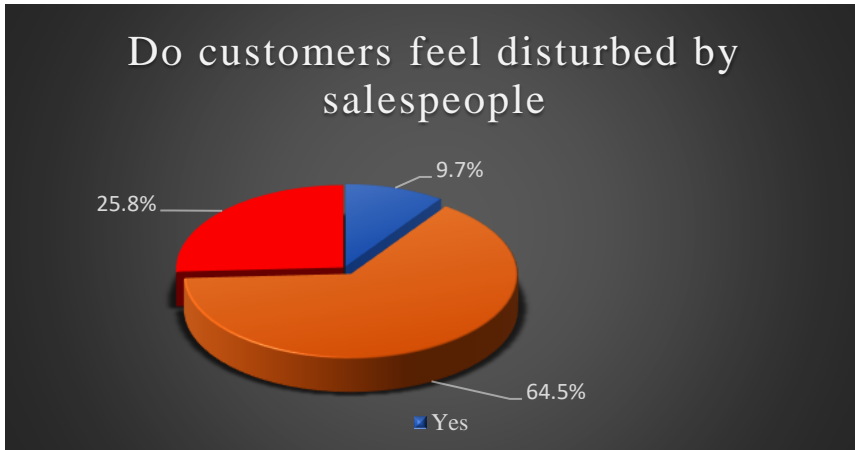
In the next survey item, participants should state the importance of personal contact during shopping. Six respondents, 19.4%, consider personal contact important, eight interviewees, 25.8%, consider it rather important. Nine participants, 29%, stated they have no defined opinion on personal contact during shopping and chose the option “neutral”. Three respondents, 9.7%, indicated they consider personal contact while shopping rather irrelevant, the remaining five interviewees, 16.1%, think that it is completely irrelevant.



**Figure 7. Importance of personal contact during the shopping**

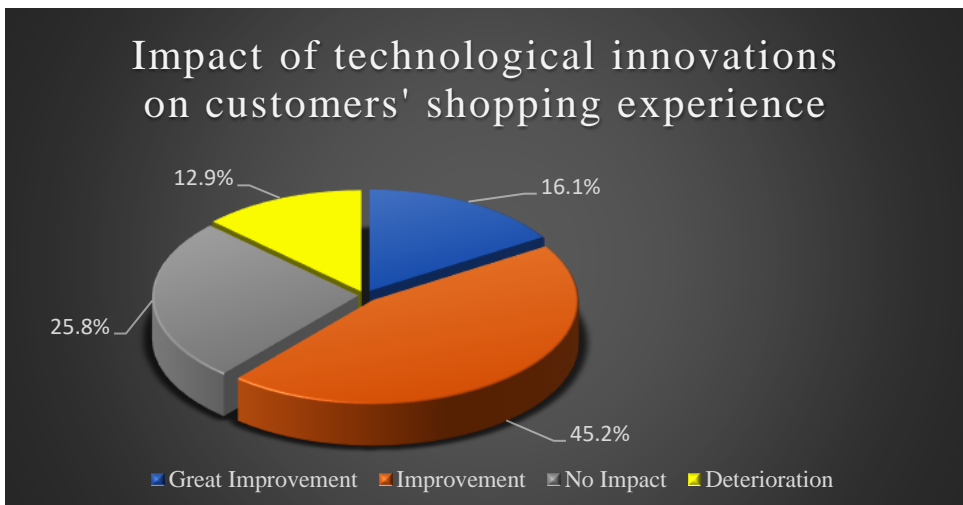
The question in the survey asking respondents whether they feel disturbed by salespeople revealed that 20, or 64.5%, do not. 25.8%, corresponding to eight

interviewees, stated that they do occasionally feel that salespeople do disturb them, another three, that is 9.7%, feel generally disturbed by salespeople.



**Figure 8. Do customers feel disturbed by salespeople**

The following survey item revealed that 16.1%, corresponding to five interviewees of the participants feel that modern technology would greatly improve their shopping experience. Another 14 respondents, which is 45.2%, stated that their shopping experience would be improved by technological innovations whereas eight interviewees, 25.8%, believe that it would not impact theirs. Four participants, that is 12.9%, indicated that their shopping experience would be deteriorated by innovative technology. No respondent assessed that these innovations would greatly deteriorate their shopping experience.



