JUSTIFICATTON OF USING TWO DIMENSION GRAPHIC CODES (QR) IN MARKETIRNG ACTIVITIES

Grzegorz Szyjewski[1] and Luiza Fabisiak[2]

Abstract

Modern models of marketing are used as methods of promotion, brand image building and sales support in organizations. All those activities are preceded with mainly ICT tools use. Modern models of marketing can help by using multimedia communication with interactivity, launched by two-dimensional graphic code. Two-dimensional QR codes create the connection between analog and digital marketing tools. The code saved and made available to the consumer in its printed form can be used as a gateway through which (often unaware) the customer becomes introduced to the world of electronic marketing. The potential of such promotion is enormous, and it is observable in the current marketing trends. However, it is worth considering whether the potential customers' society is prepared to use that technology. The problem is that there is a risk that the code's interactive post will never reach the recipient. The question which arises is about the effectiveness of the form's message, in practical use.

In order to verify the problem of the legitimacy of QR codes use, the source data was collected from the answers given to the question how well QR codes are recognized as a way of communication. The practical ability to use this channel of communication was also explored. The data was gathered from the electronic questionnaire, which was conducted among people between the age of 19-23. The decision model used in the work presents sequential decision-making, depending on the achieved situation.

Keywords: *QR codes, marketing tools, decision tree, Internet survey, multi-criteria optimization.*

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1. Introduction

Modern models of marketing are used as methods of promotion, brand image building and sales support in companies. First of all, those methods use Internet, technology and the latest techniques. Nowadays, when we observe availability of the variety of products and services on the market, customer expectations are constantly increasing. That creates a very strong competition. Companies are trying to meet customer expectations and grow ahead of the others. They have to adapt quickly to market changes, following trends and customer preferences. Modern forms of marketing activities (Finne & Gronroos, 2009) like for example multimedia, with the ability to use interactivity can help the promotion process. That is an interesting supplement or even an alternative to the traditional marketing methods. It is about redirecting the recipient from the traditional channel of communication to the electronic one.

Establishing the transmission between the sender and the receiver is possible, for example, by using a two-dimensional QR code (Quick Response). The action consists of preparing a multimedia message, which is placed on a server with the possibility of remote access via the Internet. Then the URL address with the desired content should be coded in the graphical QR code. The code can be printed on any media. Scanning that code with any mobile device camera will immediately launch previously coded message on the server.

However, it is important to consider whether the potential customers' society is prepared for using that technology. The problem is that there is a risk that the code's interactive post will never reach the recipient. So the question which appears is whether in marketing activities it is worth dedicating the area designated to present the prepared message, for placing a readable code?

There is an additional cost associated with a new form of transmission preparation (on the server) to which the QR code will redirect the customer (Sullivan, 2011). On the one hand, we can establish a relatively cheap channel of unlimited interactive communication, using a rather small budget. On the other hand, the recipient may not want or even won't be able to use that form of communication. The message will not be then delivered. The space, which was used for placing the code, becomes ineffective. Using that space for a traditional message could have a much better effect. Additionally, we have an unnecessary expenditure, spent for the preparation of a multimedia message that will not be delivered to the recipient.

2. Marketing communication modern technologies

Communication in marketing is considered as one of the most important elements determining to establish and then maintaining the relationship between the company and clients and other market players (Kwiatek, Leszczyński & Zieliński, 2009). The changes that can be observed in business marketing communications are also a response to new technological and social challenges. Their causes are primarily related to new channels and new ways of communication, which came as a result of the development of new media. There is an opportunity to interact with the customer so that you can immediately see if the message reaches the recipient (Ponduri & Bala, 2014). The primary purpose of marketing communication is the effective communication with to the addressee. It is important that the message should be as easy to understand as possible. For the desired effect, the effectiveness of such communication is rather more important than its frequency (Andersen, 2001). The primary goal of marketing communication activities is to reach the recipient attention with the message prepared for that purpose. The attention of the recipient is an essential part of the final success, as it opens the channel to which the message can be successfully transmitted. It allows you to pass the desired content to the recipient, with a high probability that the message will be acquired by the recipient. Even the best-prepared message becomes useless when it does not reach the desired recipient. The current, massive amount of marketing communication tools makes the consumer engagement in the prepared strategy, an increasingly difficult task. Consequently, interactive tools (affecting as many senses as possible) are often used to allow greater involvement of the consumer (Wiechoczek, 2016). The constantly developing technology brings newer and better solutions, which give more, probable ways to use those solutions. One of the most important divisions in modern ICT is mobile technology. Currently, mobile, communication devices are equipped with features comparable to advanced computer units.

