

## **THE IMPACT OF INNOVATIVE COMMERCIAL TECHNOLOGIES ON STUDENTS' BEHAVIOUR OF AN ECONOMIC UNIVERSITY**

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**Abstract**

In a dynamic business environment, implementing innovative commercial technologies facilitates the winning of new competitive advantages in the retail industry, given the manifested influence on consumer buying behaviour towards commercial units, as well as the significant contribution to the development of modern shops image. This paper presents the attitude of students from the Bucharest University of Economic Studies towards the adoption of innovative retail technologies within hypermarkets in Romania, based on a selective marketing research, conducted on a sample of 359 students from undergraduate and master cycles. The main objectives focused on identifying: the image of certain instruments belonging to the innovative commercial technologies in terms of usefulness in the process of buying; the intention to use innovative commercial technologies; the perception of the main advantages and disadvantages of using innovative commercial technologies in the buying process; the importance of commercial technologies in relation to other attributes underlying the development of a hypermarket image. Research results show a relatively low level of awareness among buyers, due to a reduced exposure to innovative commercial technologies, but a relatively high availability of acceptance in the purchasing process. Thus, there is a favourable assessment of the utility of commercial instruments in the buying process and a relatively high intention of use. The paper also highlights the influence of innovative commercial technologies on store image and loyalty of buyers.

**Keywords:** Commercial technologies, hypermarket, marketing research, students, image, buying behaviour, loyalty.

**JEL Classification:** M31, F14.

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## **Introduction**

Nowadays, on economically developed markets, the innovative commercial technologies tend to become important attributes used by the management of large stores in order to attract buyers, develop their loyalty and strengthen market position.

Given the consumer exposure to a wide range of products, prices and promotional actions, the use of retail technologies allows easy processing of information needed in the buying process, leading to improved consumer experience and reducing the acquisition time. Thus, the implementation of commercial technologies in hypermarkets results in a high level of service quality delivered to consumers, which has favourable consequences in terms of sales volume, business profitability, and corporate image.

From the hypermarkets' management perspective, adopting advanced commercial technologies allows to obtain valuable information on buying behaviour and consumption trends, useful in developing retail strategies. The positive impact on economic efficiency comes both from better decisional adjustments to market requirements and achievement of higher customer satisfaction indices, and from improvements in operations management, costs decrease and enhanced productivity.

The interest for studying the influence of innovative commercial technologies on retail supply and demand led to the delineation of the following main research directions, at international level: retailers' expectations toward introducing advanced-technology-based innovations in points of sales (Pantano and Viassone, 2014), impact of self-checkout systems service quality on customer satisfaction and loyalty (Orel and Kara, 2014), consumers' reasons to use or to avoid self-scanning check-out in retail stores (Dabholkar, Bobbitt and Lee, 2003), consumers' motivations of using retailing self-service technologies (Leung and Matanda, 2013), acceptance of technology-based innovations in retailing among consumers (Pantano and Di Pietro, 2012), perception of usefulness of innovative technology in retailing (Renko and Druzijanic, 2014), and influence of retailing advanced technologies on consumers shopping experience (Pantano and Naccarato, 2010), risk of using advanced technology in retailing (Pantano, Iazzolino and Migliano, 2013).

In the Romanian market, the implementation of innovative commercial technologies is in its early stages, even within large stores chains as hypermarkets, and there are no clear clues about the influence exerted by modern retail technologies on consumer attitudes and behaviours.

In this context, the present study aims to identify the attitude of students from the Bucharest University of Economic Studies towards the adoption of innovative commercial technologies in hypermarkets, and the impact of their use on future purchasing decisions.

### **1. Innovative commercial technologies**

Marketing theory and practice prove that innovative commercial technologies are determinants of consumer buying decisions in various markets. Therefore, many studies focus on researching consumer attitude toward technology, considering the impact that modern commercial tools have on consumer buying experiences.

Dabholkar (1996) has identified five attributes used by consumers in evaluating technology-based self-service: speed of delivery, ease of use, reliability, enjoyment, and

control. According to this author, the most important determinants of service quality of technology-based self-service option are control and enjoyment. In a study conducted by Dabholkar, Bobbitt and Lee (2003) consumers that avoid using self-scanning, proved to be motivated in their shopping behaviour by: the pleasure to interact with employees (not offered by this technology), the global unfavourable attitude toward using technology, the sense of having a right to be served, and the effort involved by using such technologies. Considering the influence of demographic factors such as age, gender and education, Dabholkar, Bobbitt and Lee (2003) found no relevant influence on the use of self-scanning. Regarding situational factors, these authors identified that, in crowded conditions, consumers consider self-scanning faster than in normal conditions.

Lin and Hsieh (2011) have developed a multiple-item scale that examined key factors influencing self-service technologies (SST). This includes seven dimensions: functionality (ease of use, speed), enjoyment (feeling good in using such technologies), security/privacy (safeness of operations and confidentiality), assurance (confidence in the retailer), design, convenience (accessibility to using this technology), customization (adaptation to consumer needs). Consistent with Chiu, Fang and Tseng (2010), consumer intention to use new technologies in retail area is determined by four factors: performance expectancy, effort expectancy, facilitating conditions (existence of a technical structure that supports the use of a certain technology) and social influence.

