Near Field Communication Use in Retail Stores: Effects on the Customer Shopping Process

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Abstract: This paper explores NFC based applications adequate for the use in retail stores and analyses the influence that these could have on the prevailing customer shopping process. It emphasizes the fact that NFC could provide shoppers with more benefits beyond faster payments. On the one hand, NFC based rebate coupons and loyalty cards could further accelerate the check-out process. On the other hand, NFC devices could be used to support customers with more information on available products. This could also reduce the customers' need for store personnel assistance. The paper concludes that NFC would not fundamentally change the customer shopping process but merely support it. This research was partially funded by the European Union through the FP6 project StoLPaN.

1 Introduction

Near Field Communication (NFC) is an emerging technology which combines contactless smart card technology with the convenience of mobile devices. The integration of NFC hardware e.g. into a mobile phone, enables it to emulate contactless smart cards as well as to read from and write onto such cards. The ability to act as a smart card makes it possible for NFC compatible phones to be used as replacement for physical contactless cards. The majority of the trials that were conducted with NFC technology focused on payment and ticketing applications. This means that the trial participants were either enabled to use NFC enabled mobile phones to pay at point of sales or to use them as electronic tickets for public transportation. This application focus is reflected by the coverage in trade publications: NFC is, as a general rule, described as a technology which enables the owners of compatible devices to use them for payment and ticketing services. There are, however, other applications which can be implemented based on this new technology. Against this background, this paper explores the NFC based applications adequate for the use in retail stores and analyses the influence that these applications could have on the prevailing customer shopping process.

2 Retail Applications for NFC

In order to accomplish a first assessment of the possible uses of NFC in stationary retail, we conducted an analysis of available industry publications pertaining to the technology. Publications from the GSM Association (GSMA) which represents 750 mobile network operators, the European association for standardizing information and communication systems (Ecma), the NFC Forum, and Innovision, a company designing NFC chips were considered [EC05,IN06,NF06,GS07]. The NFC applications most mentioned in these industry publications were: mobile payment, mobile ticketing, the transfer of data from one device to another, the easy pairing of devices, such as mobile phones and Bluetooth headsets, and the download of information, such as trailers and ring tones from so called smart posters. All in all, 14 different applications for NFC were named[1] and described, of which five were identified as deployable for the use in retail stores: Payment, the download of information, loyalty applications, rebate coupons, and product information.

In order to visualize how these five applications would change the way people shop, flowcharts of prevailing customer shopping processes were generated based on site surveys and discussions with store employees. Subsequently, the flowcharts were amended by the different possible NFC applications in order to identify the changes resulting from technology implementation. In order to verify the authenticity and realism of the processes, semi-structured interviews were conducted with nine European retailers for feedback in their regards. Five of the retailers were interviewed in their own offices in Switzerland and Germany, three were interviewed by phone, and the ninth was contacted by e-mail and also responded through the same channel.

While the process flowcharts were generated for apparel and footwear stores, book stores, gas stations, pharmacies, and supermarkets, the latter will be taken as example. The reason for the choice of the supermarket process lies in the fact that most NFC applications would mainly help to accelerate the checkout process. As the interviews have shown, the perception of the retail industry is, that solutions which can speed up the checkout process seem to yield the highest potential when implemented in supermarkets.

3 The current customer shopping process

The customer shopping process in supermarkets can be summarized as follows: The customer enters the supermarket, searches for the products he intends to buy or strolls through the store. When a product is located, he checks if it fulfils his requirements and makes a decision on whether or not to buy it. Optionally, the customer may ask the store personnel for assistance in order to locate a product or to receive more detailed information on a product he is uncertain of. This part of the shopping process is repeated until the customer makes the decision not to look for any more products. He then adjourns to the check-out area, where he might have to wait in line before placing his

[1] mobile payment, information download, contactless loyalty cards, electronic rebate coupons, product information, data transfer, easy device pairing, mobile ticketing, physical access control, logical access control, health care file storage, car ignition key storage, field force solution, support of children and elders

shopping on a counter or a conveyor belt. A cashier then scans the barcodes of all products and informs him about the total amount that is to be paid. Optionally, the customer can hand over coupons in order to claim rebates or his identification card for the retailer's loyalty program in order to collect reward points. The shopping process ends with the customer paying for his purchases by means of cash or electronic payment.

This shopping process does not feature many technological resources that help customers or improve their shopping experience. The only exceptions are the barcode scanners, which improve the check out process by accelerating it and by eliminating the need for manually capturing products, and the payment terminals which enable customers to pay for their purchases without the need to carry large amounts of cash. Nevertheless, 95% of the retailers consider waiting lines at their check-outs as the most serious problem to solve in order to better service their customers [CM02]. NFC technology could contribute to the alleviation of this problem. As the nine retailers have stated, this problem perception is especially shared by the operators of supermarkets and drug stores, which are very interested in accelerating the check out process. The other retailers such as apparel and footwear store operator perceive waiting lines at the check-out as less of a problem.