The traditional voice call feature is one of the many available, often not the most important one in using the device. Since mobile phones, transformed into smartphones and are connected wirelessly to the Internet, they have become inseparable companions of the everyday lives of most developed societies (Kang and Jung, 2014). At the same time, new opportunities have opened up to use these devices to achieve marketing objectives.

The mobile phone in the consumer's pocket, as the last chain of the network, became an output device easily delivering the message to the mobile owner. Additional features such as geolocation allow for even more efficient marketing activities. With information about the current location of the recipient, specific actions can be conducted, based on modern forms

of communication with the user (Reformat, 2016). Built-in, high-resolution, color display, vibration mechanism, large-image camera, microphone, or speakers, forms a set of tools that can stimulate several user's senses at the same time. That gives great opportunities for marketing and increasing the recipient's interest in the message. The message can now be not only multimedia feature but also it can be delivered directly to the "pocket" of the recipient. Essentially, it can also be personalized to customer's current needs and requirements (Weng & Liu, 2004).

From the verity of modern tools used to develop the information society, one is two-dimensional QR code (Quick Response Code) (Janiak, 2000): The marketing purposes of using the QR code use were also recognized. Multimedia messaging and unique product marketing in advertising campaigns are pointed out among the examples of using QR Codes. However, the most important is using the code as a link, which quickly transfers the user from the traditional (printed) message to the world of the Internet (Kieżel & Wiechoczek, 2016), where the possibilities of further multimedia presentations are almost endless. Thanks to the user quick and automatic redirection to the modern form of presentations, there is a chance of keeping the communication channel constantly open. Technically, the QR code is a graphical two-dimensional combination of fields, in two contrasting colors that can be compared to a chessboard. The code forms a square as well but, containing various sizes fields which are very irregularly located. They do not create any regular scheme. QR code works similar to the bar code, which is the basis for the automatic identification (Pons, ValleS, Abarca & Rubio, 2013). QR thanks to its two-dimensions (bar code has only one-dimension) allows to save in the form of a graphic object, more data than a bar code. In addition, thanks to placing three positioning elements in the corners of the QR code, it can be scanned from any position. There is no need to put the information about the up and down placement under the scanner device (Szyjewski, 2013). The tool described above gives tremendous opportunities in the marketing field.

On the other hand, that is a new way of establishing a communication channel, reserved so far for the world of electronic identification. It is commonly used in storage locations for a wide range of storage items, which need to be quickly identified. The fact of countless ways of QR codes used in communication, including marketing, is undisputed. However, the question, which occurs, asks if, at present stage of the development of the information society, it is justified to use QR code in marketing activities?

3. Source data

The source data was collected, to verify the stated problem and to answer the question: How recognizable QR codes are as a mean of communication? The practical ability to use this channel of communication was also explored. The data was collected in the form of an electronic questionnaire, which was conducted among people aged 19-23. It was assumed that in that age range we would find the biggest group of recipients who will be able to manage the task stated in the research. For most people in that age, a mobile phone with Internet access is basic and everyday use device. They are often unaware that life without permanent access to information was possible in the past.