According to technical characteristics, Pantano and Viassone (2014) have classified new technologies in three categories: (i) touch screen displays/in-store totems, which includes virtual garment fitting systems (these use 3D body scanning systems, allowing consumers to virtually try clothes) or Self-Service Technologies (SST have automated and interactive interfaces that eliminate employee assistance during the buying process), (ii) systems for consumer's own mobiles phones (which provide various information such as automatic payment, searching for certain items, comparing different products) and (iii) hybrid systems (based on some retail technologies used by buyers to move around the store, such as intelligent shopping trolleys).

Many innovative technologies are based on radio frequency identification (RFID). By using a chip, this system assigns an identification number to each item. It becomes thus possible to collect signals with a RFID reader from the identification tags and to process this data (Pleșea, 2007). It allows consumers to obtain products information (e.g. location into de store), by using a device able to recognize RFID tags (Pantano and Naccarato, 2010). After a process of literature review, Renko and Druzijanic (2014) presented the main innovative technologies in retailing, as following: barcode scanners at the retail POS (point-of-sale) checkouts, electronic shelf labels, self-checkouts, RFID, fingerprint authentication, interactive information terminals, Web portals and e-tailing.

## **2. Buying behaviour in large stores**

Various evidences are found in retail stores practice and literature, aiming to clarify buying behaviour and its specific dimensions.

In this context, Renko and Druzijanic (2014), in a survey conducted in Croatia on perception of usefulness of innovative technologies, found that the benefits perceived by consumers on using new technology are described as: increase of speed in providing services in the store (70%), facilitate the access to additional information (65.2%), diminish

the waiting time at checkouts (64.6%), avoiding pricing errors (60.9%). Researchers also concluded that Croatian consumers are aware of the benefits that innovative technology brings to stores, but there is still a lack of confidence in this type of technology.

According to Theodoridis and Chatzipanagiotou (2009), attributes that define supermarket store image are: personnel (friendly, caring, and knowing), atmosphere (temperature, cleanliness, and smell), products (variety and quality), pricing (price level and price-quality ratio), merchandising (easy finding, colour, and labelling) and in-store convenience (corridors and carriage). They proved that personnel, products, pricing and in-store convenience significantly determine customer satisfaction, whereas atmosphere and merchandising have not a significant influence on this variable. Starting from these results, it might be emphasized that commercial technologies, included especially into in-store convenience category, contribute to customer satisfaction and loyalty.

Concerning the shopping value, Babin and Darden (1995) have differentiated utilitarian value from hedonic value. The first shows the instrumental benefits of shopping (e.g., acquiring certain items), while the second reflects the experiential benefits provided by the shopping experience itself (e.g., fun, excitement, novelty, etc.). The investment at store level can increase consumers' speed of shopping by facilitating them to find products easier and in a shorter time (Shukla and Babin, 2013). Supermarket retail service quality is defined by Vazquez et al. (2001) through four dimensions: physical aspects (e.g. decoration, equipment, cleanliness, interior design, store layout of sections, product shelf position), reliability (keeping promises on product availability, on advertising campaign, reducing waiting time at cash registers, providing customers with error-free information), personal interaction (how customers are treated by store employees) and policies (assortment policy, pricing policy).

Concerning the influence of retail technologies applicability on various attributes of store's image, Ko and Kincade (1997) found that quick response technologies (e.g. electronic data interchange, bar coding or point-of-sale-data capture) determine favourable customer perception on store's attributes, mainly associated with: fast turnaround of goods, reduced stockouts and availability of advertised product. On the other hand, store attributes perceived as the least improved by applying these techniques are: home delivery and friendly personnel.

### **3. Research methodology**

The research aims to study the attitudes of students from the Bucharest University of Economic Studies towards the adoption of innovative commercial technologies within hypermarkets in Romania and the impact of new technologies on intentional buying behaviour.

Main research objectives took into consideration the following: the image of certain instruments belonging to innovative commercial technologies in terms of usefulness in the buying process; the intention to use innovative commercial technologies; the perception of the main advantages and disadvantages of using innovative commercial technologies in the buying process; the influence of buyers' intentions to use innovative commercial technologies on their intentions to recommend the store, return or revisit the hypermarket, switch to competitors; the importance of commercial technologies in relation to other attributes underlying the development of a hypermarket image.

The main hypotheses, tested in the analysis phase, were based on various studies, according to international literature. Thus, Martinelli, and Balboni (2012) have shown that the perception on service quality delivered in store, supported by the use of commercial technologies, greatly influences customer satisfaction, having significant effect on the likelihood of repurchase in a particular hypermarket and on recommendation behaviour.

H<sub>1</sub>: consumer purchase intention of a hypermarket that uses innovative commercial technologies has a significant influence on buyer intention to recommend the hypermarket;

The results of the studies carried out by Ranjbarian, Barari, and Salehni (2011) show that consumers' potential to engage in recommendations depends on a number of demographic characteristics, among which stand out the sex variable. Similar studies, conducted by other researchers, proved a greater tendency to submit recommendations from women (Bakan, 1966; Meyers-Levi, 1988; Bush, 2004, cited in Bush and colleagues, 2005).

H<sub>2</sub>: gender influences consumer intention to recommend a hypermarket that uses innovative commercial technologies;

According to Shukla and Babin (2013) the utilitarian and hedonic values provided by commercial technologies enhance the total value delivered to buyers by the store and decrease switching behaviour, leading to increased returning intention.

H<sub>3</sub>: the intention of buying from a hypermarket that uses innovative commercial technologies has a significant influence on the intended comeback in such a shop;

Pantano and Naccarato (2010) stated that the introduction of advanced technologies improve commercial activity by supplying benefits in order to attract new buyers, and provides a means for traders to increase their market share.

