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INNOVATIVE INFORMATION TECHNOLOGIES AND THEIR IMPACT ON THE PERFORMANCE OF THE ENTITIES WHICH ACTIVATE IN THE RETAIL INDUSTRY

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Abstract

The use of innovative information technologies can represent an advantage for the companies in the retail industry. This research is based on the results of an empirical study. The research was built under the auspices of the diffusion of innovations theory. Using the questionnaires collected we could establish correlations between the variables included into three categories (company's size, the information technologies used for retail, the impact of information technologies on the company) and we developed two original econometric models. The turnover is considered an endogenous variable (underlying the impact of the information technologies on its value) as well as exogenous (the existence of a unique computers network within the company depending on the turnover as a development factor). The models show that there is a negative correlation between the total turnover and the percentage of the turnover obtained through online sales, respectively the existence of a unique computers network is influenced by the existence of the online retail within the company. The conclusions underline the research limits and the necessary future developments.

Keywords: Communication and information technologies, Retail, Diffusion of innovations theory, Empirical study, Econometric models, Endogenous and exogenous variable

JEL Classification: M15, M41.

Introduction

The organizations have to face an environment continuously changing. Such a transformation is brought by the changes and evolution of the clients' needs, the technological progress to satisfy these needs and the evolution of the business management (Porter, 1997). A success factor is represented by the innovations (Coca, Dobrea and Vasiliu, 2013).

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Along with the general information technologies used by a company (e.g. an accounting software), the companies within the retail industry have to use specific retail software. The innovative degree of the technologies specific to retail is reflected in the degree of interaction between the companies and the customers, and, implicitly, in the degree of satisfaction of the customers. The advanced information technologies, such as the virtual reality, RFID, biometric technology, 3D scanning are meant to influence and improve the clients' experience and satisfaction (Kim and Kim, 2008; Pantano and Naccarato, 2010) and their in store behavior (Liljander, Gillberg, Gummerus and van Riel, 2006). From the companies behavior these technologies offers them constant feedback from the clients and can be used for the development and implementation of more efficient and personalized marketing strategies. Thus, the advanced technologies change the interaction firm – client, by introducing a set of new interactive instruments. The innovative technologies support the clients in making decisions regarding the acquisitions and allow the entities in the retail business to understand clients' objectives and develop successful strategies (Renko and Druzijanic, 2014).

In this paper we analyze the way in which retail is conducted in Romania and also the connections between the technologies used in retail and the other information technologies used within the company. Our study relied on the results of the tests run on the answers obtained to a questionnaire. In this paper we used the diffusion of innovations theory.

The article is structures as it follows: in the first part we present a review of the studies regarding the use of information technologies in the companies involved in the retail industry. We focused the presentation in two directions: the benefits of using the information technologies and the types of technologies used. The part dedicated to the research methodology follows. In the section dedicated to the research results we described the correlations between the variables and two original econometric models built on the basis of the questionnaires' answers. The paper ends with discussions and research conclusions.

1. Literature review

In the present context, characterized by the upward trend of the companies activating in the retail industry and implicitly of the competition, as well as by the changes within the structural coordinates and the exigencies regarding the quality and opportunity of the clients, the technologies become an important tool in the competitiveness growth.

Previous studies analyzed the use of the information technologies in the retail industry from several points of view. The first criteria used for the classification of the articles published in this domain is the group from who's perspective this aspect is analyzed, namely from the point of view of the company (Borges, Hopen and Bins Luce, 2009; Burt and Sparks, 2003; Bush, Bush, Orr and Rocco, 2007 etc.), of the clients (Gil-Saura, Berenguer-Contrí and Ruiz-Molina, 2009 etc.) or of the both parties (Backstrom and Johansson, 2006 etc.).

