The Neuromarketing ICT Technique for Assessing Buyer Emotional Fatigue

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Abstract. Typical consumer receives steady stream of information at purchase process. In the process of perception of this information he must not only find necessary data for him, but also process, analyses it, evaluate and weigh the pros and cons, relate it to his own needs, and at the end to make a decision: to buy or not to buy certain product. All named factors cause consumer's fatigue, stress and even aggression. In this case, the buyer can make the wrong choice and the quality of his decisions would deteriorate and it is difficult to make a decision about the purchase in such conditions.
The research is aimed at assessing the impact of the elements of the process of purchases on the emotional state of the buyer in the urban retailer. The method to assess the emotional fatigue using galvanic skin reaction (GSR) and hart rate (HR) has been presented. The elements of purchase process and stimuli affecting the buyer were assessed to find overall fatigue in current shop visiting.

Keywords. customer, emotion, state, ICT, GSR, BPM

1 Introduction

The phenomenon of consumer emotional fatigue is not new, but it is still not enough considered. It has been examined and described using the example of car selling [1]; design-making process on prices, promotions and impulse buying [2]. Changes in consumers' emotional state at different time of the day describe by Chebat, Dubé, & Marquis [3] and Kerkhof [4]. Researches, in presented studies, are comparing human reaction (using experimental method) with simultaneous answers to questions about

his/her feelings (using questionnaires) during the core processes. Noseworthy, Di Muro and Murray [5] in their research asked participants to indicate their level of excitement at a certain scale, with numerical values: «a very relaxed state», «very excited state» and «not relaxed, not excited». After the action of a stimulus, the participants need to stop the movement of the slider at the level corresponding to their senses [6]. Subjects' emotional state can measure using the Pleasure-Arousal-Dominance scale also [3]. Other approaches assess the human response to fear, pain, laughter, pleasant and unpleasant sense, anger, joy, sadness, etc., with the help of displaying images and videos. After the action of a stimulus the pause is made and the reaction of the human body is checked. The tested person also indicates what she/he reacts to different stimulus [7], stress evolution data [8].

These examples describe «simple» human reactions and allow to get the results of experiments in a «pure» form, when the action of environmental factors on the tested person is reduced to a minimum. This, on the one hand, allows determining maximally correctly the emotion of the person based on the results of his responses and instrument indications. But at the same time, in everyday life, there are no experiments in pure form. The environment constantly affects the person's behaviour and emotional state. It is therefore important to understand how the buyer will behave under the influence of specific environment at retailer. Consequently, only experimental data obtained in real conditions will be able to describe, identify and understand to the full extent what the person feels at one or another point of purchasing process. However, consumer researchers have never been able to record the internal emotional fatigue processes in directly real purchase process. It’s always been limited to designing experiments. We conducted several real-time purchase experiments which give opportunity to make particular conclusions depending on the real environment. Research proves influence of purchase process and different stimuli in it on the buyer’s emotional state and his/her fatigue appearance during any shopping, using of skin galvanic respond and pulse meter equipment.

An equally important question is the study of the different elements of the urban purchase process (problem recognition, information search, alternative evaluation, decision about purchase, behavior after purchase), their impact on emotional state of buyer and demand in a particular store.

The aim of the research is to study the emotional state of the buyer from different elements of purchases process. Therefore, the specific objectives of this paper are:

1) to develop a method for assessing the emotional state of the buyer.

2) to conduct experiments on different people who visit different retailers and evaluate their emotional state during different elements of urban purchase process.

2 System "Buyer – Retailer – Resource Management System – Environment"

Consumer behavior is complex person reaction to a set of conditions forming his motivation for the purchase objectives, time, place of purchase, sales, and services, which is often unpredictable. It is directly related to the acquisition and consumption

of goods and services, with the order of them, including the decision-making processes that precede these actions and follow them.

The purchases process is interacting a few systems: marketing (product, price, promotion and place), environment (economy, technology, politics, demography, nature), competitive environment (other retailers, their distance from the consumer, size range, goods substitutes etc.) and person – buyer. Specific features and problems arising during purchases, can be caused as well by the system: "person – tool – work place – industrial environment" [9]. Designing and functioning of the system "The buyer – Retailer – Recourse Management system – The environment" (BRME) is connected with the TS efficiency increase for the society, in general, at purchasing.