H<sub>4</sub>: consumer intention to use innovative commercial technologies has a significant influence on buyer intention to switch to a hypermarket that uses innovative commercial technologies;

Orel and Kara (2014) have proved the existence of a positive relationship between self-checkout service quality and customer satisfaction, as well as an indirect relationship with customer loyalty, mediated by their satisfaction. The influence of using commercial technology on the likelihood of repurchase in a store was confirmed by other authors as well, such as: Martinelli and Balboni (2012), Pantano and Naccarato (2010).

H<sub>5</sub>: the perceived importance of commercial technologies has a significant influence on consumer intention to return to a hypermarket that uses innovative commercial technologies.

The target population of the research was composed of students from the Bucharest University of Economic Studies, both bachelor and master cycles, which carry out shopping in hypermarkets. The delimitation of this population was based on specific realities of Romanian retail industry, regarding a very low level of implementation of advanced innovative technologies within hypermarkets in Romania and, therefore, the lack of crystallization of behavioural patterns specific to Romanian buyers, with respect to these commercial tools. Given the novelty of the issue studied and the low expertise of Romanians in using modern retail technologies, the present research has not pursued the selection of a nationally representative sample in order to generalize the information, but to

explore the extent to which we can identify behavioural elements that are already formed among a certain segment of consumers.

In selecting the segment of students, authors started from the premise that the young people has the highest tendency to use self-checkout systems in carrying out shopping in supermarkets (Orel and Kara, 2014) and assume the role of innovators in most industries, being among the first to adopt a certain type of novelty. Further, the option for choosing students within economic higher education was based on their tendency to exhibit a higher interest to commercial technologies, compared to individuals registered in other specializations, given their awareness of the importance and impact of adoption of modern technologies on the economic performance of companies. Subsequently, taking into account the relative homogeneity of students' behaviours from economic universities, as well as cost and time constraints of the research, it was decided to conduct the study on students from the Bucharest University of Economic Studies, a university that is representative for the economic higher education in Romania.

The structure of the present target population of the research provides possibility to early predict Romanians' buying behaviour, when such technologies will have a higher degree of implementation.

The research method used was the online selective survey. The survey was conducted through the use of iSondaje.ro during the period: 10 November 2014 - 3 December 2014.

The sample of the research consisted of 359 students from the Bucharest University of Economic Studies. The sample size has been calculated taking into account the following parameters: level of confidence was 95% ( $t=1.96$ ), the proportion of sampled units which possess the researched characteristic was 0.89 (estimated from the results of a study conducted by "Exact Cercetare și Consultanță" in 2013, according to which the share of the urban population who visited a hypermarket at least once per month is 89%) and the acceptable sample error was  $\pm 3.24\%$ .

The sampling method was cluster sampling, the groups being made up of faculties from the Bucharest University of Economic Studies, considering that they are heterogeneous inside and homogeneous between them in respect of the researched characteristic. There were randomly chosen four faculties, and from them there were selected the units of investigated sample. Its structure is as follows: 20.9% male persons, 79.1% female persons, 19.5% individuals with a net family income under 1,500 RON, 29.2% within 1,500-2,500 RON, 29.2% within 2,501-4,000 RON, 13.6% between 4,001-6,000 RON, and 8.5% over 6,000 RON.

Research questionnaire consisted of questions regarding specific variables, such as: consumer attitude towards six types of innovative commercial technologies, advantages and disadvantages of these technologies, shopper behaviour towards innovative commercial technologies, relative importance of main attributes underlying the development of a hypermarket image, and socio-demographic characteristics of respondents. In defining the benefits of innovative commercial technologies, authors of the present research started from those categories identified by Renko and Druzijanic (2014). Types of commercial technologies evaluated by respondents were previously chosen by taking into account the readiness of Romanian market on in-store technology adoption. Therefore, authors opted for the following instruments: intelligent trolley, personal shopping assistant, mobile shopping assistant, smart mirror, electronic price labels, self-scanning check-out. For better understanding of these specific instruments by respondents, each type of technology was

presented with a brief description of operation or functioning mode, accompanied by an explicit graphic image.

Intelligent trolley (cart) uses an automatic interface which provides products information, allows consumers to localize articles position into the store and to find the most efficient path to reach to desired items (Pantano and Viassone, 2014). Furthermore, it scans selected items, registers prices (Renko and Druzijanic, 2014), displays information on nutritional value of selected products (Dunne, Lush and Carver, 2014), and tracks the total price of consumer's shopping basket (van Ittersum et al., 2013; Pleșea, 2007). Personal shopping assistant is a handheld computer with a touchscreen and a scanner, which permits buyers to scan loyalty cards, to visualize their shopping list previously saved online, to modify own list, to get additional information about products (Ray, 2010), to choose favourite items, to identify products on sale (Pantano and Naccarato, 2010). Mobile shopping assistant is similar with a mobile phone equipped with a camera, which scans product barcode, displays additional information on product, searches for other products in the store, and visualizes the total cost of products bought (Pantano and Naccarato, 2010). Smart mirror "consists of an integrated software and a hardware system which recognizes consumer face and body by a web cam and reproduces graphically him/her while wearing a certain product" (Pantano and Naccarato, 2010, p.202). Electronic shelf labels display information such as: current price, sale price or price per unit (litre, kilo). Using such a technology, price information may be quickly updated, thus prices errors being eliminated (Renko and Druzijanic, 2014). Self-scanning checkout allows buyers to scan the barcode for products bought, giving them the possibility to verify prices and to pay for merchandise, without intervention of store employees (Renko and Druzijanic, 2014).

