SHOPPING BEHAVIOR ANALYSIS FROM RFID DATA PERSPECTIVE: THE EVIDENCE OF CUSTOMER ORIENTATION IN THE RETAIL SPACE

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EXTENDED ABSTRACT

In the developed service-based economies, there is a huge expectation towards business and marketing in the sense of creation of new services or improving the existing ones. The rapid development of IT (information technology) allows capturing and storing different types of data in huge amounts, recently called Big Data. In the context of service-based economy, it is extremely important to effectively analyze these data in order to improve or create new services. Marketing research and consumer behavior are the fields in which the application of database, data analysis and data mining technologies is the most straightforward.

In this paper, our purpose is to demonstrate how Big Data can be applied to the analysis of consumer behavior, shopping behavior in the retail space. A lot of Big Data have been generated in the retail industry; therefore the study area of consumer behavior within the shopping place (so called shopping behavior) in retailing setting has globally regained increased interest.

In this paper, we use a big dataset, collected from one of the supermarkets in Japan during the customer-tracking experiment. The customers’ shopping carts movements were tracked with the help of RFID (Radio Frequency Identification) tags. Later, these tracking data were combined with the customer identified POS (Point of Sale) data. From RFID data, the variables characterizing actual behavior (i.e. physical movements) in the retail environment, such as total shopping time/total shopping distance, time/distance spent in the store sections and between sections, the movement direction within the store etc., can be extracted. From the customer identified POS data, the variables such as products and their categories as well as amount of money spent can be extracted.

In this paper we make and test several hypotheses based on the literature review related to the customers’ orientation behavior in the retail setting. RFID data helps to get a real glance at how customers really move in the store. The hypotheses are formulated at the intersection of environmental factors, which are related to the features of shopping environment, and neurophysiological factors, related to the human features of consumer.

Based on the literature review, two main features of the shopping environment (in our case store layout), were defined. They are the “layout direction” (direction in which the layout was designed -clockwise or anticlockwise) and so called “layout loop” (forcing customers by the store layout to follow the loop in peripheral aisles). Layout direction is imposed by the designer of the retail space. Moreover, layout direction is something related to the architectural rules established in that country. The above-mentioned experiment took place in Japan, which imposes mainly clockwise layout direction to the stores and supermarkets, because of the left-sided driving rules on the roads. Furthermore, based on literature review, two main neurophysiological factors of the consumer (human) were discovered, which are “right-handiness” (the feature of right-handed individuals to focus more attention to the right) and “wall-shopping” (the inborn feeling of security by the wall, in our context along the walls of the supermarket).

First, we hypothesize that, based on the “wall-shopping” and “layout loop” rules, generally customers shop more from outer sections and as a result, these sections should have higher sales. We found strong support for our hypothesis from our data. Next, we look into the difference between two types of customers, those who move in the imposed clockwise direction and those who move in the anticlockwise direction. This hypothesis was based on the fact that “clockwise” customers as they move along this direction, shop from both types of sections located on their right (inner sections) and the sections located along the walls, on their left (outer sections), while “anticlockwise” customers, because of the “right-handiness” and “wall-shopping” rules shop mainly from outer sections. Our results were completely opposite to this statement. In our data, on the contrary, “clockwise” customers mainly shop from outer sections, while “anticlockwise” customers shop equally in both types of sections. While investigating about reasons of this phenomenon motivates us for further research, we should notice that from the previous results (Kholod et al. 2011) it is clear that “clockwise” customers spend more money than “anticlockwise” ones.

With the help of RFID data, shedding light on the actual purchasing process (in our case customers moving direction), and POS data, revealing the results of this process, we make some conclusions about actual (as opposed to self-reported) customer shopping behavior in the retail setting. We found out strong evidence that customers prefer to shop in the peripheral sections of the supermarket while moving in the clockwise direction and this particular route of the customers gives the highest sales to the supermarket.

Keywords: consumer behavior, customer shopping behavior, RFID (Radio Frequency Identification) Data, POS (Point of Sales) Data, customer orientation, “right-handedness”, “wall-shopping”, layout direction, “layout loop”.