Studying of factors affecting it requires new approaches and methods of the evaluation which will help to increase sales, on the one hand, and to raise the shop's efficiency functioning, and from other – to diminish buyers' fatigue and to increase benefits from purchases exactly in particular retailer or retail network.

In the modern conditions person interacts with various social, economic, biological systems in which he lives, works and rests [10]. One of such systems is the system of consumption of goods, essential component of which is a process of purchases. To the elements of the system of the purchases process consist of: buyer, shop, environment, and control system (BRME), fig. 1.

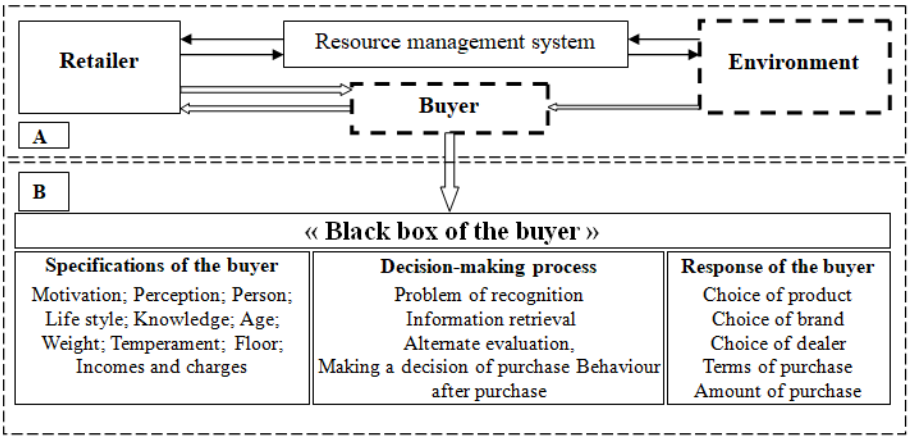


Fig. 1. Interrelation of the elements of the system "BRME" (A) and "Buyer" (B)

The buyer's emotional fatigue can be assessing according to BRME system, taking into account other elements interaction. Complex and system approach provide retailer's tool for competitiveness and stimulating the purchase process which would take into account consumers' behavior.

3 Method Statement

There is no doubt that human body has created any special reaction in purchase process of visiting certain retailer. Walk for long distance, «clamming» up the hill or

heavy traffic on intersaction act as a stimulus and influence on buyer's emotional state and his fatigue on way to shop and back. Conveniences inside of the shops, layout of goods, the amount of open cash desks, non-stressful atmosphere, polite and helpful staffs make their impact on emotional fatigue of buyer during searching and selecting of goods, and making purchase decision (fig. 2). A different retailer creates various stimuli for buyer. Buyer's reaction on it could be assumes in different stages using Pulse meter for fatigue measurements and GSR – for arousal emotions and fatigue. We measured reaction on stimulus at whole purchase process.

