

Application of NFC technology in proximity marketing

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Abstract — New needs emerge for wireless communication with the growing proliferation of mobile devices. As mobile devices evolve from the means of making phone calls into an integral part of personal life, there is a need to ensure communication of these devices at a much more personal level. Proximity marketing is a tool for creating a personal relationship between a customer and a vendor at the time of a customer's physical purchase at the store through modern, personalized, timely and relevant communication. The main aim of this paper is to assess the perception of proximity marketing activities, namely using NFC technology and to identify areas of optimization of NFC technology in the proximity marketing activities for business practice in the Slovak Republic. To ensure the fulfilment of the goal of the contribution and the marketing research, we have set the main research assumption, which is as follows: The potential of using NFC technology in proximity marketing in the business practice of the Slovak Republic exists.

Keywords — NFC, proximity marketing, marketing research

I. INTRODUCTION

New needs emerge for wireless communication with the growing proliferation of mobile devices. Current technologies, such as Wi-Fi or Bluetooth, allow you to connect to computer networks or other devices over a relatively long distance of several hundred meters. As mobile devices evolve from the means of making phone calls into an integral part of personal life, there is a need to ensure communication of these devices at a much more personal level. NFC technology allows devices to communicate with each other over a very short distance, in the order of centimetres. Therefore, enabling communication between two devices requires users to bring the devices closer together. This link to the physical action gives the user a clear idea of when their data is transmitted and when they are not, but there is no need for real physical contact and the inconvenience associated with it. The use of NFC technology in proximity marketing is becoming increasingly popular. Its application is very wide as it is with Bluetooth or Wi-Fi technology.

From the results of the analysis of the issue of proximity marketing in the conditions of the Slovak Republic it can be said that addressing consumers of the Slovak Republic through proximity marketing and hence the use of NFC technology is feasible. More than half of the Slovak population owns a smartphone, the most used device for the implementation of proximity marketing, which represents a considerable potential for success for businesses. [1]. But the reality is different. The analysis based on dialogues with marketing agency owners and marketing specialists shows the evident presence of proximity marketing in the Slovak market. However, it is clear that the level of use of proximity marketing tools is not comparable to foreign countries such as the US, the UK and others. Opinions about the reasons vary among professionals and users of proximity marketing in practice. One executive director sees great potential in the application of proximity marketing in Slovakia, as he has been working in this field of marketing and other innovative technologies for a long time. The paradox is that this analysed company and a few others consider these technologies as significant, while most marketing agencies do not use proximity marketing or consider it as supporting or complementary tool that has no significant application in the Slovak market.

In one case, however, all the marketing companies agree that there is a high lack of interest in developing a campaign using proximity marketing tools. According to the owners of the addressed companies and marketing specialists, some entrepreneurs have no idea that proximity marketing exists or its benefits. Many businesses are only set up to monitor competition, their market presence and do not focus on innovative tools. This is also one of the reasons, why marketing agencies do not invest in expanding their portfolios. This is the cause why the tools of proximity marketing do not work in the Slovak market as much as abroad. Entrepreneurs do not create demand, so marketing and digital agencies are not motivated to offer these services. This information has become the basis for a survey of consumers' perception of

proximity marketing activities. This paper will explore aspects of research issue related just to NFC technology.

II. LITERATURE REVIEW

NFC stands for “Near Field Communication”, basically a short-range, high-frequency, touch-free connection that allows data exchange between devices up to a maximum of 10 cm. NFC technologies are embedded in posters, products or books [2]. This location indicates where the RFID chip (Radio Frequency Identification) is inserted, i.e. the command antenna. Opening a mobile browser on the specified page or another may be a command. Any NFC phone can activate this command by placing its device in close proximity to the antenna [3]. Systems based on NFC technology are a passive marketing technology compared to Bluetooth beacons, which cannot be used to send push alerts and, unlike beacons, this solution does not allow for measuring the distance between the transmitting and receiving device [3]. On the other hand, the RFID chip (antenna) does not require special power supply. So there is no maintenance problem and the NFC antenna is cheaper compared to Bluetooth beacons. Popular cases of NFC use are mobile device payments via built-in RFID chips in phones and other devices. Customers who have mobile wallet apps installed can now make contactless payments via a mobile phone that replaces a credit or debit card in the payment process. In addition, NFC technology can be used to provide product details and special offers. Because of the low cost installation and operation of NFC technology, this solution is available for both large and retail chains and lesser known product brands as well [5]. This solution is also popular among customers, especially for its simplicity [6]. The big advantage of NFC systems is that no additional applications or other components are required to be installed on customers' portable devices (except mobile wallet app) [4].

The use of NFC technology in proximity marketing is becoming increasingly popular. Its application is very wide as it is with Bluetooth or Wi-Fi technology. Most commonly, the NFC chip is used to provide additional product information or as a channel to convey advertising videos to customers and enhance the shopping experience [7]. In addition, customers can receive special offers, instructional videos, or tutorials. NFC chips can be used to invite customers to download a given vendor's application, allowing the customer to access additional valuable details, information or loyalty discounts or special offers, or direct the customer to the nearest store [8]. NFC chips used for this purpose are most often located at public transport stops, metro stations, railway stations, airports, on busy streets built into various light banners or posters [9, 10]. The goal of the service is to bridge the gap between online and offline shopping for those customers who want to touch and test products before purchasing [11].

