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STRATEGY OF SUSTAINABLE COMPETITIVENESS: METHODOLOGY OF REAL-TIME CUSTOMERS' SEGMENTATION FOR RETAIL SHOPS

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Abstract. The objective of this article is to develop a methodology in order to implement real-time customers segmentation analysis in the decision making process of the enterprise. A review of big data usage in retail stores was conducted along with a document-based descriptive analysis of secondary data and further critical literature analysis. Decision making strategies and flow charts were used for the development of competitiveness methodology by referring to a case of a supermarket chain. Customer segmentation researchers analyse mainly the algorithms or behaviour pattern behind the clustering process; however, neither of them offers a proper strategy for implementing a real-time customer segmentation process inside the enterprise. Sustainable competitiveness advantage may be achieved by implementing the segmentation theory with concepts of data mining and internet of things (Iot). The process of developed data mining shows many ways for the enterprise to maximize competitiveness. However, time and large investments may be required to develop proper methods for unique solutions. A concrete case study of the selected retail store should be analysed before implementing the real-time customer segmentation methodology inside the enterprise. There is a multicultural population in every market that has different culture, beliefs, preferences and shopping patterns; therefore, constant analysis is essential for efficient usage of customer segmentation. Practically none of the prior research results carried out by other authors offered a concrete methodology how to implement real-time customer's segmentation inside the enterprise. The authors created such a methodology that can provide sustainable long-term competitiveness advantage.

Keywords: big data concept, customer segmentation, marketing, retail sales, competitiveness.

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JEL Classifications: L81, C81, M31.

1. Introduction

Due to globalization processes, present-day enterprises have a variety of customers that come from a lot of different societies, religions or ethical groups. The problem now is even more of a concern for companies that want their marketing to be effective (Randall & Seth, 2001). The concept of consumers behaviour and segmentation has been developed from the 19th century (Simkin, 2005). The general segmentation consists of consumer's characteristics like social, demographic and geographic issues. One of the first segmentations has been made regarding the consumer's buying preferences (Eliashberg & Jehoshua, 1980). This work overviews the general aspect of the consumer behaviour and makes an empirical substantiation. Other authors indicate that practice in the market segmentation is often applied rather crudely and does not go beyond analysing geography and shopping habits (Segal & Giacobbe, 1994). Newer publications regarding the customer segmentation process have been

published because of changed customer behaviour. Mangaraj and Senauer made a detail customer segmentation of shoppers in the USA grocery stores. Their work identified the main three customer segments: (i) time-pressed convenience seekers, (ii) sophisticates and (iii) middle Americans. They offered strategies how to better provide customer service regarding the segments (Senauer & Mangaraj, 2001). Another research studied the relationship between product loyalty and visit & spending pattern. Another work developed to a loyalty scheme for customer segmentation that can be used for competitiveness advantage achievement (West et al., 2005).

Similar research was done by Mukibbi & Bukenya and Mostenska & Bilan, they segmented the customers by considering the social responsibility concept and other customer behaviour. They distinguished three segments: typical customers, back to natural and convenience shoppers (Mukiibi & Bukenya, 2008; Mostenska and Bilan, 2015). These all researchers' statistical analysis results indicate the importance of customer segmentation concept. Due to the migration and multicultural environment it is important to conduct the customer segmentation process constantly, however neither of the researchers provide detail steps of a real-time customer segmentation strategy implementation (Krajňáková, et. al., 2015). On the basis of this problem the competitiveness advantage strategies need to be developed.

However, in today's world the customers change rapidly and their behaviour differ depending on race, religion or social group. Regarding this problem the research has been made that analyses the computerization process of the customer's segmentation. These algorithms are called clustering algorithms), can group data by different criteria, depending on the quantity and data type. Research that analysed the textile manufacturing industry has been made. The study identified segments by using the LRFM method, consisting of four dimensions: relation length (L), recent transaction time (R), buying frequency (F), and monetary (M), to carry out customer clusters. The results have been achieved by using the wards method to determine the cluster quantity and the k-mean method to group the customers to particular segments (Der-Chiang, et al, 2011). A similar study has been conducted on the online fashion business, segmenting the customers by means of data mining techniques and a subgrouping algorithm. The results helped to identify 49 rules that can be implemented in the development process of the competitiveness strategy at the enterprise (Brito et al., 2015). This research identified the customer trends and behaviour and can be used for the development of competitiveness strategy (Kozubíková, et. al., 2015; Bilan, 2013; Haviernikova et al. 2015, Tvaronavičienė at al. 2015). However, large customer numbers and a variety of behaviour need to be taken into consideration while developing the competitiveness strategy.