Another criterion is the analysis of the benefits, limits or of the both categories (Backstrom and Johansson, 2006). Using the benefits classification suggested by Soja (2005) we identified the following categories of benefits determined by the implementation of the information technologies in the retail industry (table no. 1):

Table no. 1: The benefits of the implementation of the information technologies in the companies which activate in the retail industry

Category of benefit	Explanation
Technical benefits	<ul style="list-style-type: none"> • Gather data regarding the behavior of the customer and the market trends quicker and more efficiently (Borges et al., 2009; Sorescu, Frambach, Singh, Rangaswamy and Bridges, 2011; Vieira, 2010; Shankar, Inman, Mantrala, Kelley and Rizley, 2011); • Reliability and accuracy of data, errors reduction (Ellram, La Londe and Weber, 1999; Lawson, 2001);
Organizational benefits	<ul style="list-style-type: none"> • The improvement of the strategic and operational coordination (Borges et al., 2009); • More agile and more flexible business structures (Luftman, Lewis and Oldach, 1993); • The integration of the selling channels (traditional and online) to assure the consistency and circuit of information regarding the clients, orders and inventories (Oh, Teo and Sambamurthy, 2010); • The improvement of the focus on the market’s requests (Borges et al., 2009); • The improvement of the selling points (Pantano and Naccarato, 2010);
Economic benefits	<ul style="list-style-type: none"> • Efficiency of the selling points (Pantano and Laria, 2012; Pantano and Naccarato, 2010); • Costs (Borges et al., 2009) and time (Ellram et al., 1999; Lawson, 2001) reduction; • Improvement of inventories management (Ellram et al., 1999; Lawson, 2001); • Improvement of internal processes (Gil-Saura et al., 2009);
Social benefits	<ul style="list-style-type: none"> • Improvement of the relationship with the customers and business partners (Mentzer and Williams, 2001).

Unlike other activity domains, for which the benefits generated by the implementation of the information technologies were seen only from the point of view of the entity, in the retail industry many studies focus on the benefits as they are perceived by the clients. Thus, the clients consider that the implementation of the information technologies brings better access to services (Bitner, Ostrom and Meuter, 2002) and the services’ improvement through an increase in speed and quality (Ellram et al., 1999; Lawson, 2001; Renko and Druzijanic, 2014), support the decision-making process (Sorescu et al., 2011; Vieira, 2010; Shankar et al., 2011; Dumitrana, Glăvan and Dumitru, 2009), influence the experience of the clients (Bitner et al., 2002; Bharadwaj, Walker Naylor and Hofstede, 2009; Pantano and Naccarato, 2010), bringing higher satisfaction levels (Bitner et al., 2002).

The benefits identified depend on the type of technologies. The interactive technologies (such as, e-mail, hyper-text technologies, web browsers, instant messaging, access technologies such as WiFi, WiMax, mobile phones with web browsing abilities, GPS technologies, social networks such as Facebook, search technologies such as Google, but also bookmarking and technologies for information organization) allowed the entities to

implement new business models, to contact the customers in new ways, to change the provision and delivery of products, to offer the customers the opportunity to interact with each other, to improve the experience of the virtual customers and to benefit from new communication and negotiation instruments between the client and the seller.

There are several classification criterions in the specialized literature. Previous studies focused on the analysis of one type of technology: e-commerce (Borges et al., 2009; Burt and Sparks, 2003); sales force automation (Bush et al., 2007); biometric technologies (Clodfelter, 2010); systems for the determination of the geographic position (Moiseeva and Timmermans, 2010); self-service information technologies (Kallweit, Spreer and Toporowski, 2014; Lee and Yang, 2013); or several tools (for instance, Gil-Saura et al., 2009: bar codes/scanners, self-service technologies, loyalty programs, payment instruments, websites, software).

The information technologies used in the retail industry can be classified using several criterions. One of them is the classification into technologies used in-store and technologies used out-store (Ellram et al., 1999; Lawson, 2001; Liljander et al., 2006; Gil-Saura et al., 2009). The types of technologies used in-store are: the software such as CRM or ERP, POS, RFID, payment methods. Their advantages are that they improve the client's experience, the internal management, the business processes, the communication with the partners, reduce costs. The technologies are used out-store for the transport, warehousing or delivery. In this category we can include the ERPs, warehouse management, GPS.