The survey system used in the research is the author's solution. It was published as remote access to a server based on running PHP technology scripts and using MySQL database. And on the client's part, there were used simple HTML5, CSS3, and JavaScript technologies. An important issue in the conducted research is the fact that the survey was made available on desktop computers. Running the survey on a personal mobile device would block the possibility of scanning (on the same device) QR code displayed in one of the questions. It was also tried to keep the natural conditions, preventing the respondents from preparing earlier for the test they had been subjected to. It created the real situation where respondent was supposed to reflect the situation when he faces the QR code "here and now."

The survey consisted two phases. In the first respondents answered simple questions. Their answers helped to eliminate those who did not have necessary tools to be used in the further task. The negative response to one of the first two questions eliminated from further participation in the survey. The questions were as following:

1) Do you use a mobile phone?
2) Do you use an Internet access in your mobile?
3) Within the first part, we also collected data, which later allowed us to determine the profile of the respondent. These data were derived from the answers to the following questions:
4) Do you use printed coupons offering discounts on food or services?
5) Do you use the option to purchase and/or store tickets in your mobile? (cinema, theater, train, plane tickets)?
6) Do you use promotional coupons stored in your mobile using applications such as McDonald's, KFC, QPony, Apple Wallet, etc.?

In the second part of the survey, a QR code recognition test was used as the initiator of an interactive communication channel and its practical use. A sample marketing message containing a QR code was presented to the respondent. He or she had to make a declaration of whether he/she would be able to use such an offer. The marketing message used in the survey is illustrated in Figure 1.

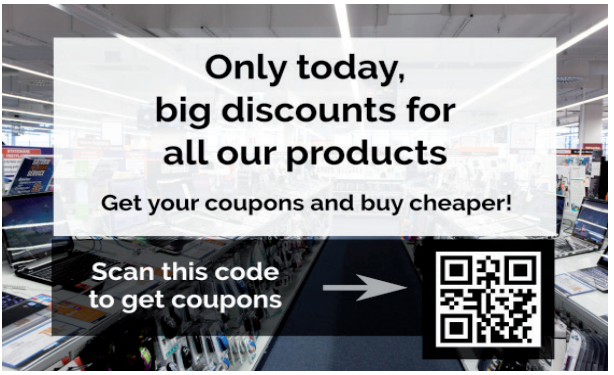

Figure 1. Sample marketing message used in the survey

Respondents received the following request: "When entering to the electronics store to make a purchase, you see a poster shown below. Do you know what to do to get a discount? " The only possible answer was: YES or NO. Choosing the negative answer, the respondent was eliminated from further participation in the survey. It was also stated that the message prepared in such a form would not have reached him/her effectively. After selecting the positive answer, the next step was the practical verification of the given answer. The study uses modern technologies and the capabilities of QR technology. The next request, which appeared on the screen, was containing a QR code, with the command: "Scan the code now and see what it is hiding." The code was generated individually for each questionnaire, and only the real scan resulted in the appropriate record in the database. Authors avoided the risk of misrepresentation, which could occur while respondents would have the possibility to check others' answers. The message itself was not as important.

The purpose of the survey was the investigation whether the recipient would be able to initiate a communication channel using a two-dimensional QR code.

The scenario of the further steps of the survey strictly depended on the result of practical code scanning. If the process was successful, the respondent should answer next question: "How often do you use (scan) such codes?" He or she had four possible answers:

1) As soon as I see the code and if I have time, I always scan the code with curiosity.

2) I scan the code if I am interested in an offer.

3) I scan the code only if I could not find sufficient information in the traditional ad text.

4) I never scan QR codes.

Two-step survey allows you to verify the practical use of QR codes. It was about acquiring official data. The authors wanted to investigate how the respondent would behave if he/she sees the QR code right now, without any prior preparation for such research. That allows you to know the practical, opportunity to open a marketing communication channel, via a QR code. The survey was conducted in the second half of January 2017. The data collected during the survey was recorded in an electronic database for further analysis.