Merchants who choose to take advantage of NFC technology are rewarded with measuring the number of content impressions, display time, display duration, or response to the viewed content. The merchant gets a better overview of the traffic of each department of his store. He also exactly knows which products the customers are interested in. In addition he has the opportunity to get feedback, suggestions and improvements, deepens contact with customers, allowing

him to correctly understand their preferences and thus correctly set all marketing campaign tools to achieve their synergies within the marketing strategy used by the business at the point of sale [12, 13, 14, 15].

III. METHODOLOGY

The main aim of this paper is to assess the perception of proximity marketing activities, namely using NFC technology and to identify areas of optimization of NFC technology in the proximity marketing activities for business practice in the Slovak Republic. To ensure the fulfilment of the goal of the contribution and the marketing research, we have set the main research assumption, which is as follows: The potential of using NFC technology in proximity marketing in the business practice of the Slovak Republic exists.

Based on the set problem and the goal of the marketing research, we decided to carry out the marketing research on a sample of consumers of the Slovak Republic, i.e. a selected set of statistical units that we select from the whole set of consumers of the Slovak Republic. We chose a deliberate choice as a sample selection method. We set the conditions on the basis of which the sample of respondents forms a suitably selected sample [16]. The size of the representative sample was determined by the following equation:

$$n = (z_{\alpha} \cdot \sqrt{p \cdot (1-p)}) / c^2 \quad (1)$$

where n is the minimum number of respondents, z_{α} is the critical value of the normal distribution, p is the likely sample proportion, expressed as a decimal, and d is the confidence interval, expressed as a decimal [17]. The confidence level was set at 95%. The critical value of the normal distribution at confidence level $\alpha = 0.05$ was 1.96. This is based on the fact, that 95% of the area of the normal distribution is within 1.96 standard deviations of the mean. For those cases where the likely sample proportion was not known, p was set at 50%. The confidence interval was set at 5%.

In order to conduct a marketing survey of the perception of proximity marketing activities via NFC technologies by consumers in the Slovak Republic, it is necessary to provide a sample of at least 385 respondents. In order to carry out a qualitative survey, a questionnaire was chosen as a tool for data acquisition. The questionnaire ensured finding the perception of proximity marketing activities via NFC technologies by consumers in the Slovak Republic. The survey was conducted in April 2019. The 568 respondents participated in the questionnaire survey.

For two-dimensional statistical analysis, pivot tables between basic geographical and demographic data [18, 19] and selected questionnaire questions in connection with NFC technology were processed. To investigate the dependence between variables, Pearson's independence test, which was performed using the IBM SPSS Statistics 24, was used. We used another kind of statistical testing to verify the hypotheses in this paper as well. This is a one-sample t-test, which we realized using MS Excel.

IV. RESULTS

In one question, we examined whether consumers' mobile phones contain NFC and how consumers use it. Only 10% of consumers use this feature for mobile payments, and 1% of consumers use this feature to send contact cards. Up to 52% of consumers have this feature on their mobile phone but do not use it at all. 27% of consumers do not own an NFC mobile phone.

Following the querying about the use of the NFC feature by consumers' mobile phones, we investigated their attitude to the possibilities that the NFC feature provides in proximity marketing through a question: Would you like to receive additional product information by simply tapping your mobile phone to the marked location? 35% of consumers would like to receive additional product information via NFC on their mobile phone. 23% of consumers consider such an option to be unnecessary, but 23% of consumers likewise marked the answer: I do not know. 19% of consumers do not own an NFC mobile phone and they do not even care.

Based on an assessment of all the functional features of NFC chips, we consider this technology to be the successor of QR codes in many ways, which are relatively popular among consumers. Therefore, in the following question, we focused on the most commonly used tool of location based marketing - QR code.

Up to 82% of consumers have ever encountered a QR code. In addition, we wondered whether consumers are inclined to scan QR code to view its content. Only 12% of consumers are always interested in the content of a QR code and they would scan it. Up to 49% of consumers would in certain cases scan the QR code. 25% of consumers would not scan the QR code and 14% of consumers do not own a mobile phone with a QR code reader.

Subsequently, we used the data for statistical testing of the hypothesis: more than 70% of consumers in the Slovak Republic prefer the possibility not to scan QR code via a feature on their mobile phone. We set an alternative hypothesis: less than 70% of consumers in the Slovak Republic prefer the possibility not to scan QR code via a feature on their mobile phone. It is clear from the formulation of the alternative hypothesis that this is a left-tailed test. After checking of the condition ($568 * 0,7 * 0,3 > 5$; $119,28 > 5$) we calculate the value of the variable T, according to the relation:

$$T = \frac{(0,254 - 0,7)}{\sqrt{((0,7 * (1 - 0,3)) / 568)}} = -23,220 \quad (2)$$

Decision: The inequality has been confirmed ($-23,220 < 1,6449$), so we reject H_0 at significance level $\alpha = 0.05$. The decision shows that less than 70% of consumers in the Slovak Republic prefer the possibility not to scan QR code via a feature on their mobile phone. From the results we can say that a large part of Slovak consumers have a positive attitude towards the way of displaying content via QR code.