According to another classification the information technologies can be used before the sale (for instance, self-service technologies), for the sale (for instance, ERP, POS, payment methods) and after the sale (for instance, CRM, GPS).

Rao (2000) classifies the information technologies used in retail from the point of view of the benefits brought to the management of the entities and focus on data warehousing and data mining. The data mining techniques include: association, sequence-based analysis, clustering, classification, estimation and fuzzy logic technique. Regarding the systems for the decision support, these are usually used together with the data warehouse, have a friendly language, allow the generation of data from numerous sources by combining financial and nonfinancial information, external and internal and offer instruments necessary for the regressions, trends analysis, scenarios testing and effects anticipation. In the same time, to improve the commercialization function, the entities can use open-to-buy systems which correlate buying transactions with the buyer's budget, merchandise allocation system which allow their automate replenishment, systems for the promotions planning, POSs, display systems and plan-o-gram software which indicate the employees the places in which the products have to be put or which allow the presentation of the merchandise in an identical manner within the shops, as well as the RFID.

Grewal, Ailawadi, Gauri, Hall, Kopalle and Robertson (2011) approach the innovative technologies indirectly, through three questions: whom they address, what promotions and models to establish the price should be used and how to make efficient promotions. From this perspective, the analyze the following technologies: mobile phone applications, personal assistant for the online shopping and the kiosks for the customers identification; electronic price tags, RFID for prices and promotions; in-store digital messaging and eye-tracking equipment to increase the efficiency of the promotions.

Renko and Druzijanic (2014) approach the innovative technologies used in retail considering their benefits and limits from the point of view of the customers and the companies in Croatia. The clients don't consider that the implementation of innovative technologies will affect their loyalty towards a certain shop. The information technologies which have a great impact on the companies analyzed are the programs with loyalty cards, the social networks and the online commerce. Regarding the limits of the innovative information technologies used in retail, the companies mentioned: limited contact with the clients, high costs and the need to train the sales persons to use the new technologies. An interesting finding is that the use of the innovative technologies is recognized by the clients, but there is a lack of trust and the ones that don't have the necessary knowledge and experience appreciate them as too complex and a probable source of stress.

The e-marketing comprises e-commerce websites, intranet, extranet, CRM and SFA systems (Trainor, Rapp, Beitelspacher and Schillewaert, 2011). E-commerce goes beyond the entity's limits and influences directly the attitude of the entity towards the market and the profitability, by offering new solutions, extending the clients' access and facilitating the appearance of new business models. From the point of view of the diffusion of innovations theory, the e-commerce causes at first shock and rejection, followed by the phases of recognitions, adaptation and change (Burt and Sparks, 2003). Some studies analyze the e-commerce on types of merchandise sold (for instance, Gil-Saura et al., 2009).

The information technologies influence the performance of the companies and their ability to satisfy the clients' needs is they are used for the integration of multiple channels. The integrated promotion, integrated management of the information regarding the transactions, products and prices, integrated access to information, integrated fulfillment of the orders, integrated services for the customers, improve the efficiency, innovating capacity and the performance of the entities in the retail industry (Oh et al., 2012).

The success of the implementation of the information technologies by the companies in the retail industry doesn't depend only on their degree of innovation, but also on the possibility of the clients' to accept the concept, on their using the system and on the way in which they interact with this new retail environment (Burt and Sparks, 2003), on flexibility, information security and innovation (Venkatraman, 2000). Thus, while the entities use advanced techniques to create attractive in-store experiences for their customers, sometimes they are attracted by old cultural values (such as the shop assistants behavior) (Backstrom and Johansson, 2006).