**Figure 9. Impact of technological innovations on customers' shopping experience**

The final survey item asked participants if they would prefer modern technology or salespeople while shopping. 15 respondents, corresponding to 48.4%, stated they would prefer salespeople over innovations, the opposite was true for nine, that is 29%, of the interviewees. The remaining seven participants, 22.6%, did not have a preference.



**Figure 10. Do customers prefer modern technology or salespeople**

### **3.4. Interpretation**

The conducted survey unveils interesting details about customers' thoughts on technological innovation. A deduction can be made from the answers to the first survey item. Here it appears that customers are not heavily leaning towards the online or stationary way of shopping. This is evident as well in the largest part of respondents that stated they did not have a preference as in the similar number of participants that preferred online or stationary retail. It could be assumed that younger participants would rather shop in online stores while older respondents prefer stationary retail, however, this assumption is incorrect. The subdivision by the preferred way of shopping is present in all age groups in similar parts. This implies that by focusing on the strengths of online retail, businesses can gain customers of any age as this way any customer type could have their requirements met.

From the second survey item, there can easily be seen which innovations customers would want to be implemented or not. The answers given in this survey show a strong desire for access to additional information on offered products and for the possibility to add items to a virtual shopping list and have them provided for collection. A strong dislike can be seen in the lack of votes choosing the choice of answers that proposed the presentation of suggested items depending on earlier bought products. This can be interpreted as the desire of customers to feel their data is protected and not processed for personalized advertisements. As the processing of big data is an indispensable marketing tool, retail must use the customers' shopping history, however, the knowledge about their customers' businesses possess needs to be used concealed. The other options, a fast delivery arrangeable in-store, payment via the app, and user interfaces to select items to be

provided in a collection area, were also desirable for a third of the respondents each and should, therefore, if possible, be implemented.

Almost half of all respondents stated they would shop in stores without employees. This could be interpreted as a potential threat if a retailer decided to modernize its business model as one could be tempted to believe that his target group would be cut in half. Another interpretation, however, is that although no company has yet implemented a such concept, almost half of all respondents are already willing to rely completely on digital information. That presents an immense opportunity for the first companies investing in the addressed technologies as they could achieve a significant gain in reputation thus gaining customers from competitors.

Also, the short accepted delivery period shows the need for an optimization of the warehousing processes. If the orders are quickly registered, prepared, and shipped they can be completed in a shorter time thus fulfilling the customers' requirements.

As only a quarter of the respondents would not mind a lack of personal contact while shopping, some employees should remain in the stores. Although the current tasks of cashiers and salespeople would be taken over by the technological solution described, a new task needs to be found for the employees. Due to the implementation of innovations, they could help customers with the payment and usage of the user interfaces. This would not cause any difficulties as most respondents do not feel disturbed by salespeople. On the upside, technological innovations would improve the customer experience of more than 60% of the respondents.

#### **4. Modern Showroom Concept**

To develop a new business model for retailers, the research results and the findings from the survey can be combined to find a balanced ratio of technological possibilities and the customers' preferences. Doing just that, a showroom concept is an obvious choice.

The survey unveiled that almost half of the respondents would shop in a store without salespeople although they would prefer to have personal contacts in stores. This implies that businesses should not dispense all the personnel but keep some employees. The respondents also stated their liking of payments via the app and via a user interface. As NFC is currently cheaper to implement than an AI, the payment via NFC contact appears as an attractive payment option. Connecting this with the customers' preference for personal contact, businesses should employ cashiers to help customers pay their selected items and explain the use of the payment interfaces.