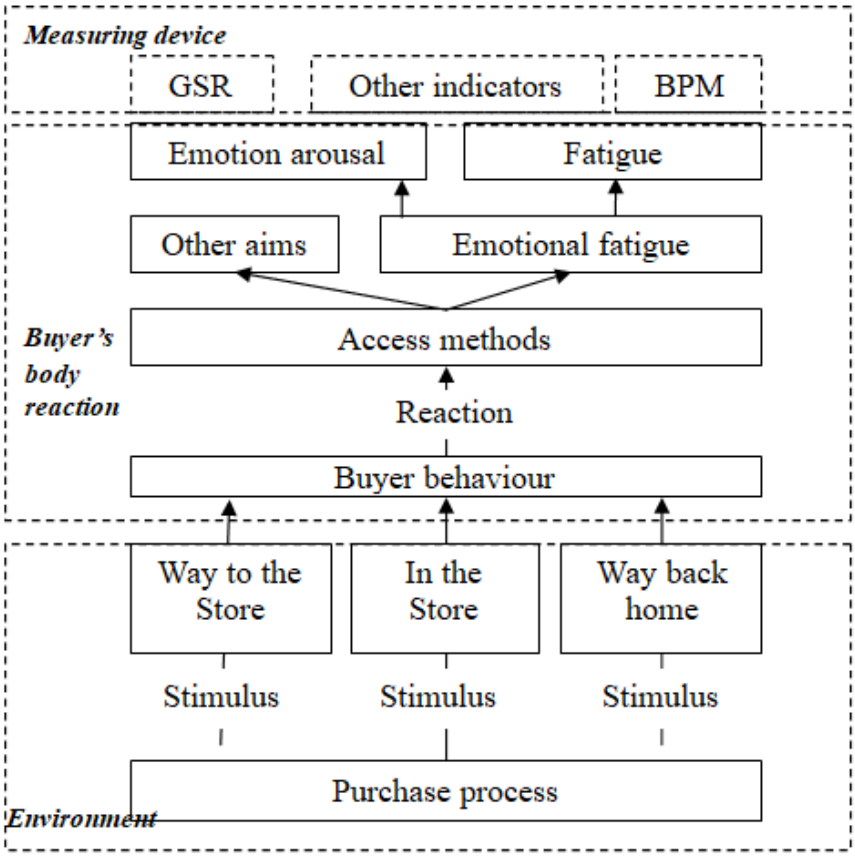


Fig. 2. Conceptual framework of emotional fatigue research

Therefore, we suggest that any of these actions or things in purchase process could be stimulus for consumer's emotional reaction. Here, we explore, how human organism (semantic system, circulatory system, nervous system) reacting on purchase process elements in different stores according to stress-index and emotional shift level.
For understanding changing of emotional fatigue was used shift of level of buyer's emotional reaction [11] as emotional component and stress-index [12] as fatigue component [13]. Measurement was made at start of element of purchase process and at the end of it. The shift between measurements indicates about emotional fatigue of

buyer at current element. Also, interests are reaction on the rapid stimuli: pick of need product, standing in line before cashier, moment of making purchase, cell rang and other. It was asses by shift of GSR value.

Also, were compared current human biometrics performances (moda of R-R intervals, amplitude of a mode, R-R variation scope) with normal state. According to this, assess of body state has been made.

To assess buyer's background emotional fatigue during purchase process was made sample before exit from home (GSR value) and compare with end state value – after coming back. The change between two values indicates about increase of buyer's background emotional fatigue level.

4 The Results of the Conducted Experiment

Assessment of the impact of the process of purchases on the functional state of person was held by fixing the body's response to the different factors with the help of galvanic skin reaction and heart rate. The following factors in the shopping process were studied: time spent on the walking to the retailer and back; time spent in a store; the process of selection and evaluation of products; the decision to purchase; waiting in line before the cashier; moment of making purchase. It is established that if the store is placed within a long walking distance then additional factors must be taken into account: time spent on the getting to the transport stop and back; time spent waiting at the transport stop; change of the types of transport; time spent in transport.

The most informative parameters of the influence of information flow on the behaviour of the buyer were selected for this study. They are identified with the help of measurement of G.S.R. cardiovascular rhythm. G.S.R. sensor was attached on the left hand on the index and ring fingers. NeuLog Pulse sensor was attached to the little finger of the left hand, (Fig. 3).

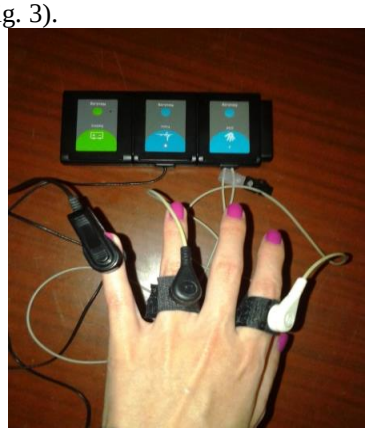
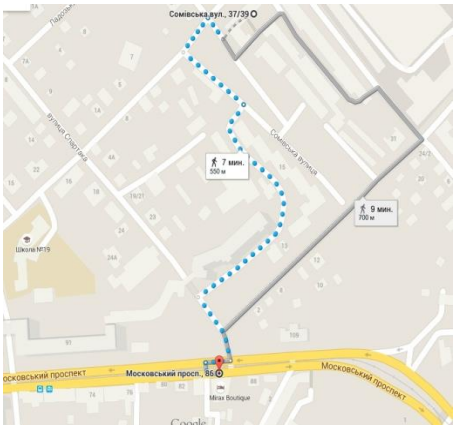