2. Research methodology

The authors of the previous papers use different theories, such as the theory of reasoned action (Jones, Sundaram and Chin, 2002; Speir and Venkatesh, 2002; Lee and Yang, 2013), technology acceptance model (Jones et al., 2002; Speir and Venkatesh, 2002; Dabholkar and Bagozzi, 2002; Weijters, Rangarajan, Falk and Schillewaert, 2007; Kowatsch and Maass, 2010; Renko and Druzijanic, 2014), diffusion theory (Weijters et al., 2007; Kowatsch and Maass, 2010), contingency theory (Tsai, Raghu and Shao, 2013). As a research methodology, the papers published previously adopted as research method the case studies (Backstrom and Johansson, 2006; Borges et al., 2009), questionnaires addressing the companies' representatives (Oh et al., 2010; Renko and Ficko, 2010; Tsai et al., 2013), questionnaires addressing the customers (Gil-Saura et al., 2009; Lee and Yang, 2013;

Renko and Druzijanic, 2014), interviews with the companies' representatives (Bush et al., 2007; Renko and Druzijanic, 2014), laboratory experiments (Kallweit et al., 2014; Dabholkar and Bagozzi, 2002).

This study relies on *the diffusion of innovations theory*. This is the most used theory for explaining the measure in which an innovation is spread within a population (Straub, 2009). It is the foundation of understanding the decision to implement an innovation. For the IT, their potential to improve the company's performance is a strong motivation for implementation. This is made progressively, covering an increasingly numerous population. Three components influence the diffusion process: the characteristics of the innovations, the characteristics of the companies adopting the innovation and the characteristics of the environment. In this case, the innovations are the ones specific to IT implemented in retail, the characteristics of the companies are defined in terms of size and the environment is the Romanian one.

This research relies on the results of an empirical study regarding the use of the information technologies in the Romanian companies. The study considers the opinion of the companies' representatives, not of the customers. The questions related to the use of the IT in retail took into account the online sales. We have made this choice because we considered that this segment cannot exist without the support of the IT and this analysis is the most relevant for this research. In the same time, we started from the idea that most of the companies activating in the retail business has online sales and we considered that the research results will be easier generalized starting from a sample of companies. The questionnaire had 21 questions and was split into three sections: information regarding the company (number of employees, turnover, total assets, the company's domain, the existence of a unique computers network), information about the retail activity (company has retail activity, types of products sold, online retail activity, percentage of the turnover represented by the online sales – above or under 50%, types of websites used for the online sales – company's websites, websites specialized in announcements such as Mercador, price comparators such as Shopmania, the use of Google commercials, the types of payment used) and information regarding the computerization of the company's activities (the most important criteria which determined the applications choice, benefits generated by the use of information systems, difficulties appeared in the implementation of the information systems, potential future effects of the use of information technologies). The questionnaire was pre-tested by two academics. After this phase, changes were necessary in order to present clearer expressions. The questionnaire was posted on Google Drive in September, 2014. It was available until November 15, 2014.

The following research hypotheses were formulated (restructured in two classes of presumptions specific to the research):

- The variable I.5 defined by the existence of a unique computers network at the level of the company is an exogenous or explanatory variable (I.2 becoming an endogenous variable):
 - The turnover of the company can be modelled with the variable generated by the existence of a unique computers network at the level of the company;
 - The capacity of the company to be involved in online retail depends on the existence of a unique computers network at the level of a company;

- The instruments used for the online sales depend on the existence of a unique computers network within the company;
- The use of the Google commercials for the online sales depends on the existence of a unique computers network within the company.
- The variable I.5 defined by the existence of a unique computers network at the level of the company is an endogenous variable or explained variable (I.2 becoming an exogenous variable this time):
 - The existence of a unique computers network within the company depends on the turnover;
 - The existence of a unique computers network within the company depends on the existence of the online retail activity;
 - The existence of a unique computers network within the company depends on the instruments used for the online sales;
 - The existence of a unique computers network within the company depends on the use of the Google commercials for the online sales.

