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THE MODEL OF INTEGRATED SYSTEM FOR CUSTOMER BEHAVIOUR ANALYSIS

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Abstract

In this article, the author has introduced trends in developing technologies used for analysing consumer behaviour and supporting marketing actions in malls and retail networks focusing on using data in marketing information systems. The author has presented solutions based on indoor navigation and indoor positioning systems, customer loyalty software and social network data analysis systems, which currently, due to insufficient integrity, do not provide a full scope analysis of customer behaviour on site, as a result decreasing effectiveness of taken marketing actions. The author has proposed a model of system which integrates separate technology groups in one consistent solution in order to achieve synergy effect in the area of customer behaviour analysis and behavioural targeting. A group of systems integrated in one, consistent technology is a new source for building marketing information systems, especially crucial for big commercial retail networks.

Keywords: customer behaviour, IoT, big data, MkIS, indoor positioning systems;

1. INTRODUCTION

Customer behaviour research issues has been targeted in scientific articles and lectures since several decades (Osman, 1993, pp. 133-148). Currently, growing competition on mall and customer network markets, implies developing the field of consumer behaviour analysis and behavioural targeting. Technological development leads to improving possibilities to use customer data in decisive processes (Roberts & Lilien, 1993, pp. 27-82). IT solutions market is growing rapidly and more customer analysis systems appear. Constantly more researchers focus on using IoT in analysing purchasing processes, in order to increase sales effectiveness.

2. CUSTOMER BEHAVIOUR IN THEORY

Literature focusing on marketing problems contains many different definitions of the term "customer behaviour", which emphasise qualities of this term. According to Schiffmann & Kanuk definition, the term customer behaviour consists of actions linked to searching, buying, using and evaluating goods and services, which have capability to fulfil needs (Schiffman & Kanuk, 1984, p. 6). Hansen defines this concept as a set of actions and customer perception, which consist of the following stages: preparing the decision to choose a product, choosing the product and consuming (Hansen p. 15). Engel, Blackwell and Miniard define the customer behaviour as a set of actions and decisions that precede the actions and condition that are related to acquiring, using and administering the goods and services (Engel, Blackwell, Miliard, 1993, p. 4).
In the classical model of purchase decision making, the customer is going through a five stage process:

- Identifying the problem,
- Searching for information,
- Rating possible variants
- The decision to purchase,
- Behaviour of consumer after the purchase (Trejderowski 2009).

In case of mature consumers, who use information technologies during the processes of fulfilling the decisions about the purchase all defined stages of purchase decision-making can be monitored and interpreted using information technologies. Constantly carried out analyses of customer behaviour are one of the most crucial elements of the marketing information system. In further parts of the article, solutions for acquiring customer behaviour data will be presented. Among others their purpose is to gather data on customer behaviour, going into interactions with the consumer in the way to convince him to buy the product. On each of these stages of purchase decision making there is a possibility to obtain information on customer behaviour.

3. MARKETING INFORMATION SYSTEM IN THE ASPECTS OF THE ANALYSIS OF CONSUMER

According to Jobber (Jobber, 1977, pp. 297-304) marketing information system (MkIS) *is a system in which marketing data is formally gathered, stored analyzed and distributed to managers in accordance with their informational needs on a regular basis*.
The essential functions of a marketing information system are:

- Gathering information,
- Storing gathered information resources,
- Processing the information – according to the decisive people's needs for information in marketing area.
- Sharing the information to managers (Marciniak p 54).

Operations of Marketing Information Systems are primarily focused on analysing the obtained data. The more amount and greater differentiation of types of consumer data, the better systems support in reacting on changes and marketing decisions making. The growing needs of businesses implies increase in the number of applications which allow decision makers to gathering, storing and processing the information. A noticeable trend is also an integration process of IT systems which support different areas of business activity. At the same time, currently used systems due to lack of integrity do not provide a full scope analysis of consumer behaviour and the purchasing decisions made by them (Marciniak pp. 51-68). Due to analysing needs and expectations of consumers using data from multiple

sources the quality of taken decisions is improved. The possibility to monitor the actions taken by the clients in multidimensional manner would allow to accelerate decisions processes. As a result, it allows managers to adjust the marketing system in terms of strategic and operational marketing management. Author's research of applications functionality clearly shows there is a lack of one, single application that would provide comprehensive information to support decision making process. The range of operations of this kind of systems includes the following features:

- Planning marketing activities;
- Creating a marketing budget;
- Customer Relationship Management;
- Implementation of loyalty programs;
- Management of brand value;
- Keeping a calendar of events;
- Customer Service;
- Evaluation of effectiveness of the marketing activities;
- Organising processes and resources in marketing (human, financial, information);
- Supporting search engine optimization;
- Multivariate analysis of customer information based on monitoring activity on-line;
- Multidimensional analysis of segmentation and selection of target market (Marciniak p 59-63)[1].

Analyzing features of current marketing decision support systems it is noticeable that current IT solutions do not consider a data about a large group of consumer activities. It is caused by difficulties in obtaining data from actions taken by consumers on social media and reactions of consumers during the purchasing process. Considerable difficulty is the analyzing of distributed data and automatic interpretation of it in order to obtain relevant information in decision process. Moreover, the problem lies in lack of integration between applications, social media data and point of sales systems. Running a retail networks requires a rapid response to changes and trends in consumer behavior. Currently, systems operate in isolation. Gaps in the functionality of popular applications such CRM cause that the decision making process is slowed and inaccurate. As a result MkIS do not use data from multiple sources.

4. BIG DATA ANALYSIS IN TERMS OF CONSUMER BEHAVIOUR

In the new economy, the digitization of all human activities leads to the proliferation of data sets. Enterprises pass to a new generation of business which enable analyzing massive amounts of digital information. Structured data provide signals to decision-making processes of companies. Large data sets (Big Data) are used to search for key information in order to achieve market advantage.
There are three parameters which typify Big Data analysis (Płoszajski 2013, pp. 5-10):
Variety – Big Data are present in the forms of pictures, messages, signals, results of operations of users' interactions on websites and social networks. They are generated from various sources - computers, smartphones, sensors and other devices.
Velocity – Big Data gathers information in real time as it appears. Companies through it gain agility and efficiency of the decisions-making process.
Volume - the quantity of data on the Internet is growing at a rapid pace. As a result of this phenomenon, companies can process terabytes of data in a short time.
Big Data is based on the simultaneous processing of different types of data at the same time. It is a different approach compared with traditional analysis. Processing large data sets create value by making them transparent and accessible at any time (Pawełoszek, Wieczorkowski, 2015 pp. 1563-1568).

Currently, processes of gathering information on consumer behavior and purchasing decisions are based primarily on traditional methods such focus group interviews and survey. Analysis of consumer behavior and evaluation of the effectiveness of merchandising can be automated using technology of indoor navigation and positioning system.

[1] Research done with information found in literature and leading software providers offers - Microsoft Dynamics CRM, Oracle Siebel Enterprise Marketing Suite, Unica Cororation Marketing Central, Comarch Enterprise Marketing Management Solution SAS, SAS® Customer Intelligence

5. INDOOR NAVIGATION SYSTEM IN THE LIGHT OF CONSUMER BEHAVIOUR

The paradigm of the Internet of Things depicts a future where everyday objects are equipped with microcontrollers that enable interaction with users and other systems, combining all the elements in a network. Internet of Things can be defined as a network of physical objects connected with each other, where physical objects are part of the business processes (Haller Karnouskos Schroth 2009 pp. 29-30).
The concept of Internet of Things allows to introduce technology and automation in every part of human activeness, technology that works and interacts in a real time and ensure dynamic development of companies (Murthy, Kumar, 2015 pp 18-27). Indoor navigation as a part of that concept can be used in malls to improve the shopping process. These solutions are based on a network of sensors- beacons deployed in buildings, shops. Through mobile applications system basing on data gathered by sensors is able to compute and show the optimized path to reach the selected stores. As a result, the solution helps clients reaching their destination. What is more the application based on the analysis of location recommend the products, and transmit information about ongoing promotions and discounts. Activating customers to buying products is the main achievement of system (Karunarathna, Weerasingha, Rumy, Rajapaksha, De Silva, Kodagoda, 2014, pp.292-296).