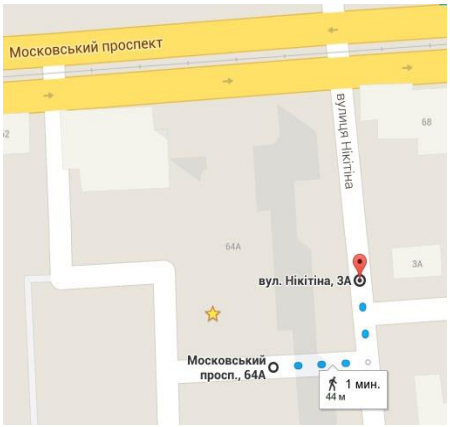
Fig. 2. Mounting sensors on the buyer

Routes of the experiments are presented at the Fig. 4.

a)



b)



c)

Fig. 3. Routes of the experiments

Along with the registration of G.S.R. in the store and on the way to it photo and video fixation of the buyer's behaviour was conducted (Fig. 5).

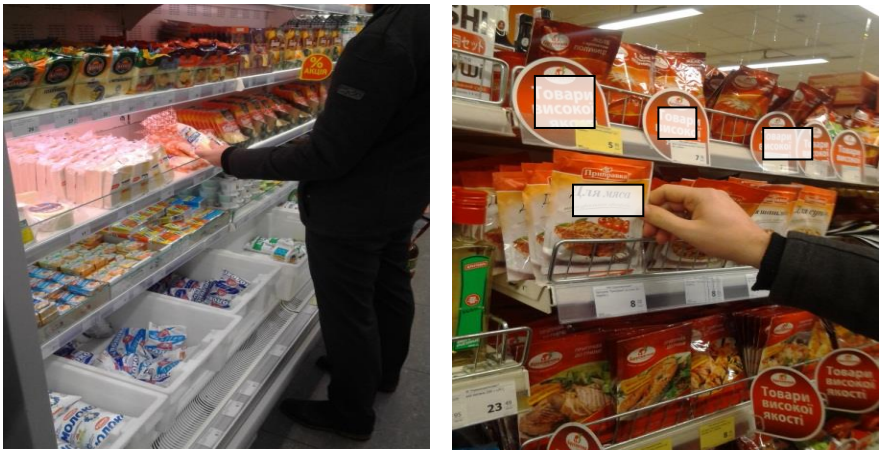


Fig. 5. Example of the photo and video fixation of the experiment

Overlaying of the video on the measurements of sensors made it possible to determine what the tested person felt at different moments of purchasing. This process was done by hand. For the convenience recording was started synchronously with the start of sensors work (fig. 6-8).

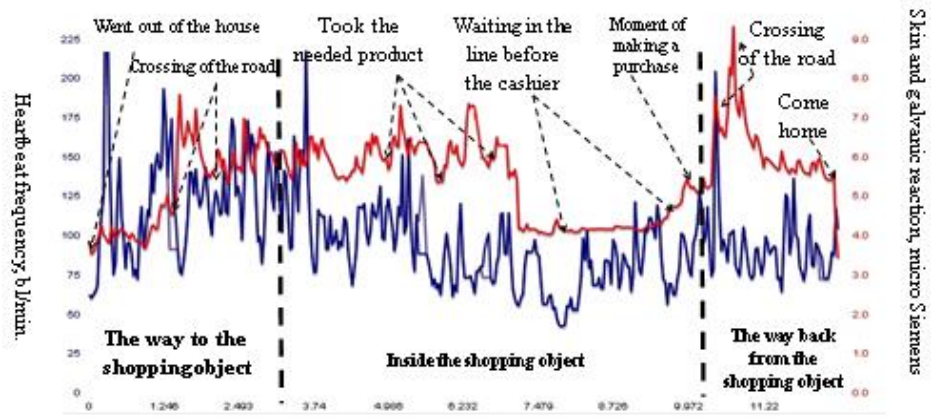


Fig. 6. Measurement of the G.S.R. (microsiemens) and pulse (beats per minute) of the buyer during visit of the retailer which is located at a distance of 550 meters from his home area. The square of the retailer is 450 m^2; number of purchases – three; gender – male; frequency of measurements is 6 times per second (Fig. 4 a)

It should be noted that the average heart rate and GSR reaction per minute data show its value in chosen activity when the frequency of measurement is 6 times per second.

Value of one purchase did not exceed 200 hryvnyas (8 USD), the average amount was 75 hryvnyas (3 USD). All shops were within walking distance. The visited shops were the following: small shops, discounters, stores near the house.