21 variables were analyzed in a correlation matrix. Among them, 11 variables were kept in order to prove the research hypotheses and to build the econometric models. The first variable starts from question I2 who's answers received the values -1, 0, 1 according to the turnover's level (the only one of the 11 variables rebuilt to model the turnover according to the existence of a unique computers network at the level of the company) and afterwards ten other explanatory or endogenous variable. All the variables modelled are codified according to the information presented in Table no. 2:

Table no. 2: Variables used

Question	Variable	Description
I.2	SER01	Turnover
I.5	SER02	The existence of a unique computers network within the company
II.1	SER03	The company has retail activity
II.3	SER04	The company has online retail activity
II.4	SER05	The percentage of sales represented by the online retail
II.5	SER06	Tools used for the online sales
II.6	SER07	The use of Google commercials
III.2	SER08	Type of software used within the company
III.4	SER09	Percentage of work done with Excel
III.8A	SER10	Dematerialization of the documents and procedures
III.9	SER11	The measure in which the software corresponded to the expectations

3. The results of the empirical study

77 answers were received to the questionnaire. In order to analyze the companies represented by the respondents from the point of view of the size, we used three variables: the number of employees, the turnover, the total asset. About 35% of the companies had less than 25 employees, about 53% had a number of employees between 25 and 100 and the rest of 12% of the companies had more than 100 employees. Graphically, the situation is presented in figure no. 1:

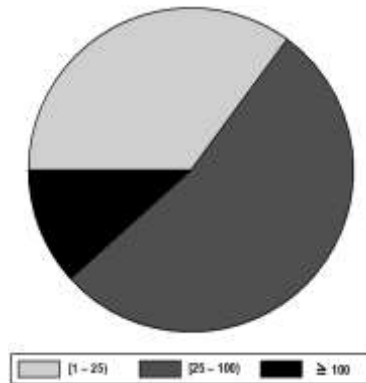


Figure no. 1: The structure of the sample from the point of view of the average number of employees registered in 2013

The value of the turnover registered in 2013 was less than 100,000 EUR for 23% of the companies, between 100,001 and 1,000,000 EUR for 52% of the companies and above 1,000,000 EUR for 25% of the companies. Graphically, the structure of the respondents according to the turnover is presented in figure no. 2:

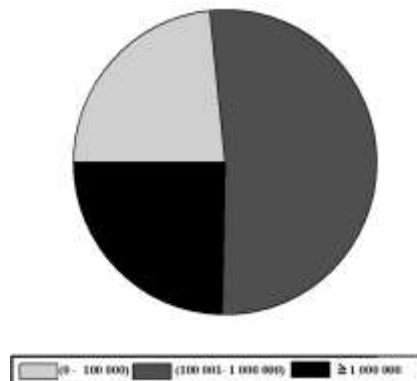


Figure no. 2: The structure of the sample from the point of view of the turnover registered in 2013

For the value of the total assets we used the same intervals as for the turnover and the percentages registered were 36%, 43% and, respectively, 19%. Graphically, the situation of the total asset is presented in figure no. 3:

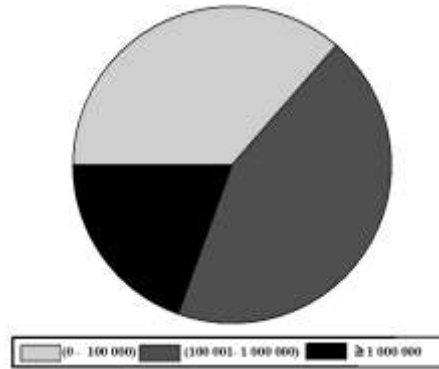


Figure no. 3: The structure of the sample from the point of view of the total assets registered in 2013

The previous charts prove that the sample was relatively representative, within ranges according to the present development level and the present structure of the Romanian companies.

The correlation matrixes, both the extended one and two of the restricted matrixes, based on which the econometric models were created, are presented in the tables 3.1-3.3

Table no. 3.1: The extended correlation matrix – section *General information*

Variable	SER01	SER02
SER01	1.000000	0.445733
SER02	0.445733	1.000000
SER03	-0.207094	-0.138439
SER04	-0.097653	0.294332
SER05	-0.240112	0.013202
SER06	-0.151404	0.212577
SER07	0.048503	0.202933
SER08	0.243936	0.227119
SER09	-0.038579	-0.234327
SER10	0.281341	0.344301
SER11	0.184047	0.230719

Source: Values determined by the authors with the help of the EViews software.