Therefore, the novelty of the paper is a developed implementation methodology of a real-time customer segmentation process. The majority of the studies mainly analyse the algorithms or behaviour pattern behind the clustering process (Havierniková, et al. 2015); however, neither of them offers a strategy to implement a real-time customers' segmentation process inside the enterprise activities. The creation of this methodology is essential for retail stores, otherwise due to the migration and multicultural environment customer segmentation strategies will not be effective. The methodology created by the authors can provide sustainable competitiveness advantage for a multicultural market.

Therefore, the main goal of our study is to develop a methodology that shows how to implement real-time customers segmentation analysis of the decision making process for sustainable competitiveness advantage. The methodology consists of secondary material research and a case of a supermarket chain. However, due to commercial secrets, no legal names will be mentioned in the article. The secondary material analysis was conducted on new innovative technologies. The first arising industry is big data. The big data industry consists of data mining methods used for understanding information regarding the enterprise's customers. The second industry is Internet of Things (Iot). This concept is used to convert information from the surrounding environment to the computer language. By combining these two concepts a competitiveness advantage methodology was created for retail stores. In order to explain the methodology, a deeper understanding of the problem is presented in the upcoming chapters. Therefore, the detailed objectives of the study are:

- to overview the customer segmentation possibilities and offer a strategy for customer segmentation of retail stores,
- to analyse the Big data and Internet of Things concepts usage inside the retail stores,
- to create a competitiveness advantage methodology for real-time retail stores customer's segmentation.

2. Customer Segmentation Possibilities

The concept of the customer behaviour and spending pattern analysis is essential in order to efficiently use marketing and distribution strategies (Laužikas et al. 2015). Only subsequently, it is possible to provide value added products or services. Value can be interpreted differently depending on the customer's beliefs and social group. Cuadros and Dominguezs analysed the importance of segmentation to the enterprise competitiveness strategies. Their research offered a customer segmentation model based on value generation. The research identified 9 segments based on the customer's spending pattern, loyalty level and recommended for the enterprise to focus on the segment that may bring the largest profit (Domínguez & Cuadros, 2014). The segmentation possibilities vary from one enterprise to another, and different industries may require different insights regarding their customers; however, there is a theoretical concept about the customer's behaviour and segments. The main parts of the segment can be identified by three criteria: geographical, demographical and individual attributes (Denise, 2012). The geographical criteria mainly is relative to service providers or classic shops, because many customers tend to choose and buy what is near them. For example, to repair a car, not many people would consider driving or transporting the car to another city, because the expenses would increase dramatically. Internet shops also need to consider the geographical criteria, however, while outsourcing distribution services this criteria's might be unimportant (Schwarzl and Grabowska, 2015). Regardless, proper segmentation based on geography could optimize the distribution cost.

The research that analysed this aspect and a fuzzy clustering algorithm that grouped the customers and offered a cost effective logistic network model were conducted. The developed algorithm can be readily implemented in practice to help the logistics operators reduce operational costs and improve customer satisfaction levels (Wang, Xiaolei, Xiaolei, Xiaolei, 2014). Other aspect of the segmentation is demographical issue. This part consists of various aspects mainly related to the person's status (age, gender, race, etc.). This concept is often used for promotions and packing design, simultaneously these criteria can be used for segmentation purpose. The geographical and demographical criteria have been used for a long period and they can be used for competitiveness advantage achievement. A number of companies distribute their products based on different positioning strategies and highlight the right products for the right customers' segments. However, new technologies (e.g., data mining) had been developed and by gathering large amounts of data a more detailed segmentation concept can be developed. This segmentation is based on individual attributes of the customer.