#### **4. Research results**

The level of students familiarity with commercial technologies types presented in this research is quite low, electronic shelf labels being the most common commercial instrument met by buyers (77.7%), followed at a great distance by self-scanning check-out (14.8%), mobile shopping assistant (7.2%) and personal shopping assistant (6.4%). Romanian buyers are least exposed to smart mirror (3.3%) and intelligent trolley (3.6%).

Usefulness in the buying process of those commercial technologies types analyzed in this research was evaluated by using a Likert scale with 5 levels (1-"Strongly disagree" - 5-"Strongly agree"), asking respondents to express their agreement to the following statement: "This instrument will help me in the buying process". Based on the results obtained, we can conclude that all commercial instruments presented have above average levels of perceived usefulness, the most useful being considered the intelligent trolley, 85.2% of respondents believing that it will help them in the buying process (Table no. 1). The next two positions are occupied by the mobile shopping assistant (average value 3.94) and the self-scanning check-out (average value 3.92), while the lowest level of usefulness was recorded by the smart mirror (average value 3.55).

**Tabel no.1: The influence of innovative commercial technologies instruments on behaviour towards hypermarket (average values)**

<b>Commercial instrument</b>	<b>The usefulness in buying process</b>	<b>The intent of use</b>	<b>The influence in hypermarket selection</b>
Intelligent trolley	4.21	4.3	3.61
Mobile shopping assistant	3.94	3.87	3.39
Personal shopping assistant	3.83	3.78	3.4
Smart mirror	3.55	3.52	3.27
Electronic shelf labels	3.8	3.79	3.29
Self-scanning checkout	3.92	3.91	3.57

Intention to use commercial technologies was evaluated with the same scale type described above, the statement on which subjects were asked to make judgments being the following: "I would use such an instrument in the shopping process in hypermarket". The highest usage intention is recorded by the intelligent trolley, 88.6% of buyers being willing to use it (average value 4.3). This is followed by the self-scanning checkout (average value 3.91), while the lowest intention level is recorded by the smart mirror (average value 3.52) (Table no. 1). It is noted that all scores are above the average value of 3.5, which translates into a high availability of using these commercial instruments by students.

Assessing the influence of innovative commercial technologies, in the process of selecting the hypermarket for shopping, involved the use of the following statement: "This instrument would greatly influence my choice of selecting the hypermarket in which to make shopping". The commercial instruments that record the greatest potential to influence consumers, are the following: the intelligent trolley, 55.7% of shoppers agreeing with such an impact, and the self-scanning checkout (53.8%), while the lowest impact is recorded by the smart mirror (average value 3.27) (Table no. 1). It is noted that all commercial technologies types that were analyzed in the present research recorded a score slightly above value 3, which translates into a medium to high influence in the selection process of a hypermarket. Therefore, these are able to provide a competitive advantage in the retail market.

Regarding consumer perceived benefits of innovative commercial technologies (measured by using a five level scale, from 1 - "to a very low extent" to 5 - "to a great extent"), first stands the benefit of increasing the access to information on the products displayed; 47.9% of respondents believing that this advantage is secured to a great extent, while 39.6% think that it occurs to a large extent. In second place is positioned the advantage of reducing the waiting times at the cash register (average value 4.18) and in third place, with an average value of 3.93, are recorded perceived benefits such as increasing the speed in product choice, and eliminating the errors related to prices displayed (Figure no. 1). Because average values exceed 3.5, we can conclude that all the above mentioned benefits show a high intensity of expression.



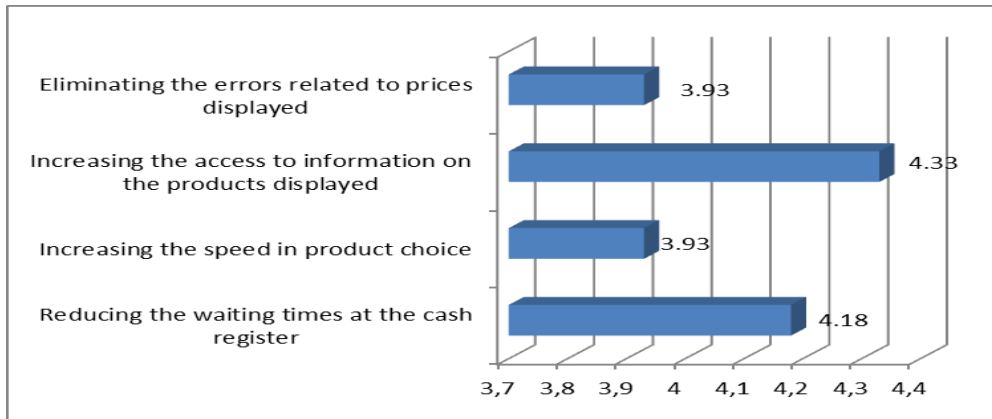


Figure no. 1: Benefits of using innovative commercial technologies

Concerning the disadvantages of using innovative commercial technologies, 37.9% of respondents indicated the perception of such potential problems. Out of these, over half (52.2%) believe that the main disadvantage is the difficulty of using such technology. This is motivated by the higher degree of usage complexity or by the specific behaviour of certain categories of buyers (e.g. the elderly) who lack the knowledge and skills needed to use new technology, and therefore they become reluctant to do so. Other disadvantages mentioned by respondents are the following: errors in usage (17.6%) caused by consumer carelessness or the lack of good faith in the behaviour of certain buyers, increase of store costs (16.9%) due to the need to make significant investments by hypermarket management, jobs reduction (16.2%) by taking over some functions that were previously provided by sales staff, risks of failure (10.3%) due to potential technical problems, increase of time spent in store (9.6%). The time spent in store is required for familiarization with the use of these tools or to complete certain functions provided by these new commercial technologies (Figure no. 2).