During the conducted interviews, different explanations were given concerning this problem: Shoppers usually don't go to supermarkets for pleasure or to treat themselves, but to fulfil basic needs of acquiring food, beverages, and other household necessities. Also, many customers do not go to supermarkets on their day off, but squeeze the chore of shopping between leaving work and going home. Therefore, most customers wish to spend as little time as possible in a supermarket. Due to the large number of products that the average customer buys in a supermarket when compared to other stores and owing to the requirement to have each of these products scanned by a cashier, the check-out process in a supermarket takes up a larger amount of time than in other stores.

4 The NFC enabled customer shopping process

In section 2, five NFC applications were identified as deployable for the use in retail stores. These applications can be split into two groups: Those that support the shoppers while they are on the store floor on the one hand, and those that could become part of the check out process.

The download of information and the procurement of product information constitute two different applications of a single solution. Both applications could support shoppers on the store floor. While the download of information generally describes the access of data such as rebate coupons and links to web based content triggered by reading an NFC tag embedded in a smart poster, the procurement of product information describes accessing data after tapping such a tag embedded in a product packaging or attached to the shelf holding the product. Both applications could be used to help shoppers to find out more about the product that retailers have to offer and to reduce their need for assistance by store personnel. Store personnel could also use these solutions in order to procure information on products and thereby better serve their customers.

The implementation of NFC based payment, loyalty applications and coupons on the other hand could give retailers a means to accelerate parts of the check-out process. As was stated before, the checkout process seems to yield the largest potential for an improvement of the entire customer shopping process [CM02]. NFC devices could hold the customers' payment cards, loyalty cards, and rebate coupons at the same time. Holding one NFC device up to a contactless reader could replace having to get two plastic cards and several coupons out of a wallet or purse.

As these descriptions show, the NFC based applications would not fundamentally change the customer shopping process, but merely support it on the store floor and in the check out area. They also illustrate, that the majority of the promoted NFC applications are focused on supporting the check-out share of the customer shopping process.

5 Feedback from retailers

While retailers that operate supermarkets and drug stores showed most interest in those NFC applications that could accelerate the check-out process, the operators of apparel stores and other specialty stores were more interested in providing customers with information on the sales floor. As mentioned before, supermarkets have a higher likelihood of customers being forced to wait in line at the check-out than other retail stores. They also have a large number of customers that want to leave the store as soon as they have gathered the products they require. On the other hand, solutions that would require item-level tagging of products with NFC tags, such as the retrieval of product information, sparked less interest on the part of supermarket operators. This reluctance was justified with the low average prices of supermarket products and the low margins of food retailers, which makes the tagging of products to expensive in the near future. In contrast, providing customers with product information or the possibility to download coupons by means of smart posters or shelf tags seemed to constitute an interesting possibility. The embedded NFC tags could be used by a large number customers over a long time period and do not have to be replaced when a product unit is sold.

Retailers operating department stores on the other hand were less interested in accelerating their check out processes, because, in their opinion, waiting lines constitute less of a problem in their stores than they do in supermarkets. Also, the check-out process is a less important part of the shopping process at a department store than it is in a supermarket. This is in part due to the smaller average number of products bought by customers which results in shorter scanning processes. Another reason is the fact that many customers do not just satisfy specific needs in department stores, but stroll through the stores and enjoy the shopping experience. This means that a smaller share is in a hurry and wishes to leave the store as soon as possible. While NFC based payment, loyalty programs, and coupons were not rejected by these retailers, their adoption is not a priority. Department store retailers were on the other hand very interested in NFC solutions that could provide shoppers with information on the shop floor. The main interest consisted in possibilities that could reduce the customers' need to consult store personnel. Discussed applications included the provisioning of general information about products or their availability in the front store and the back store upon touching a NFC

tag on a shelf or embedded in a smart poster. The possibility of tagging individual products was also discussed. Due to the higher average price of products in department stores, the tagging of individual products with NFC tags constitutes a more realistic possibility to this part of the retail industry than it does to the operators of supermarkets.

6 Conclusion

NFC is a technology that enables mobile devices to emulate contactless smart cards, read from or write to compliant RFID tags, and to communicate with each other in a peer-to-peer mode. These abilities make it possible for such devices to be used as payment cards, hold electronic tickets, and easily download data from tags and networks without the need for manual interaction such as typing in URLs. The NFC applications appropriate for the implementation in stationary retail most mentioned in industry publications are mobile payment, loyalty applications, electronic coupons, the download of information from smart posters, and the procurement of product information.

With the exception of barcode scanners and conventional contact based payment terminals, the customers' shopping process in most retail outlets does not include the use of any technology solutions to improve the customers' shopping experience or to accelerate the check-out process. NFC based payment, loyalty applications and coupons could support and accelerate the check out process. The download of information from tags attached to smart posters, shelves, or individual products on the other hand could make the time shoppers spend on the store floor more convenient. Interviews with nine European retailers indicate that supermarket and drug store operators indicate a greater interest in solutions that can accelerate the checkout process, while department store operators are more interested in improving the shopping experience on the store floor.

This paper has shown that the implementation of NFC technology in the current supermarket environment would not fundamentally change the customer shopping process, but merely support it. However, the combination of NFC technology with other current retail innovations such as mobile check-outs and self-scanning concepts could have a stronger influence on the way in which people shop. Such concepts could ultimately render regular check-outs unnecessary.

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