Table no. 3.2: Restricted correlation matrix – section *Retail information*

Variable	SER03	SER04	SER05	SER06	SER07
SER01	-0.207094	-0.097653	-0.240112	-0.151404	0.048503
SER02	-0.138439	0.294332	0.013202	0.212577	0.202933
SER03	1.000000	0.592849	0.289579	0.369388	0.008231
SER04	0.592849	1.000000	0.448107	0.730192	0.226938

Variable	SER03	SER04	SER05	SER06	SER07
SER05	0.289579	0.448107	1.000000	0.473586	0.340442
SER06	0.369388	0.730192	0.473586	1.000000	0.197698
SER07	0.008231	0.226938	0.340442	0.197698	1.000000
SER08	0.025265	0.238149	-0.130668	0.073341	0.116740
SER09	-0.109659	-0.270634	-0.007566	-0.252050	0.014462
SER10	-0.149424	0.158065	-0.035701	0.104943	0.159564
SER11	0.066512	0.162767	0.060185	-0.003234	0.008350

Source: Values determined by the authors with the help of the EViews software.

Table no. 3.3: Restricted correlation matrix – section Information on the computerization of the activity within the company

Variable	SER08	SER09	SER10	SER11
SER01	0.243936	-0.038579	0.281341	0.184047
SER02	0.227119	-0.234327	0.344301	0.230719
SER03	0.025265	-0.109659	-0.149424	0.066512
SER04	0.238149	-0.270634	0.158065	0.162767
SER05	-0.130668	-0.007566	-0.035701	0.060185
SER06	0.073341	-0.252050	0.104943	-0.003234
SER07	0.116740	0.014462	0.159564	0.008350
SER08	1.000000	-0.289362	0.270163	0.163695
SER09	-0.289362	1.000000	-0.126410	-0.229233
SER10	0.270163	-0.126410	1.000000	0.136614
SER11	0.163695	-0.229233	0.136614	1.000000

Source: Values determined by the authors with the help of the EViews software.

The first section of Table 3 shows that the hypotheses of dependency of the turnover with the existence of a unique computers network are validated with a high intensity (I5 being defined by the model's authors as an exogenous variable or factorial in the first case), but also the hypotheses of dependency of the existence of a unique computers network with the turnover, with the online sales and with the use of information technologies as a consequence of the dematerialization of the documents and the procedures, as well as with the expectations related with the optimum implementation of the company's software (I5 being redefined as an endogenous or resulting variable in the second case as well).

In the second part, which was dedicated to the analysis of the retail activity, we noticed that this activity is directly correlated with the online commerce, with the percentage of the turnover obtained through online sales, with the types of websites used for sale and indirectly correlated with the turnover, which means that the companies in our sample which have online retail have a smaller turnover than others. The online sales are directly correlated with the existence of a computers network, with the retail activity, with the percentage of the turnover obtained through online sales, with the types of websites used for the sales and with the use of the Google commercials. For our sample we identified strong correlations between the percentage of the turnover obtained through online sales (as an endogenous variable) and the retail activity, the online sales, the types of websites used for sale and the use of the Google commercials. It is indirectly correlated with the total volume of the turnover. The types of software used for sales are directly correlated with the existence of a computers network, the retail activity, the online sales and the percentage of

the turnover obtained through online sales and indirectly correlated with the percentage of works accomplished with Excel or similar software. The use of the Google commercials is correlated with the existence of a computers network in the company, the online sales and the value of the turnover obtained through online sales.