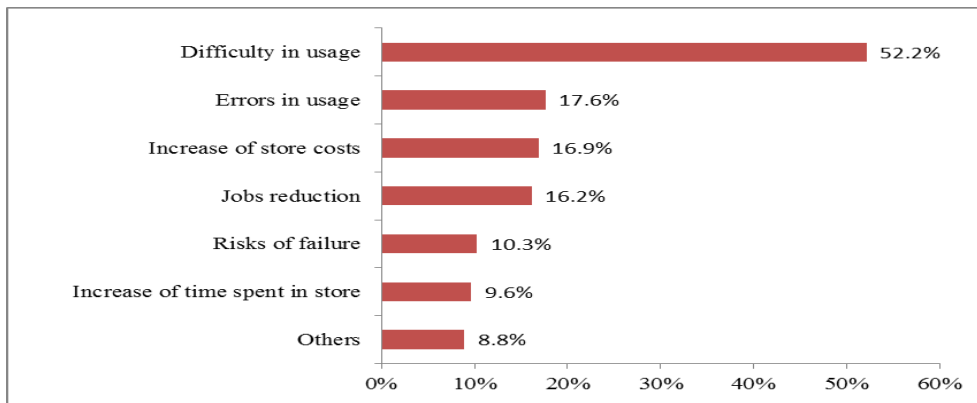
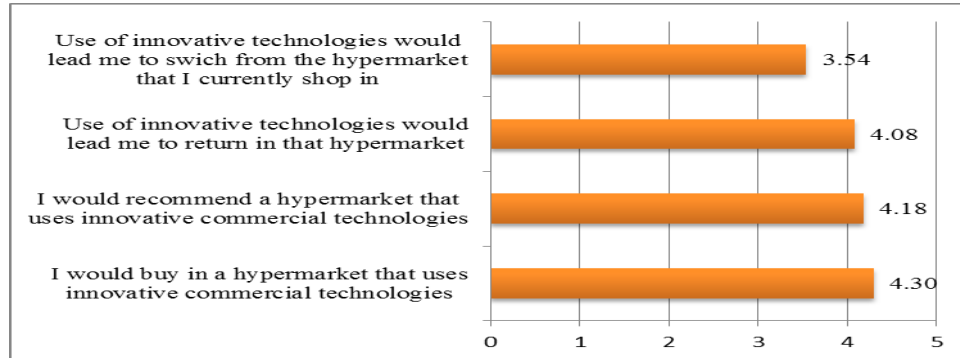


Figure no. 2: Disadvantages of using innovative commercial technologies

Consumer buying behaviour towards a hypermarket that uses innovative commercial technologies was assessed with the help of a Likert - type scale with 5 levels (1-“Strongly disagree” – 5-“Strongly agree”). Average values recorded are shown in Figure no. 3. Thus, regarding consumer purchase intention of a hypermarket that uses innovative commercial technologies, 88.9% would go shopping in such stores. The average value for this statement is 4.3, which translates into a high likelihood of occurrence of this behaviour.



**Figure no. 3: Influence of innovative commercial technologies on buying behaviour**

Regarding the intention of store recommendation, as an important dimension of hypermarket loyalty, 35.9% of respondents would “totally agree” with such behaviour, while 47.6% would “agree”, leading to an average value of 4.18. These results show that consumers exhibit a relatively high intention to recommend the store. Consumer intention to return to a hypermarket that uses innovative commercial technologies record an average value of 4.08, which suggests a relatively high expression of the intention to return, but to a lower intensity compared to the first two behavioural variables. Innovative commercial technologies play a moderate role in determining consumers to switch from the hypermarket where they are currently shopping. Slightly more than half of buyers (51.9%) are willing to adopt switching behaviour in favour of the hypermarkets that use new commercial instruments, which indicates that this attribute might become a competitive advantage for hypermarkets in Romania.

Regarding the correlation between the purchase intention from a hypermarket that uses innovative commercial technologies and the buyers intention to recommend such a store, there is a strong relationship, Spearman correlation coefficient  $\rho=0.785$ , Kruskal-Wallis test value being  $H=222.4$ ,  $p<0.01$ . This supports the hypothesis  $H_1$ , existing a high probability that a person who intends to carry out shopping in a hypermarket that uses innovative commercial technologies to recommend that hypermarket to other persons.