The customers today are multi-cultural which separates them from each other due to their lifestyle, social group or beliefs. Therefore, the segmentation process is much more complex if all the issues are considered. The customers' attributes can be of various types: the pattern of spending or visiting the shop, bought products or even the sequence how the products were bought. They could also be more social based attributes like profession, education level, income, marital status and similar issues. This kind of segmentation has been done in a research paper that described a method how to assign customers to a lifestyle segment based on their purchase history (Miguéis, Camanho, Camanho, 2012). This particular research identified the possibilities of different customer behaviour. The point is that customers like to shop differently and depending on their behaviour, better services and products can be offered. The main aim of the marketing is to provide the right product, to the right person, at the right time. By using a more complex customer behaviour segmentation method, this can be achieved more efficiently (Marques and Almeida, 2013). However, real-time customers' segmentation process is necessary, because customers often change and new customers need to be quickly assigned to segments.

In general, a variety of customers behaviour is identified (Figure 1). Price oriented customers tend to look for the lowest price, and they are usually the customers who search the web and the newspaper for possible discounts. Easy going shoppers are behaving differently: they just go the shop, walk around and buy what they like and what they want, and often buy much more than they need. The quality oriented shoppers tend to spend more money, however, they may choose better brands for higher quality or prestige. Smart shoppers compose a new concept, called professional consumers or prosumers. This type of customers tend to buy products that provide additional benefits, usually this is done through multi-level marketing scheme, however, some traditional shops also promote recommendations, and eventually they offer customers more discounts, money or other additional

services for their work (Cova, 2012; Csigéné Nagypál et al., 2015). Time oriented shoppers tend to stick to regular brands and try to finish shopping as fast as possible. The last types of shoppers are those who tend to move from one brand to another often and try innovative and new products. They have a strong personality, want to stay unique and are called early-adopters. Understanding this concept, proper marketing strategies can be formed; however, before the history of customer shopping needs to be analysed.



Fig.1. Customer buying behaviour segments, own study

Many companies identify the benefits of combining customer segmentation, big data and Internet of Things concepts. One of the leading developers of statistical software is forecasting that small and medium size enterprises will start using Big data in their enterprise activities, and it will create a new industry that will be worth over 14.5 billion dollars (SAS company’s report, 2012). What kind of possibilities can these industries provide regarding the customer segmentation process? The main possibilities could be to use data mining for product recommendations, to evaluate the probability of customer loyalty level and to offer sustainable competitiveness strategies in order to hold the loyalty at a particular level. In addition, the data mining can be used to offer proper discounts regarding the history of customers. These possibilities will be reviewed in the next chapter.

3. Use of Big Data and Internet of Things in Retailing

The next section of the article will overview the big data possibilities. The Big data concept can be described by three elements. The first element is the quantity. The data of the enterprise have increased dramatically in the last decades. The same can be said about the customers. Retail stores collect information regarding customers. Large databases of shopping history require new servers and cloud computing is started to be used in retail stores (Gupta et al, 2013). Another problem is that not enough information that could be used for data mining is collected. This problem mainly arises because customers are afraid that their information will be manipulated; however, at the same time additional information could be used to provide better services. The point is that not only large information is necessary for proper data mining, but qualitative information is needed as well (Hajduová, et. al., 2014). If enterprises have particular information about their customer’s profession, hobbies and other life styles, they can analyse and provide personal services and products for them. This type of analysis is necessary even more in today’s world, because social media has reached new heights, therefore data variety is also crucial for the Big data concept (Stubbs, 2014).

The reason is that not only large quantities of information can be achieved, but the type of data also differs. The data type can be structured and unstructured. The unstructured data analysis is commonly found in social me-

dia. A research has been done that created a warning system for adverse drug reaction. The authors conducted a text filtering system that would identify wrong recommendations of drug in forums and other social media channels (Yang, Kiang, Shcang, 2015). This kind of similar process also could be implemented in the retail sector for better customer service. Concept of Big data evolves in this area- velocity. For example, social media comments can appear fast when a problem acquires. Therefore, an automated data mining algorithm should be implemented to identify the possible risks faster and more efficient. The next aspect of Big data is comprised by insights that can be applied for competitiveness strategy development.