The third section of the restricted correlation matrix shows that the type of software used for the activities within the company (ERP, independent software on types of activities produced by the same company or by different vendors) are significantly correlated with the turnover's volume, the existence of a unique computers network and the online sales. The percentage in which software similar to Excel is used within the company is indirectly correlated with the existence of a unique computers network within the company, the online sales and the types of websites used for sale. The potential effects mentioned by the respondents regarding the use of information technologies (such as the dematerialization of the documents and the procedures) are directly correlated with the turnover and with the existence of a computers network. The degree in which the expectations of the respondents were met by the implementation of the information technologies is directly correlated with the turnover.

Starting from the correlation matrix, we tested several models.

The first is the one of the dependence of the turnover (SER01) on the existence of a unique computers network within the company (SER02), but also on the percentage of the turnover obtained through online sales (SER05), the type of software used for the company's computerization (SER08) and the dematerialization of the documents and procedures as a potential effect of the implementation of the information technologies (SER10). The model is presented as it follows:

$$SER01 = \alpha + \beta SER02 + \gamma SER05 + \delta SER08 + \lambda SER10 + \varepsilon, \tag{1}$$

where $\alpha, \beta, \gamma, \delta, \lambda$ are the correlation coefficients and is the intercept.

The tests are presented in table no. 4.

Table no. 4: Statistical tests for model 1

Dependent Variable: SER01				
Method: Least Squares				
Sample: 1 77				
Included observations: 77				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.653450	0.147882	-4.418738	0.0000
SER02	0.563438	0.156270	3.605543	0.0006
SER05	-0.246711	0.108679	-2.270100	0.0262
SER08	0.089229	0.099113	0.900275	0.3710
SER10	0.157899	0.150711	1.047690	0.2983
R-squared	0.283091	Mean dependent var	0.012987	
Adjusted R-squared	0.243263	S.D. dependent var	0.697618	
S.E. of regression	0.606863	Akaike info criterion	1.901702	
Sum squared resid	26.51632	Schwarz criterion	2.053897	
Log likelihood	-68.21553	F-statistic	7.107792	
Durbin-Watson stat	1.968406	Prob(F-statistic)	0.000070	

Source: Values determined by the authors with the help of the EViews software.

The equation which results for our sample is the following:

$$\text{SER01} = -0.653450 + 0.563438\text{SER02} - 0.246711\text{SER05} + 0.089229\text{SER08} + 0.157899\text{SER10} + \varepsilon \quad (2)$$

We notice a negative correlation between the total turnover and the percentage of the turnover represented by the online sales, which shows that the companies have other selling channels. At the moment the Romanian companies cannot increase significantly the percentage of online sales without decreasing the rest of the types of sales and even the total turnover in the end. The turnover is positively correlated with the existence of a unique computers network at the company's level, the type of software used for the computerization of the company and the dematerialization of the documents and procedures as a potential effect of the implementation of the information technologies.

The R² coefficient shows a determination of 0.283091 for this model, which leads to a R = 0.532, representing a value which is above the theoretical level of intensity of the statistical correlation. The value of the Fisher – Snedecor (F-statistics) test is above seven and relatively validated the associations made in the model analyzed.

The second model tested within this research was connected to the decision to finance and implement a unique computers network at the level of the company, according to the turnover, the existence of the e-commerce within the company and the dematerialization of the documents and the procedures as a future potential effect of the implementation of the information technologies. The model is presented as it follows:

$$\text{SER02} = \alpha + \beta\text{SER01} + \gamma\text{SER04} + \delta\text{SER10} + \varepsilon, \quad (3)$$

where $\alpha, \beta, \gamma, \delta$ are the correlation coefficients and ε is the intercept.

The tests are presented in table no. 5.

Table no. 5: Statistical tests for model 2

Dependent Variable: SER02 Method: Least Squares Sample: 1 77				
Included observations: 77				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.478645	0.067169	7.125935	0.0000
SER01	0.293588	0.068935	4.258886	0.0001
SER04	0.341138	0.107699	3.167525	0.0022
SER10	0.167609	0.096317	1.740183	0.0860
R-squared	0.341252	Mean dependent var		0.649351
Adjusted R-squared	0.314180	S.D. dependent var		0.480302
S.E. of regression	0.397759	Akaike info criterion		1.044608
Sum squared resid	11.54948	Schwarz criterion		1.166364
Log likelihood	-36.21742	F-statistic		12.60541
Durbin-Watson stat	1.957837	Prob(F-statistic)		0.000001

Source: Values determined by the authors with the help of the EViews software.