4. Research methodology

The research was based on the classification method, which allows to arrange the decision process and to model the decision situation. The data came from the questionnaires and formed the probability of respondents' answers. The research was done according to the decision tree analysis method. That technique allows investigating different decision processes (Breiman, Friedman, Olshen & Stone, 1984), where we can find decision order and where every next decision depends on the previous one (sequential processes). The decision tree was built by defining the goal of the research and the problem, which occurred after receiving surveys' results. Classification based on the decision tree resulted in a simple algorithm for decision support. Thanks to that algorithm it was easy to highlight the sequence decisions, and it became easy to examine the probability of criteria changes. The Bayes analysis was used in the research activities (Langey, Iba & Thompson, 1992), which takes into account occurrence of unexpected events. For example, the answer to the question about the familiarity of the QR codes and about the ability to use them, coming from most respondents, was wrong.

The method is dynamic. It is opposite to the classical analysis because it does not narrow the assessment in the decision-making process regarding one single answer. It provides results for all potential paths specified in the survey (Szczech, 2009).

The applied decision tree model presents sequential decision-making process, depending on the achieved situation. For the survey purposes, it fills the technical and economic parameters and evaluation criteria. This is an important issue in cause-effect analysis and multi-criterion optimization process. The guidelines of the conducted survey were used in the decision tree creation (criteria - sub-criteria - questions). As a result, we received a set of criteria and set of sub-criteria, which created the adaptive structure decision tree. The described decision tree is shown in Figure 2.

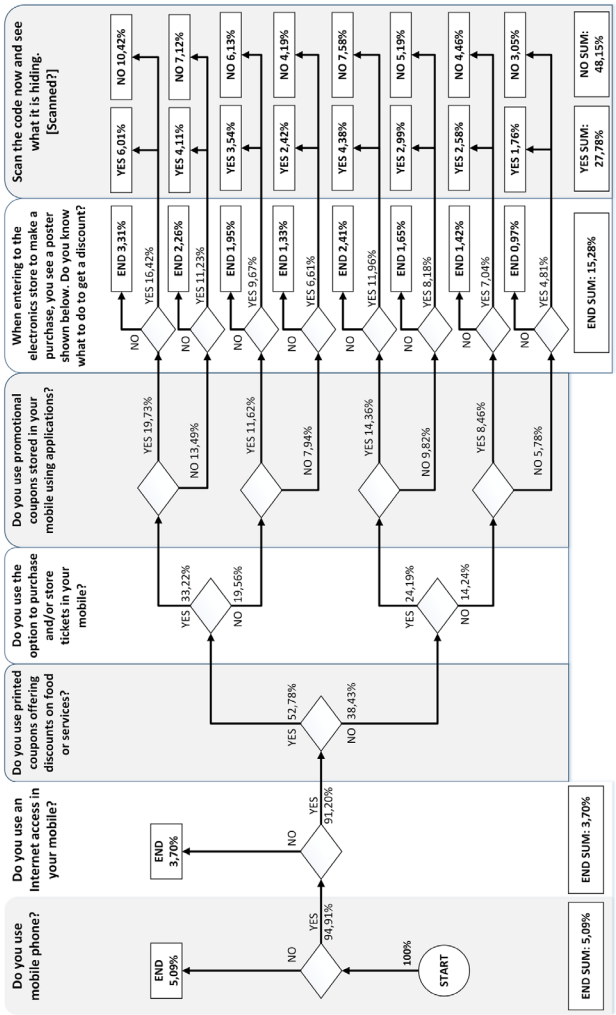

Figure 2. A decision tree model based on a survey

The decision tree model illustrates the specification of criteria and sub-criteria together with probability parameters. It means assigning the weights for interpretations and decisions purposes. The decision tree induction algorithm builds a tree model, which nodes correspond to tests performed on attribute values. Branches correspond to test results, and leaves represent object assigned to classes. The basis for the classifier's work is Bayes's theorem, which determines the conditional probability of research. That probability is determined based on the data contained in the set, through a conducted survey, criteria, and sub-criteria analysis.