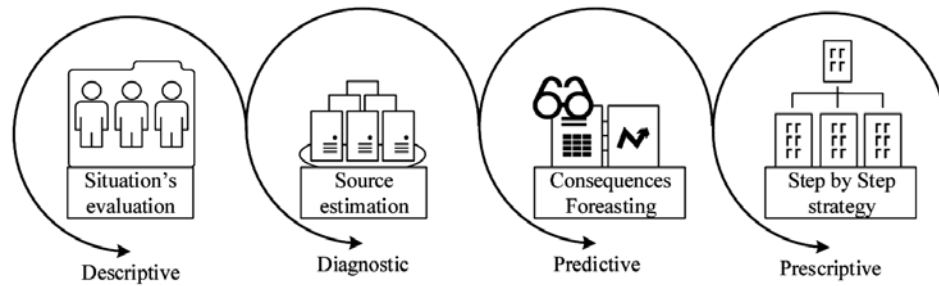


Fig. 2. Sustainable competitiveness strategy structure, own study

Figure 2 indicates the main principles of sustainable competitiveness strategy by using Big data concept. Descriptive analytics applies data mining algorithms to past information and describes the reasons behind success or failure. Predictive analytics uses history of customers and tries to predict their behaviour. This method can be used for creating better marketing strategies. Prescriptive analytics methods take advantage of the results of descriptive models and the hypothesis's substantiation of predictive models and develops a strategy for every possible case (Oracle Corporation, 2012). The understanding of these concepts is essential for proper Big data implementation in the enterprises. The methods used to analyse and provide insight can be combined by three steps. The first step is data gathering. The second step is data mining and the third step is the interpretation of the results. In order to properly gather the information several methods can be used, firstly the information should be gather from the ordering and history of customer purchase.

This sometimes can be a difficult task, because the enterprise may have millions of customers and large servers' needs to be bought in order to properly use the gathered information. The other aspect is gathering information from none standard sources. The concept of Internet of Things here is important. The methods used in this concept are developing rapidly. They consist of various things, the basic ones are radio frequency identification (RFID) and barcodes. Barcodes are used in retail stores and they gather important shopping history information, however this is not enough for proper customer understanding. RFID could be used for customer route tracking or other information, that could be used for data mining algorithms development (Yan, Zhang, Zhang, Zhang, 2008). In addition, smart mobile phones also can gather much information from the environment. A report of London's universities analyses the future of retail environments - "The use of ambient sensors, interactive tailored media, digital object memories, and Bluetooth Low Energy to name but a few technologies, in networked shopping environments provides potentially benefits for retailers, consumers and thus the entire retail economy" (Hudson, Jode, Barthel, 2014).

The research identifies the upcoming technology that can be used in the retail sector and by combining it with Big data concept, competitiveness advantage can be achieved. The second step of Big data analysis is the data mining process. This process consists of various algorithms that can be used to discover insights about retail store's customers. SQL server data mining add-in can be used for this goal. This particular tool can be used in enterprise quite cheaply, because many enterprise have Microsoft Excel and uses databases. Depending on the database, they may use a different software, because many developers have similar possibilities like SAP, Oracle etc.

Table 1. Data mining algorithms’ overview (Winston, 2014)

Algorithm	Method’s principles	Goal
Naive Bayes	Evaluations the probability of the event by using logistic regression analysis.	- Assigns a new customer to a particular segment. - Automated evaluation of discount efficiency.
Decision tree	Constructs a decision tree based on regression analysis between the input data and secondary data.	- Forecasts the customer behaviour. - Helps to make better decisions.
Logistic Regression	Describes the dependency between the input data and secondary data and forms a regression model.	- Forecasts retail sales of particular discount offer. - Evaluates the important factors.
Linear Regression		
Time Series	Statistical dependency is evaluated between the input data and secondary data.	
Clustering	Data is grouped by calculating distances or evaluating probabilities for different groups.	- Customer segmentation for marketing channel identification. - Enterprise structure adjustment to the identified segments.
Sequence clustering	The same principle as the clustering algorithm is applied. In addition, the probability of an event to occur and the sequence is taken into consideration.	- Identifies the customer behaviour by their shopping history.
Association Rules	Identifies data combinations and probabilities for them to happen.	- Used for shopping basket analysis.
Neural Networks	Method takes input data and calculates possible combinations. Then the calculated data are again analysed for possible combinations.	- Forecasts customer behaviour. - Better decision making. - Labels customers to a particular segment.