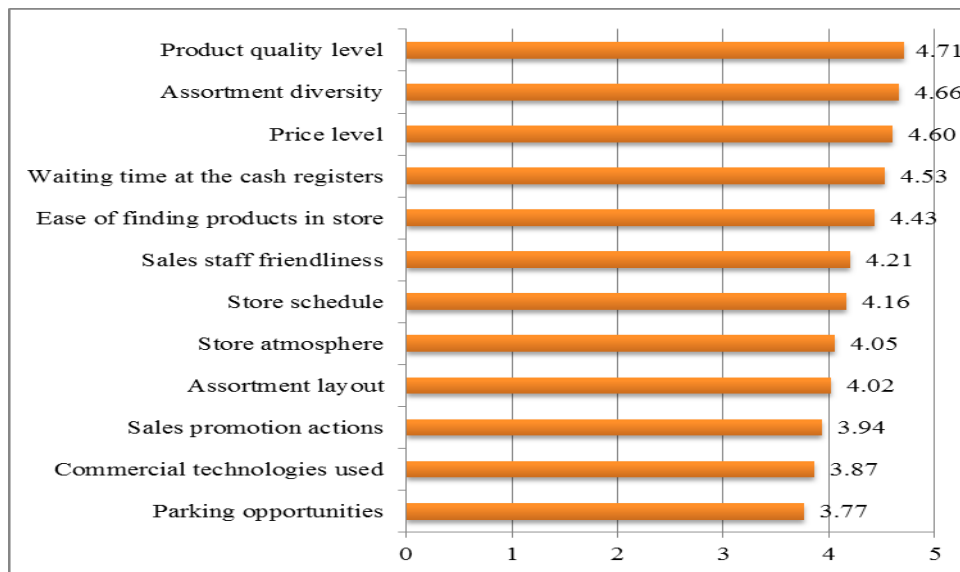
The intention to recommend the hypermarket that uses innovative commercial technology is higher in the case of women, 87.3% of them being willing to adopt such behaviour, than among men, where the proportion is 69.3%. Chi-square test value  $\chi^2 =14.685$  ( $p<0.01$ ) indicates that the hypothesis  $H_2$  is accepted, the gender influencing the intention to recommend the hypermarket that uses innovative commercial technologies.

Consumer purchase intention from a hypermarket that uses innovative commercial technology correlates also with the intention to repurchase from such a store, Spearman

correlation coefficient is  $\rho=0.705$  (the Kruskal-Wallis test  $H=178.221$ ,  $p<0.01$ ), the hypothesis  $H_3$  being accepted. Thus, there is a high probability that people who intend to buy from a hypermarket that uses innovative commercial technologies to return.

A meaningful correlation appears between consumer purchase intention and the intention of switching the hypermarkets in favour of another that uses innovative commercial technologies (Kruskal-Wallis test value  $H=98.851$ ,  $p<0.01$ ). The value of the Spearman correlation coefficient  $\rho= 0.524$  shows that the relationship is of medium intensity, the intention to use innovative commercial technologies influencing the migration towards a hypermarket which uses such tools, accepting the hypothesis  $H_4$ .

Importance of main hypermarket attributes in the development of its image was assessed by using a five-level semantic differential (1-“Very low importance” - 5-“Very high importance”). The highest scores were recorded by the following attributes: product quality level (average value 4.71), assortment diversity (average value 4.66), and price level (average value 4.60). Commercial technologies used have a relatively high importance in the development of a hypermarket image, gaining an average value of 3.87. However, innovative commercial instruments proved to be less important than other store characteristics, as students are less exposed to modern technologies and, consequently, less accustomed to them in relation to other attributes of the hypermarket (Figure no. 4).



**Figure no. 4: The importance of main attributes in forming the hypermarket image**

There is a moderate strength of correlation between the importance of commercial technologies and consumer intention to return to a hypermarket that uses innovative commercial technologies (Spearman correlation coefficient  $\rho=0.521$ , Kruskal-Wallis test value  $H=98.902$ ,  $p<0.01$ ), situation that leads to the acceptance of hypothesis  $H_5$ . Therefore, the persons who considered as being important the use of innovative commercial technologies in a hypermarket revealed a higher intent to return to that type of store, such a tool may becoming an instrument of customer loyalty development.

In order to group the attributes underlying hypermarket image in factors containing the initial information, it was used the method of principal component analysis. This is recommended when the main purpose is to determine the minimum number of factors explaining the maximum variance of the analysed data (Malhotra, 2007). The first step was represented by analysis of correlation matrix between items, being identified values above 0.3, which indicates the possibility of applying the method (Labăr, 2008). Such an approach was also confirmed by the results of the Bartlett's test of sphericity ( $\chi^2 = 1004.7$ , for 45 degrees of freedom and a significance level  $p < 0.01$ ) and of the Kaiser-Meyer-Olkin test, whose value was 0.820, above the minimum accepted of 0.5 (Malhotra, 2007). The number of extracted factors was 2, calculated by identification of eigenvalues that exceeded level 1, the factors rotation method being varimax. Two attributes were eliminated from the analysis, sales staff friendliness and store atmosphere, which had similar loadings for both factors (Labăr, 2008). Factor loadings and communalities level for the items left in the analysis are shown in Table 2, being omitted the loadings below 0.4 (Stevens, 2002, cited in Labăr, 2008).

Within factor 1 there were included several attributes, depending on factor loadings presented downward: assortment layout, commercial technologies used, ease of finding products in store, parking opportunities, sales promotion actions, store schedule, waiting time at the cash registers. It can be observed that this factor includes commercial technologies and other attributes associated with them. Based on these reasons, it was named: *Attributes of commercial technologies*. The second factor includes attributes that refer to the hypermarket offer such as: assortment diversity, product quality level, price level. These elements have led to awarding the name: *Characteristics of the offer*.