The results of measurements of «NEULOG» show that the buyer suffers less tension on the street on his way to the retailer than in the shop. It should be noted that at all pictures, the buyer's stress state increases in the moment of transition the road (roadway), as evidenced by his G.S.R. and heart rate rhythms.

The results showed an ambiguous character in determining of the heart rate rhythm. Thus, in Fig. 6, 8 heart rate rhythm in the moments of leaving home and returning home has not changed or even decreased. In all other cases, heart rate increased after returning home. Ambiguous results of the data require further studies with more people.

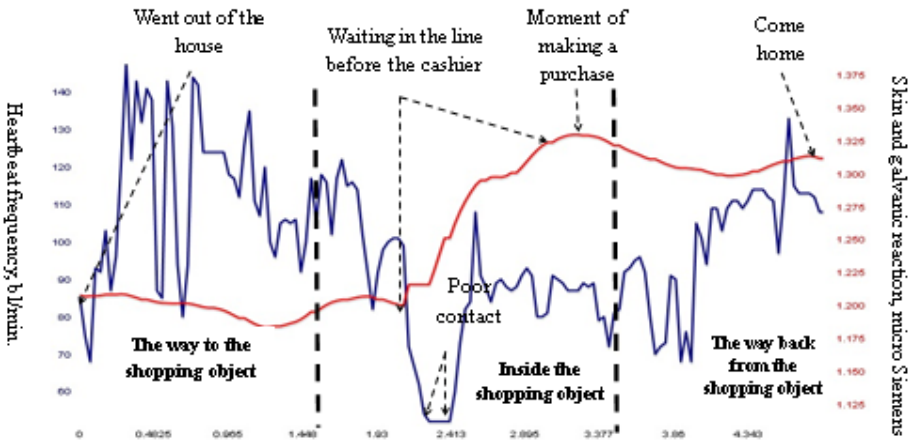


Fig. 7. Change of the G.S.R. (microsiemens) and pulse (beats per minute) of the buyer during visit of the retailer which is located at a distance of 50 meters from his home area. The square of the retailer is 20 m^2; number of purchases – one; gender – female; frequency of measurements is 6 times per second (Fig. 4 b)

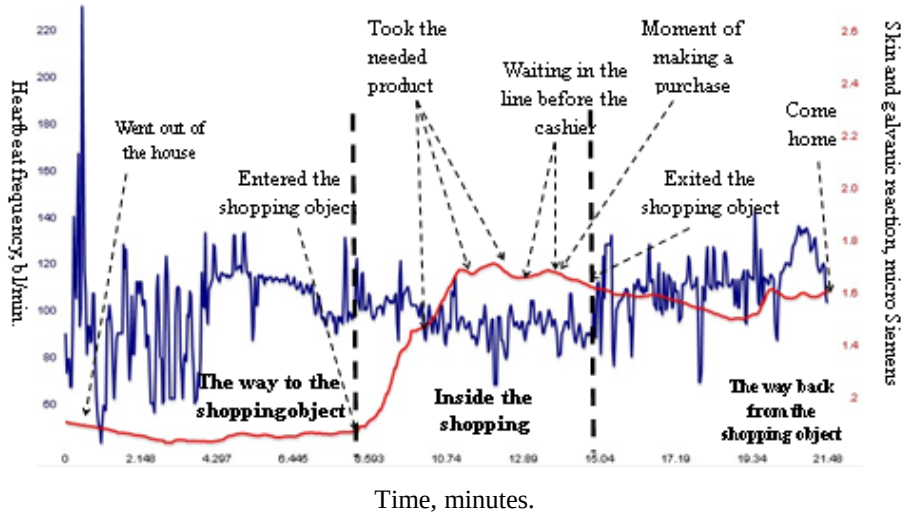


Fig. 8. Change of the G.S.R. (microsiemens) and pulse (beats per minute) of the buyer during visit of the retailer which is located at a distance of 300 meters from his home area. The square of the retailer is 450 m^2; number of purchases – three; gender – female; frequency of measurements is 6 times per second (Fig. 4 c)

Analysis of the experiments showed that the bigger is the galvanic skin reaction of the person when coming out of the house before buying, the bigger this index will be when he returns home, which makes it an essential parameter.