Dudh and Pitambare, presented the benefits of implementing the solution highlighting the area of consumer behavior analysis, operational analysis, and opportunities to improve profitability.

Table 1: Benefits of implementing indoor navigation and positioning

Customer Analytics	Operational Analytics	Revenue Improvement
✓ Identify and trigger real time offers ✓ Identify and offer various loyalty programs. ✓ Identify personalized alerts and high-value rewards ✓ Redeem rewards ✓ Identify customized coupons. ✓ Optimized in-store customer experience. ✓ Purchase a product in real time in-store via a mobile device. ✓ Pay without the need to join a checkout queue	✓ Engage with customers in real time using their mobile phone and an app Follow-up with the shopper after the shopping experience to provide additional information or receive offers based on the beacons they were near during their store visit ✓ Optimize store layouts and product placement based on navigational patterns Optimize website, merchandising zones on desktop and mobile ✓ Help customers locate items in-store ✓ Offer better in-store customer service ✓ Inventory planning ✓ Fraud detection :Loss prevention — both internal and external ✓ Improve Store traffic patterns to eliminate choke points.	✓ Empower sales associates ✓ Improve business processes and generate more revenue ✓ Identify peak traffic times, checkout line length, number of associates presently in-store and product location ✓ Improve campaign management

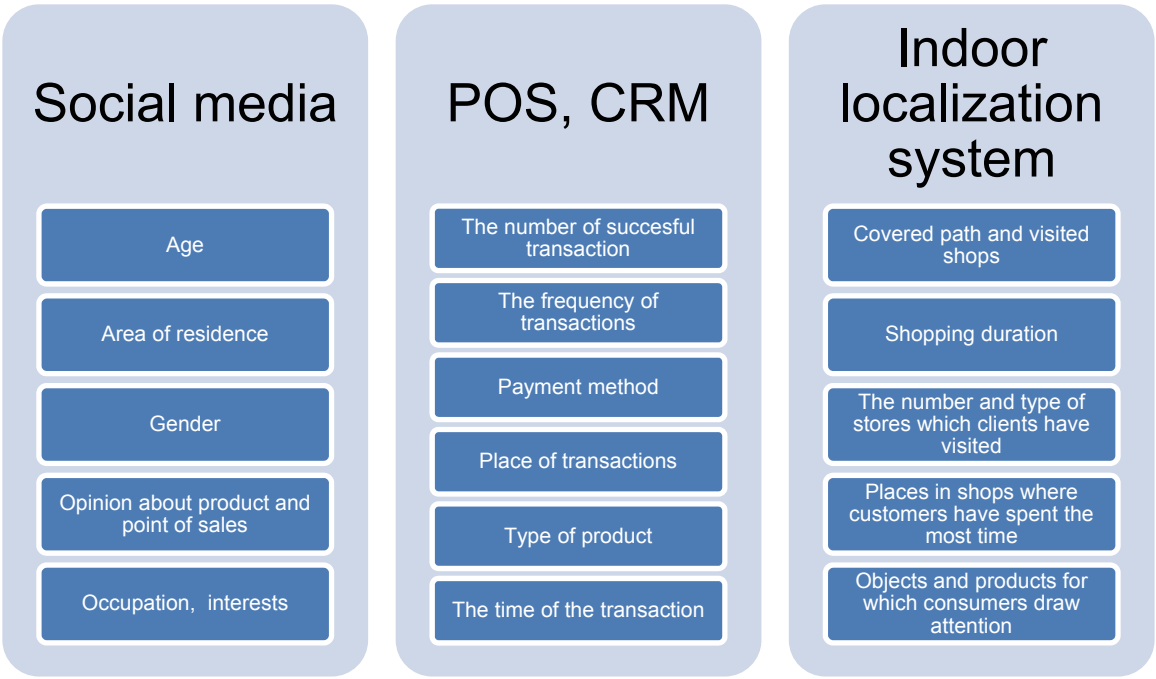
Source: Dudh and Pitambare p. 294

The implementation of indoor navigation technology can be a key factor to activate customers to purchasing. The integration of consumer data from social media, POS, CRM and indoor navigation system may provide the solution for behavioral targeting. The system can help to explain purchasing decision-making processes.