Table 1 indicates the main algorithms that can be used for retail store customer segmentation and behaviour modelling. Naive Bayer may be used to optimize the segmentation process and new appearing customers may be assigned to a particular segment regarding the past shopping history. Decision tree algorithm can be used to offer new products to customers based on probability that they will buy. By having more detail information about them proper products could be offered. For example, if the products are bought once per 20 years, then regarding the age of the customers discounts could be offered to new customers at that particular age. Time series could be used to forecasting discount possibilities and to choose the best discounts that could provide the most profit. Clustering algorithms can be used to determine the best marketing channels for exactly the right customers. By combining association rules and clustering algorithms, products may be recommended that are fitted for the right customer. The last part of the analysis process is insight. It is not enough just to provide information and use mining models, the results need to be interpreted and optimize for best usage. Therefore, it is important to understand how the algorithms work in order to develop a competitiveness advantage strategy.

4. Methodological Assumptions for Real-Time Customer Clustering Process

The next section of the article is a case study of a retail store. During this case study a methodology for real-time segmentation and behaviour forecasting process will be developed. The selected enterprise is a retail store with various products from construction to food products; it is a large super market, however for commercial reasons the names of the company will not be mentioned. The goal of this case study is to show how data mining concept can be implemented inside a sale store for sustainable competitiveness strategy development. The first step is to gather the required information for proper segmentation. The general information about the customers can be used from their loyalty cards, that usually all retail stores has for planning purpose. Specific customer information is beneficial in order to create accurate models. Therefore, the enterprise needs to evaluate the possibilities of event organization for specific information gathering. This step is crucial for all others steps. Moreover, the concept should be explained to the customers that this will not only benefit the enterprise, but also will provide better services for them. When the necessary information is gathered, methods for proper customer service can be developed.

Figure 3 indicates sustainable competitiveness strategy that can be implemented inside the enterprise. As mentioned before the first step is proper information variety and quantity. Then the information is analysed using descriptive analytics and goals are made. To achieve the goals model types are selected. There can be three

types of the model. The first one is the direct model that is used to forecast whether a customer will purchase a specific product. Constant types of models are used regularly to evaluate the loyalty level, analyse shopping basket and analyse the customer behaviour. Moreover, the last type of a model is used when the model does not exist and a new one needs to be created. After the development of a new model it is important to evaluate its effectiveness, therefore there are various methods for validation purpose. The point is that the model is thought by the history, then when new customers appear by using mining algorithms and previous history, decisions can be made. Validation algorithms are essential in order to approve correct decisions. Different algorithms may work better depending on different attributes and population size. Therefore, the validation process is essential in order to choose the best algorithm.