5. Empirical verification of the presented QR code evaluation - discussion

The presented research is based on the results of an interactive electronic survey. A group of 234 respondents, students from the technical and economic universities in Szczecin were subjected to the research. Students from various faculties of the University of Szczecin and the West Pomeranian University of Technology participated in the research. The survey categorized all factors influencing the effectiveness of the use of two-dimensional graphic (QR) codes in marketing activities. Surveys were classified by the criteria (conditional criteria), which were included in the decision tree. The goal of the survey was to check the effectiveness of the use of 2D graphic codes (QR) in marketing activities.

The obtained data set shows that the examined population was characterized by values indicating high technological level. Almost 95% of respondents declared using every day a mobile phone. Moreover, more than 96% of them (over 91% of the total) admitted that they have access to the Internet directly through the mobile device. Nearly 63% of those declared that they use technology to buy and/or store tickets to the cinema, theater, train, or airplane. Almost 60% of them use their mobile as a channel to access promotional coupons related to promotional activities delivered by different companies or institutions. It can, therefore, be assumed that most of the examined group of people are aware and able to use modern ICT.

However, the most important step in the procedure was to find out what part of the surveyed people was able to open a marketing communication channel by scanning the QR code. 91% of the survey respondents joined the survey, as the remaining 9% declared that they did not have the proper equipment (5%) or access to the Internet (4%). In the first question of that stage, the data was derived from respondents' questionnaires.

As much as 83% of this group (76% of all respondents) said that they could use a promotion that was supposed to run by scanning QR code. The value at this stage would indicate that the use of QR codes in marketing communications is justified. It allows you to use all possibilities of IT channels through traditional (printed) media. In addition, 76% of potential forwarding traffic has declared no obstacles to the commencement of such communication (QR code scanning). The distribution of all respondents to each option is shown in Figure 3.

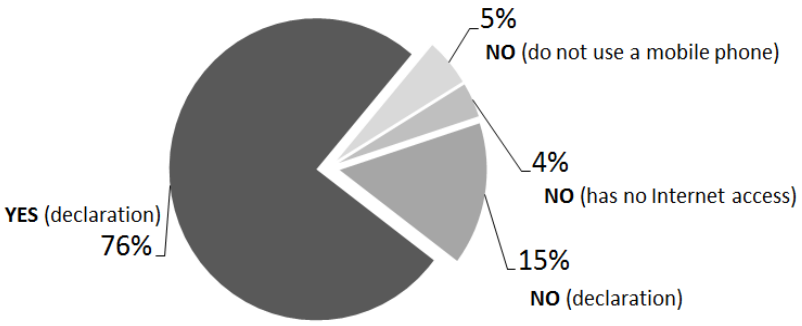

Figure 3. Distribution of declared skills/abilities of QR code scanning among respondents

The use of the modern IT in the reliable survey system allows checking the declarations provided by the respondents. The goal of the study was to test people in real QR code scanning what they previously declared. Results obtained during this part of the research procedure, widely deny the thesis, stated during the theoretical part. While the advantages of using QR codes remain unchanged, the group of people using that communication channel decreased to 28% of the surveyed population. This decrease is due to the fact that only one in three from the testers group, declaring such skill, performed the scan correctly. The other two out of three did not know how to scan the QR code. The results obtained in the second stage are shown in Figure 4

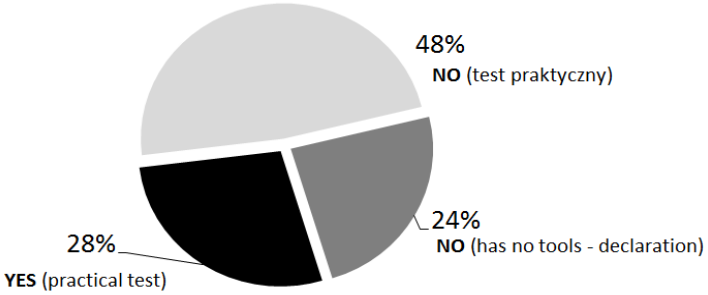

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Figure 4. Distribution of practical skills of QR code scanning among respondents