**Table no. 2: Factors loadings after rotation**

	Factor loadings		Communalities
	Factor 1	Factor 2	
Assortment layout	0.787		0.638
Commercial technologies used	0.691		0.512
Ease of finding products in store	0.649		0.527
Parking opportunities	0.638		0.436
Sales promotion actions	0.619		0.450
Store schedule	0.605		0.422
Waiting time at the cash registers	0.592		0.414
Assortment diversity		0.815	0.674
Product quality level		0.736	0.586
Price level		0.697	0.517
Variance explained by eigenvalues (%)	38.482	13.274	
Variance explained after rotation (%)	31.070	20.686	

Note: loadings < 0.4 have been omitted

The graphic representation of the items included in the two factors is shown in Figure 5, through a two-dimensional system, in which on the Ox axis is represented the factor 1 and on the Oy axis the factor 2. The closeness of each attribute toward one of the axis and the distance from the origin point are elements representing visually the extent to which the two factors define these items (Labăr, 2008).

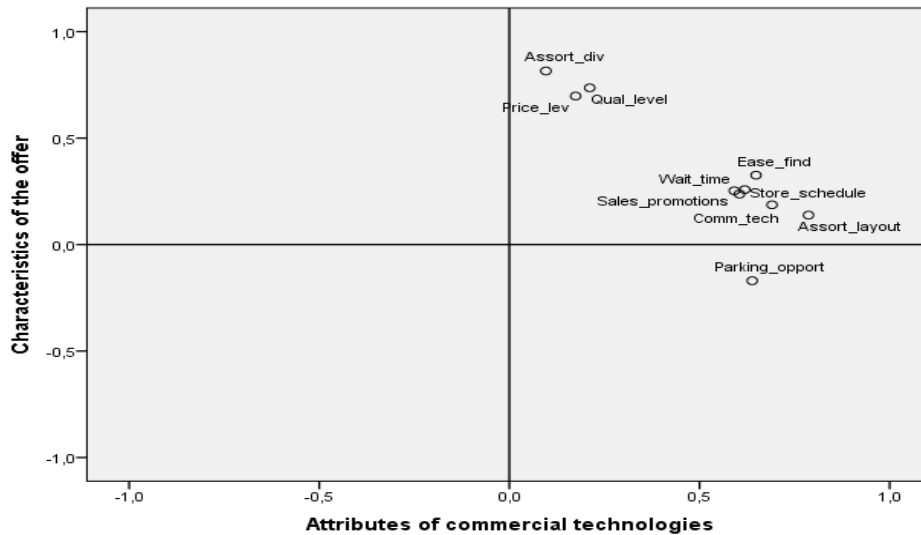


Figure no. 5: Representation of the extracted factors

As regards the total variance explanation, factor 1 accounts for 31.07% of the variance, with a much higher value in relation to factor 2, for which the percentage is 20.69%. This situation may be explained by the fact that commercial technologies and the associated attributes acquired a greater importance in choosing a hypermarket, while the offer characteristics are quite similar for the main retailers. Thus, hypermarkets may possess significant competitive advantages through the use of innovative commercial technologies and through providing some facilities that may be associated with them (improving the assortment layout, facilitating the way products can be found in the store, increasing the visibility of sales promotions, reducing waiting time at cash registers).

**Conclusions**

The paper approaches, from the perspective of marketing research, the usefulness of innovative commercial technologies for consumers and the effects on future purchasing behaviour.

In Romania, the degree of implementation of such modern commercial instruments is still low, causing low consumer experience in the usage process. Given the novelty of the research theme for the Romanian market, the study was exploratory in nature, data being collected from a sample made up exclusively of students. The selection was based on the responsiveness to novelty of this category of consumers.

The results revealed a relatively low level of awareness among respondents, but a relatively high availability of acceptance in the buying process. According to research results, the intelligent trolley (cart) achieves the greatest potential for use in hypermarkets in Romania. The students consider the intelligent trolley to be the most useful and most influential in the selection process of a hypermarket, compared with other commercial instruments examined. The main advantage of innovative commercial technologies relates to increasing the access to information on the products displayed. Consequently, this benefit may become

a shaft of communication for organizations wishing to implement such technologies. In developing commercial strategies, companies are recommended to remove the main barrier perceived by individuals in accepting these instruments, namely the difficulty of using such technology. This can be achieved by providing more complete information to buyers and by ensuring the necessary assistance in the habituation process.

Using innovative commercial technologies has implications for consumer behaviour towards store, influencing their loyalty to the organization and contributing to the development of corporate image. Based on this result, companies operating in the retail industry may include those instruments specific to commercial technologies into integrated loyalty programs, if we consider that several innovative retail instruments allow process customization to buyer specific needs. However, in using innovative commercial technologies, it is necessary to respect consumer right to privacy, since these new tools allow management and staff access to a large volume of information on buyer characteristics and his behaviour in sales outlets (Clarke III and Flaherty, 2008).

Considering various facilities granted to consumers, the adoption of new technologies by companies operating in the retail industry creates opportunities to diversify the means of attracting customer demand to the points of sale, leading to image differentiation and gain of competitive advantage.

The main limitation of this research is the lack of statistic representativeness and the impossibility of generalizing the results to Romanian consumers. In terms of future research directions, as innovative commercial technologies will reach a higher level of adoption within hypermarkets in Romania, subsequent studies may also address other segments of buyers, providing a broader image of the effective customer behaviour, additional to intentional behaviour.