In relation to the QR code, we determined whether consumers were willing to install additional apps on their mobile phones. Only 13% of consumers would definitely install this app because they are interested in the QR code

content. 44% of consumers would in some cases install such an app. 17% of consumers would probably not install an additional application to load a QR code because their content is mostly uninterested. 14% of consumers are not interested in the content of the QR code and therefore would certainly not install the additional application needed to scan the QR code. 12% of consumers do not own a mobile phone with the option to use additional apps.

Pivot tables between basic geographical and demographic data and selected questionnaire questions were processed for two-dimensional statistical analysis. Pearson's quadrat independence test was used to investigate the dependence between variables. The dependence was monitored at a significance level of $p < 0.05$. In this analysis, we tested the hypothesis $H(0)$: there is no correlation between the basic geographical and demographic characteristics and the answers to the questions in the questionnaire. All null hypotheses we have established have been confirmed and this means that there are no statistically significant dependencies between the monitored variables and therefore, it is not appropriate to apply them practically within the framework of proposals and recommendations for the practice of Slovak companies.

V. DISCUSSION

In the questionnaire survey we found out how consumers perceive NFC technology and its possibilities in terms of proximity marketing. The evaluation of the results suggests that more than 60% of consumers have this feature built into their mobile phone. However, it is very important to note that up to 50% of consumers do not use this function at all. Only 9% of consumers use the feature for mobile payments and approximately 1% of consumers use the feature to send contact cards.

The results of the survey show that businesses wishing to take advantage of NFC-based proximity marketing need to make enough efforts to inform consumers about the presence and benefits of NFC chips at the point of sale. Because a large number of customers do not use this feature on their mobile phone, it is important to draw attention to the chips by proven tools such as information poster, installation of NFC chips in various light displays, placing NFC chips in the eyes of consumers, notifications of their presence through screens located in the store or inclusion of a voice message in the music playlist in the store.

The big advantage of NFC chips is their easy use by consumers and very low operating costs. In the light of all the information gathered, it is relevant for businesses to address consumers with concise information and offers via NFC chips distributed around their store. It is desirable that content be relevant, graphically customized, and engaging. In particular, the following information should be addressed to consumers via NFC chips: additional product information, redirection to the company website or e-shop, redirection to time of availability of the product that is currently sold out, redirection to verify product availability at another physical store, provide information about the current campaign. The importance of providing such information was also confirmed by the

consumers' replies to the questionnaire. Up to 35% of respondents would like to use the NFC chip to obtain supplemental product information by simply tapping their mobile phone to the designated NFC chip location. In addition, more than 22% of consumers could not assess whether they would be interested in such an option. Only 19% of respondents expressed their negative attitude towards this form of additional product information.

Based on an assessment of all the functional features of NFC chips, we consider this technology to be the successor of QR codes in many ways, which are relatively popular among consumers but are not liked by businesses equally. The popularity among consumers is also confirmed by the results of a questionnaire survey where more than 50% of consumers indicated that they would definitely or in some cases scan the QR code to display its content via a reader on their mobile phone. Confirmation of this conclusion, we have done through the verification of the hypothesis according to which it can be said that less than 70% of the Slovak consumers would prefer for the option not to scan QR code via a feature on their mobile phone. In addition, around 50% of consumers are also inclined to believe that they would definitely or likely download an additional application to their mobile phone that would allow them to view the content of the QR code. In our opinion, using an NFC chip that can communicate to the consumer the same content as a QR code is much easier and more consumer-friendly. Consumers are not burdened by downloading additional applications or scanning QR codes.

VI. CONCLUSION

Nowadays, sales of mobile phones with NFCs are growing rapidly in the world and thus the possibilities of its use are expanding. The potential of NFCs is much greater, and since most people carry mobile phones with them almost everywhere throughout the day, it is logical that the expansion of NFCs into all areas of human life will introduce it in Slovakia as well. From the evaluation of questions focused on finding out the status of the use of the NFC function by Slovak consumers, it can be said that this function is least used among the technologies (Wi-fi, Bluetooth) enabling the realization of marketing proximity in the Slovak Republic. This represents significant limitations of marketing proximity through NFC technology in the Slovak Republic, which we tried to eliminate in the discussion. All the above technologies are useful tools for communication that is timely, relevant and personal. If necessary, these technologies can of course be used simultaneously to achieve their mutual cooperation. It is also possible to link location based marketing tools to proximity marketing tools. In this way, a comprehensive mobile marketing system can be created with respect to the customer's location relative to the point of sale.

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