It is established that influence of the duration of the process of purchases on adaptive properties of the human body is negative. The longer buyer walks in the store, the more tired he becomes and his stressful condition is bigger also, he can not make purchases and choose needed things. The indications of G.S.R. demonstrate it very good in the moments of leaving home and getting back home. The amplitude of changes varies from 0.25 microsiemens (for 5 minutes) till 2.5 microsiemens (for 15 min.). A similar conclusion can be made from the analysis of heart rate rhythm. Duration of the shopping process increases the frequency and amplitude of heart rate rhythm that is clearly visible at Fig. 6.

If we consider the waiting time in the line before the cashier, the change of the G.S.R. almost does not occur, and the heart rate rhythm changes (Fig. 6, 8). Heart rate indicator shows that a person is in the calm state, the range of the heart rate varies from 80 to 100 beats per minute. Before making a purchase, the variation range increases to 70-120 beats per min.

A detailed analysis of the elements of measurement of G.S.R. (Fig. 6-8) shows that the increase of the voltage depends on the conditions for purchases (environment), on the person and on the shopping object.

5 Analysing the Results of Urban Purchase Process

Change of the parameters (G.S.R., BPM) depends on the initial indicator of the state of the person in the moment of leaving the house. The higher it is, the stronger is the buyer's reaction to shopping. Gyulyev & Dolia [14] noted in their researches that the ultimate fatigue of the passenger depends on the first measurement before when he leaves his home.

With the different figures, it can be observed that signals increase or decrease depending on the purchase process elements and buyer's parameters (gender, age, etc.). Different people react differently to stimuli in the process of shopping. It is believed that the long wait in line has a negative impact on the emotional state of a person and his tiredness [15]. Fig. 6, 8, show that waiting in the line for more than 2 minutes had virtually no impact on the buyer. Just before the cashier it is observed a slight increase of the G.S.R., caused by the fact that he is laying out the goods at the checkout. At the same time the data of fig. 6 indicate that even the short time of waiting in the line (1.5 min.) negatively affects the emotional state of the person: G.S.R. is increased sharply at 0.5 points; heart rate is jumping. Perhaps the difference in the emotional reaction of different people depends on the type of their temperament [16]. Anyway, it is necessary to increase the data sampling and conduct appropriate tests to determine the temperament of the people who take part in the investigation.

6 Discussion

Already existing studies and methods compare human reaction (using experimental method) with simultaneous answers to questions about his/her feelings (using questionnaires) during core processes.

Main part of the research is devoted to the analysis of the factors that affect the buyer and measuring of his G.S.R. and heart rate indicators during the shopping process. The combination of multiple signals helps assess the buyer's reaction to stimuli in a better way [17]. The environment constantly affects the person's behaviour and emotional state. Therefore important to understand how the buyer will behave under the influence of specific environment at the retailer at him/her. How will the location of the goods on the shelves and departments in the store affect the results of his choice and fatigue? What feelings will call advertising at the entrance to the commercial property? How the lines before the cashier and the amount of opened cashboxes will affect him? How will the other elements of the trading service affect his emotional state, behaviour, and the result of purchases? All these questions are difficult to answer unequivocally only in laboratory conditions. Consequently, only experimental data obtained in real conditions will be able to describe, identify and understand to the full extent what the person feels at one or another point of purchasing process. Implementation of BRME system approach can help answer to this issues.

7 Conclusion

The conducted research, at first time, has estimated the buyer's emotional state and allowed quantifying objective response of the buyer’s body in the process of making purchases. Assessment of the impact of various factors was measured by the galvanic skin reaction and heart beats per minute. It is revealed that people's reaction in the shopping centres can be measured with the help of medical devices. The study has shown the changing parameters of the galvanic skin reaction and frequency of cardiovascular rhythm depending on duration of purchases and the number of roads «on the way to» and «back» from the retailer, at retailer, the correct choice of goods, waiting in line before the cashier. The results of the study can be used for planning sales areas, shops, sales analysis, advertising campaigns and analysis of the customer’s behaviour.

Usage of this method can help to estimate the level of emotional fatigue of the buyer during its visit to any shopping object. Also, shopping object affects emotional state on the buyer can be found.

The system “The buyer - Retailer – Resource management system – The environment" is offered which directed to increase the social interaction efficiency at purchasing. Analysis of factors affecting system operation efficiency is conducted.

Received results can be used in the up-today market analysis, planning, and simulation of visits of retailer, analysis of sales, manufacture of storekeeping strategy and deliveries on the market and analysis of buyers and their behavior. Research gives the

opportunity to improve of the quality of customer service in urban retail considering emotional fatigue of the buyer.

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