#### **References**

- Babin, B.J. and Darden, W.R., 1995. Consumer self-regulation in a retail environment. *Journal of Retailing*, 71(1), pp.47-70.
- Bush, V.D., Bush, A.J., Clark, P. and Bush, R.P., 2005. Girl power and word-of-mouth behaviour in the flourishing sports market. *Journal of Consumer Marketing*, 22(5), pp.257-264.
- Chiu, Y.-T. H., Fang, S.-C. and Tseng, C.-C., 2010. Early versus potential adopters. *International Journal of Retail & Distribution Management*, 38(6), pp.443-459.
- Clarke III, I. and Flaherty, T. B., 2008. RFID and consumer privacy. *Journal of Internet Commerce*, 7(4), pp.513-527.
- Dabholkar, P., 1996. Consumer evaluations of new technology-based self-service options: an investigation of alternative models of service quality. *International Journal of Research in Marketing*, 13(1), pp.29-51.
- Dabholkar, P.A., Bobbitt, L.M. and Lee, E.-J., 2003. Understanding consumer motivation and behaviour related to self-scanning in retailing: Implications for strategy and research on technology-based self-service. *International Journal of Service Industry Management*, 14(1), pp.59-95.
- Dunne, P., Lush, R. and Carver, J., 2014. *Retailing*. Eight Edition. Mason: Cengage Learning.
- Exact Cercetare și Consultanță, 2013. *Comportamentul de cumpărare din magazine*. [pdf] Available at: <[http://www.exactcc.ro/Photos/Studies/Comportamente %20de%20cumparare%20din%20magazine.pdf](http://www.exactcc.ro/Photos/Studies/Comportamente%20de%20cumparare%20din%20magazine.pdf)> [Accessed 12 March 2015].

- Ko, E. and Kincade, D.H., 1997. The impact of quick response technologies on retail store attributes. *International Journal of Retail & Distribution Management*, 25(2), pp.90-98.
- Labăr, A. V., 2008. *SPSS pentru științele educației. Metodologia analizei datelor în cercetarea pedagogică*. Iași: Editura Polirom.
- Leung, L.S.K. and Matanda, M. J., 2013. The impact of basic human needs on the use of retailing self-service technologies: A study of self-determination theory. *Journal of Retailing and Consumer Services*, 20(6), pp.549-559.
- Lin, J.-S.C. and Hsieh, P.-L., 2011. Assessing the self-service technology encounters: development and validation of SSTQUAL scale. *Journal of Retailing*, 87 (2), pp.194-206.
- Malhotra, N., 2007. *Marketing research. An applied orientation*. 5<sup>th</sup> Edition, New Jersey: Pearson Prentice Hall.
- Martinelli, E. and Balboni, B., 2012. Retail service quality as a key activator of grocery store loyalty. *The Service Industries Journal*, 32 (14), pp.2233-2247.
- Orel, F.D. and Kara, A., 2014. Supermarket self-checkout service quality, customer satisfaction, and loyalty: Empirical evidence from an emerging market. *Journal of Retailing and Consumer Services*, 21(2), pp. 118-129.
- Pantano, E. and Di Pietro, L., 2012. Understanding consumer's acceptance of technology-based innovations in retailing. *Journal of Technology Management & Innovation*, 7(4), pp.1-19.
- Pantano, E., Iazzolino, G. and Migliano, G., 2013. Obsolescence risk in advanced technologies for retailing: A management perspective. *Journal of Retailing and Consumer Services*, 20(2), pp.225-233.
- Pantano, E. and Naccarato, G., 2010. Entertainment in retailing: The influences of advanced technologies. *Journal of Retailing and Consumer Services*, 17(3), pp.200-204.
- Pantano, E. and Viassone, M., 2014. Demand pull and technology push perspective in technology-based innovations for the points of sale: The retailers evaluation. *Journal of Retailing and Consumer Services*, 21(1), pp.43-47.
- Plêșea, D., 2007. RF-ID technology and future's hypermarkets. *Amfiteatru Economic*, 9(21), pp. 91-96.
- Ray, R., 2010. *Supply chain management for retailing*. New Delhi: Tata McGrawHill.
- Ranjbarian, B., Barari, M. and Salehni, M., 2011. Word of mouth communication and some consumption habits among Iranian consumers. *African Journal of Business Management*, 5(26), pp.10303-10313.
- Renko, S. and Druzijanic, M., 2014. Perceived usefulness of innovative technology in retailing: Consumers' and retailers' point of view. *Journal of Retailing and Consumer Services*, 21(5), pp.836-843.
- Shukla, P. and Babin, B.J., 2013. Effects of consumer psychographics and store characteristics in influencing shopping value and store switching. *Journal of Consumer Behaviour*, 12 (3), pp.194-203.
- Theodoridis, P.K and Chatzipanagiotou, K.C., 2009. Stores image attributes and customer satisfaction across different customer profiles within the supermarket sector in Greece. *European Journal of Marketing*, 43 (5/6), pp.708-734.
- van Ittersum, K., Wansink, B., Pennings, J.M.E. and Sheehan, D., 2013. Smart shopping carts: How real time feedback influences spending. *Journal of Marketing*, 77(6), pp.21-36.
- Vazquez, R., Rodriguez-Del Bosque, I.A., Diaz, A.M. and Ruiz, A.V., 2001. Service quality in supermarket retailing: Identifying critical service experiences. *Journal of Retailing and Consumer Services*, 8(1), pp. 1-14.

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