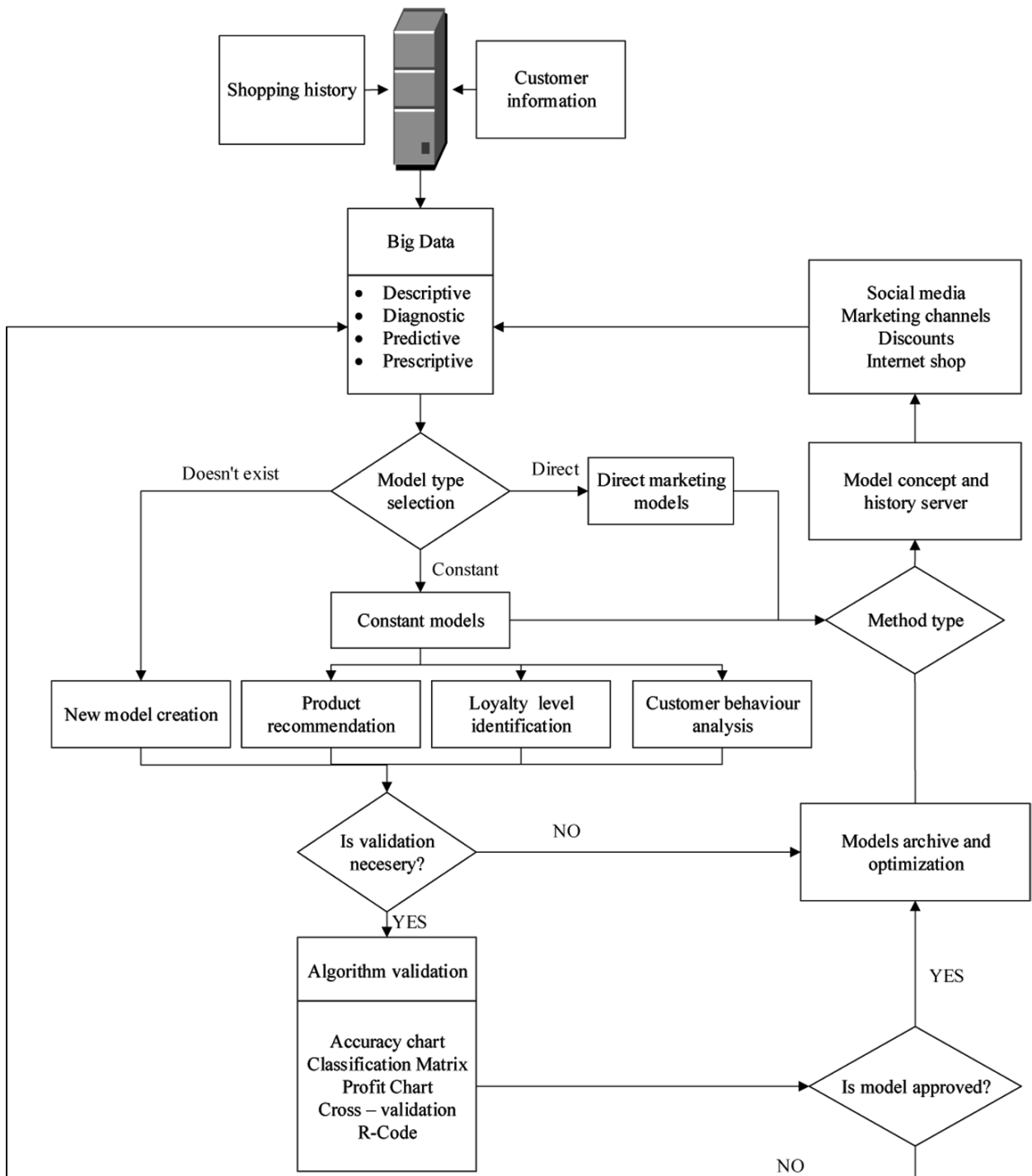


Fig.3. Sustainable competitiveness strategy implementation process, own study

The validation can be used to forecast the possible profit or just verify errors that may appear. In addition, many of the integrated methods may require modifications; therefore, it is possible to conduct them inside the server or using specific software. One of the software language is developing rapidly and is called a statistical language – R code. This is an open source language that can help to create and validate specific data mining models (Chapman, 2015). Then, if the model is approved it needs to be archived, described and optimized. Later, when a similar problem occurs, the model can be retrieved and reused. It is also important to mention that the model will work regarding the previous history; therefore, the customer behaviour may differ depending on the country or continent. It is unlikely that the model created in Europe will work in Asia or the United States. In the future, the whole process should just run between Big data analysis, model usage and result usage. Nevertheless constant analysis and goal setting are essential to develop a proper competitiveness advantage.

5. Real-Time Customer Clustering Process: A Case Study

It is essential to understand the possibilities of data mining process. The first example can be made by using customer segmentation process. For example, by identifying spending patterns for specific product categories and by assigning customers to different segments, specific commercial and marketing strategies could be applied. By segmenting customers on the basis of different product categories we can get regular customers who buys specific product categories; then when discounts are made, the information via email or via mobile phones can be send precisely to them. By this case, the cost of marketing can lower and profit increase, because the enterprise will have more satisfied customers.