In relation to the achieved result, a question was asked, as part of the supplement to the practical test research. People who have scanned the code

correctly have been asked to indicate how often they use this type of tool. The popularity of each option is shown in Figure 5. The results indicate that every third person never uses that tool for launching a marketing communication channel. The form of that tool encourages only 13% of people who can use QR codes. They declare that they scan the code to satisfy their curiosity about hidden message. The highest percentage declared the most rational option. That group points to the desire to know the rest of the message, but only after they are interested in the content presented in the traditional form. 15% of the group use QR codes to gain additional information that was not included in the main marketing message.

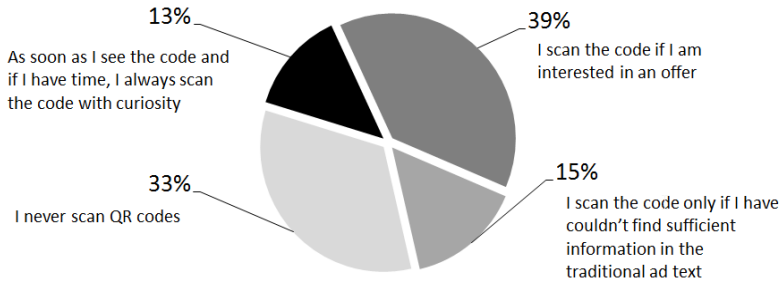

Figure 5. How often people who can scan the code use that skill

Through the practical verification of the declared skills, we managed to obtain data that best describes the actual state of the researched phenomenon. It shows that only 28% of the surveyed people were able to launch a marketing communication channel by scanning two-dimensional graphic code. Another 24% of the group did not have the technical ability to use such communication or immediately declared a lack of appropriate skills. The fact that almost half of the respondents claimed that they could use QR code right away was the most important result of the study. Practical verification of this declaration revealed that 48% of the general public was wrong about the assessment of their skills. As a result of the combination of theoretical and practical results, it was found that two out of three respondents would not be able to run the message set in a QR code. Only one-third of respondents would be able to start that type of communication. In addition, every third person in the group who can use that communication channel declares that he or she does not do so in practice. That means that only 19% of the surveyed group would be reached by that type of marketing communication channel. That value indicates that the use of advertising space and the cost of preparing multimedia content as an additional message becomes unreasonable. If the percentage of people who can scan the code is added to the probability of doing so, the result will be

less than satisfying. The final value will indicate that the use of such a way of opening a marketing communication channel is ineffective.

6. Conclusions

The results form a basis for analyzing the current behavior of consumers. It concerns the legitimacy area and the subsequent efficiency of using 2D bar codes (QRs) in marketing. The decision tree method and probability were used as tools for the research. From the received results, it can be concluded that the reach of the consumer in the surveyed group, with the message via the QR code, is relatively low. It comes from a lack of ability or skills to communicate by scanning the QR code. Taking into account the characteristics of the study group, prognosis for the study conducted within other target groups is not very promising. It can be assumed that the surveyed group represents the lowest level of digital exclusion. At the same time, it is characterized by a high level of ability to use simple ICT services. Conducting the study in two stages (theoretical and practical), at the same time, allowing the extraction of low-quality data obtained from the questionnaire. In case the final thesis is based on the results obtained only from the theoretical part, its assumptions would be false. Only using new information and communication technologies allowed us to gain data describing the situation properly.

The thesis, based on the findings of the research, reveals the low usage of the QR codes in marketing communication channels. It is based on the analysis of high-quality data. The data was gathered by collecting theoretical declarations from respondents, then verified by a practical test of the tested skills of respondents.

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