6. THE MODEL OF INTEGRATED SYSTEM

The complexity of the data obtained from the group of IT solutions can allow to make a multi-faceted analysis of consumer behaviour in the real time. In the following picture the author presents the key groups of data from different systems, which can be gathered and analysed in the context of consumer behaviour.

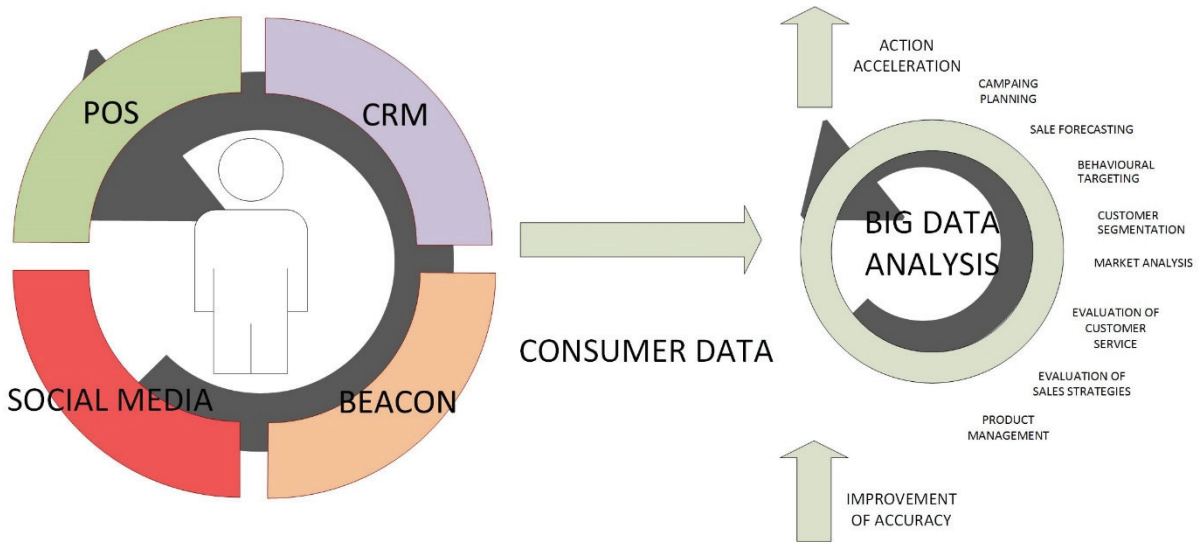
Picture 1: Key types of data usable for analysis of consumer behaviour



Source: Own elaboration based on system analysis.

The integration of data collected from many sources is essential in order to increase the accuracy of forecasting and accelerate a decision-making process. Data from multiple systems will allow mangers to define new patterns of consumer behaviour and assess perception of the purchasing process from the consumer point of view.

Picture 2: Key types of data usable for analysis of consumer behaviour



Source: Own study.

Consumer behaviour are a major factor in process of marketing decision making. The implementation of this model in the MkIS would allow managers to respond more quickly to changes in the external environment and increase the precision and validity of decisions taken in the area of marketing. Ultimately, the combination of data from loyalty systems, social media, indoor navigation system and CRM can improve the quality and efficiency of decision-making process. The model should be analysed in two dimensions - as a tool for decision making at the tactical and strategic level, which is covering the segments of customer groups, affecting on the decisions fields such budgeting, modelling of sales process, sales forecasting, analysing market changes, as well as a system for defining needs of the individual customer. The information obtained from hybrid system may allow to indicate the place of optimization of marketing communication and support the analysis of an individual consumer needs. What is more deploying the model should also improve tools of customer segmentation. In the effect it would be possible to choose better type of advertisement in a behavioural targeting process by massages and signals tailored to specific individuals.

7. SUMMARY

There is a need to develop the single application which integrates data from multiple systems in order to create multi-dimensional analysis system of consumer behaviour in the real time. The integration makes opportunity for multi-dimensional analysis of the needs and reactions of consumers, ultimately it improve accuracy in behavioural targeting. The system will increase effectiveness of product positioning and will reduce costs of market research. As a result, the implementation of the model the purchasing process, adapting the product offer to current needs of consumers will be optimized. An increase in profitability of retail networks will be end result of implementation.

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