More than half of the respondents also claimed to like the concept of choosing items in an app and collecting them in a designated area where they are provided for them. Furthermore, almost two-thirds of the interviewees agreed that they would be interested in receiving additional product information in a shopping app. This indicates that a store with just a small sales area, where each available item is just presented as a sample and equipped with an NFC tag sending the product information to customers' smartphones on demand would meet the customers' likings while reducing fixed costs for space, additional costs, and personnel costs. The smaller sales area is especially intriguing for retailers with a wide range of

products, as due to their high number of offered goods, they require large sales areas which are very expensive. Therefore, the reduction of costs for space could have a remarkable impact on retailers with a wide range of products. Opposed to the sales area, the storage space would need to be larger than usual to store most of the goods. If warehouse robots were also to be integrated into the modernized business model, this storage space could be designed very space-saving thus minimizing the costs the large storage space would require. However, these robots would have to be implemented anyways to enable the store to provide the selected items in the collection area. They would also make the survey participants wish for same- or next-day-delivery booking in-store more realizable by optimizing warehousing processes.

This modern showroom concept could furthermore prevent shoplifting as all the products presented in the sales area would only be there once as a sample. Also due to the minimized sales area, customers could easier be observed thus giving shoplifters hardly any chance to pick up items to steal.

A third of the survey respondents would in addition be excited if user interfaces would be implemented for customers to arrange deliveries. For customers that know exactly what they need and those who do not own a smartphone, also there could be added the option to select items at the user interface, pay them right there, and have them provided in the collecting area.

As most of the respondents did not appreciate the idea of product suggestions based on earlier purchased items, the advertisements in the customer app should not be presented as such, but as selected products presented randomly to every customer. This way the customers could be nudged to buy suitable accessories for earlier bought items without realizing it. However, this advertisement would need to be designed very subtle as customers could be angered if they realized that their earlier purchases are influencing their suggested items. (Herold-Blasius, 2019)

In summary, the modern showroom concept would consider a small sales area and a larger storage area. In addition, there would be designated areas for the collection of provided goods, one inside the store with a comfortable waiting area and another one outside of it where bulky or heavy items could be collected. Cash registers would be replaced by user interfaces that would allow customers to arrange delivery, select items, and pay via smartphone. The selected goods would be provided by warehouse robots navigated by NFC communication as AI is currently hardly affordable. The size of the sales area would be as small because it would only have to offer enough space for one of each offered product as a sample. Customers would use custom apps that could send the information on which items to provide to the warehouse robots and to pay while parallelly being able to receive information on any item on display on demand. If any difficulties were to arise, employees could offer help while additionally offering personal contact, which customers deeply appreciate. This concept would drastically reduce costs after the break-even point of the restructuring of the stores has been reached.

## **5. Outlook**

This paper analyzed the possibilities technology offers to retail to develop their current business model. For this, the first innovative technologies like NFC, AI, and warehouse robots were presented to give an overview of the available technologies retail could resort to. They could be used in a plethora of ways. NFC creates the possibility for a network navigating the robots and to pay via the app,

robots could make the employees unnecessary saving personnel cost. AI was considered to be too expensive to implement in the modern showroom concept, but in the future with receding prices, AI could become a valuable asset expanding the advantage of a technological conversion by automatically optimizing all processes related to a retailer's enterprise resource planning system by analyzing big data through deep learning algorithms.

Next, a survey was conducted to determine the customers' interest in technology, in general, to be able to connect the possibilities and acceptance of customers. As the survey unveiled, the customers had a particular interest in personal contact while shopping, setting the only limit to the technological potential which could replace all employees.

From the connection of these two sides, there was then deducted a modernized business model for retail that included for all the presented technologies while weighing in the customers' interests. The modern showroom concept that was created included the use of warehouse robots to collect items the customers selected and provide them in a collection area. In this creation, there were found solutions for any possible difficulty that may arise in the planning of the implementation of the concept like the collection area outside the store for heavy items and the maintaining of employees to offer personal contact while shopping and explain possible problems customers may face using the new user interfaces.

The modern showroom concept can confidently be regarded as the future of stationary retail. It suits the customer's wishes while simultaneously reducing costs in the long run. While the acquisition costs would currently be particularly high, due to the rapid progress in technology these costs will be reduced in the foreseeable future. Retailers would not only reduce their fixed costs but also improve the customer experience as many customers would be excited to engage with new technologies in stores. Therefore, retail businesses that could afford the restructuring of their store concepts should strongly consider acting on it to gain an advantage over their competitors by attracting customers with their innovative business model based on modern technology.

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