The same segmentation process can be conducted by using sequence clustering algorithm, providing a possibility to identify specific product groups. By using this segmentation method, multiple products can be offered. These are not simply recommendations that an enterprise developed, but statistically approved decisions. In addition, this kind of recommendations can be developed also for the long-term products. After completing the data mining process, specific age groups that buy specific products can be identified. This means that if in Europe couples usually get married at the age of 24 and leave home, they tend to buy specific products like furniture, kitchen equipment and so on. However, if a customer bought these products he/she may not need them again for a specific time, therefore by using the previous history the products can be offered to new customers that have the same specific characteristics or discounts may be provided to old customers who want to renew their equipment. In this step, specific forecasting methods can be used. It is possible to predict the probability whether the customer will buy a specific product (see table 2).

Table 2. Customer segment’s probability evaluation

Loyalty cards No.	Age	Gender	PC1	PC3	PC4	PC6	PC7	PC8	Segment	Probability
006F6908	49	Male	0.6	67.65	0	0	0	26.94	Cluster 3	0.687
006F6909	53	Male	4.14	17.35	0	18.62	4.55	0	Cluster 6	0.585
006F6910	42	Female	0	16.12	24	0	0.26	0	Cluster 4	0.756

Own calculations based on supermarket chain’s data

Table 2 shows probability that a certain customer will spend more in a concrete product category. In this particular case several customers were identified in witch product group they would spend more depending on their certain characteristics age, gender, hobbies, marital status etc. When a new customer provides this kind of information, it can be forecasting what products he/she might buy. Depending on the forecasting, exactly the right products can be offered to the customers, based on buying history of other customers. By using decision tree and regressions algorithms the main customers can be identified and the marketing strategies will be used more efficiently and it will provide better value to the customers. If the retail store uses properly social media, then the unstructured data can also be gathered. New data mining models can even help to analyse random comments, videos and other information that can be found in forums or social media. By using this information, algorithms can be made to identify the loyalty level of the customer. A specific shopping pattern can be predicted that shows, whether the customer starts to buy products at the competitors. Evaluating the probabilities for a customer to be

assigned to a segment “regular shopper” or “irregular shopper” proper marketing strategies can be used.

Using the data mining process described above sustainable competitiveness advantage can be achieved. Other studies regarding the segmentation process have been done, however practically none of them offered methods for real-time customer’s segmentation possibilities.

Conclusions

The analysis of the segmentation process identified new trends and possibilities for the enterprise to conduct marketing strategies. By implementing the segmentation theory with data mining and Internet of Things concept sustainable competitiveness advantage may be acquired. The developed data mining process shows many ways for the enterprise to maximize competitiveness. However, time and large investments may be required to develop proper methods for unique solutions. Other researchers has conducted concrete analysis of customer segmentation based on different patterns, however practically none of them offered a methodology how to implement the real-time analysis process inside the enterprise. By using the authors developed segmentation process real-time customer’s segmentation analysis could be used inside a retail shop. This particular finding and recommendation provides a solution and solves the limitation problem of other researchers, who only analysis a concrete situation and does not offer steps how to use the segmentation process regularly in retail shops. These findings are beneficial for developed strategies based on customer segmentation process, because the customers change rapidly and are from various cultures. One of the best examples by combining data mining, customer segmentation and Internet of Things concepts could be a specific mobile application. An enterprise could create their own mobile application with an integrated mining model. The main idea would be for a customer, before entering a shop, to login to this application. Choose specific products that they desire. Receive recommendations specifically for them. Then he would choose his buying behaviour: time saver, quality seeker, etc. Depending on the criteria, different products could be offered for him. After the selection of specific products, the minimal way for him to travel in the retail store would be calculated. Then when he chooses the products via the mobile phone. He can select if he wants those products to be send via distributor, be prepared by the staff or he wants himself to take the products and buy at the self-service cashier. This kind of method would provide excellent customer service, however the technology is still being developed and large investments will be required.

In order, to determine the implementation of the data mining models inside an enterprise a more detail case analysis must be done. This research identified the possibilities to use real-time customers segmentation, however to adapt the model to SMEs customer behaviour patterns need to be forecasted. The main limitation is, that this methodology works for enterprise with a successful history and for new enterprise this methodologies implementation will not provide necessary economic efficiency. In the future, a case study of customer behaviour pattern forecasting will be done. In future research the main limitation will be analysed: can social media provide necessary information for customer behaviour pattern determination? The answer to this question would provide necessary customer segmentation information for the implementation of the authors developed methodology to newly established retail stores.

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