The equation which resulted for our sample is the following:

$$\text{SER02} = 0.478645 + 0.293588\text{SER01} + 0.341138\text{SER04} + 0.167609\text{SER10} + \varepsilon \quad (4)$$

We notice that the existence of a unique computers network at the level of the company is determined directly by the turnover's volume, the existence of the online sales and the dematerialization of the documents and procedures. In other words, the companies with a high turnover, with online sales and in which the dematerialization of the documents and procedures is wanted, have a computers' network.

The R^2 coefficient shows a determination of 0.341252 for this model, which leads to a $R = 0.584$, representing a value which is above the theoretical level of intensity of the statistical correlation. The value of the Fisher – Snedecor (F-statistics) test is above 12.6 and relatively validates the associations made in the model analyzed.

Conclusions

In this work the authors started from a literature review within which we emphasized the benefits obtained by the companies which use innovative technologies in their retail activity and we analyzed the types of technologies used. The results lead to the idea that the innovative technologies improve the interaction between the companies and clients and suppliers, streamlines their ability to answer the continuously changing needs of the clients and contribute to the increase of the financial performance of the companies in retail industry.

The second part of the study was dedicated to a quantitative research of the impact of information technologies on the performance on a sample of companies which have e-commerce activity. Some of the correlations identified, such as the intensity correlation above the average, which exists between the retail and online sales (considered, in turn, exogenous and endogenous variables) validate the idea, which generated actually the article, that the online sales are used more intensely by most of the companies with retail activity. To this is added the validation of the high intensity correlation between the percentage of the turnover obtained through online sales (as an endogenous variable) and the retail activity, online sales, types of websites used for sale and the use of the Google commercials.

One of the limits of the research is the reduced number of answers obtained in this first investigation, in which there is a risk to consider the results as simple opinions regarding the association and hierarchy of exogenous variables. Without being able to define performant models within this article, yet, the econometrical models obtained and presented on a relatively restricted number of companies (77) for a number of only 21 initial variables and only eleven selected in the end represent a necessary and in the same time original start of construction, taking into account the variables and explanatory phenomenon or the typology of the exogenous factors.

This paper is just the author's first research in the area and one can see that even at a very low size of the investigated sample some pioneer models are partly validated and are interesting for the future studies, even they present risks when testes on bigger populations. In the future, the models created within this research will possibly be tested on big samples of companies for both situations of modelling the turnover (as an exogenous and an endogenous variable). In the same time, the correlation between the use of the innovating information technologies and the performance of the companies will be possibly tested

more profoundly, qualitatively, in companies recognized as emblematic for the retail channels used in their business.

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References

- Backstrom, K. and Johansson, U., 2006. Creating and consuming experiences in retail store environments: Comparing retailer and consumer perspectives. *Journal of Retailing and Consumer Services*, 13(6), pp. 417-430.
- Bharadwaj, N., Walker Naylor, R. and Hofstede, F., 2009. Consumer response to and choice of customized versus standardized systems. *International Journal of Research in Marketing*, 26(3), pp. 216-227.
- Bitner, M.J., Ostrom, A.L. and Meuter, M.L., 2002. Implementing successful self-service technologies. *Academy of Management Executive*, 16(4), pp. 96-109.
- Borges, M., Hoppen, N. and Bins Luce, F., 2009. Information technology impact on market orientation in e-business. *Journal of Business Research*, 62(9), pp. 883-890.
- Burt, S. and Sparks, L., 2003. E-commerce and the retail process: a review. *Journal of Retailing and Consumer Services*, 10(5), pp. 275-286.
- Bush, A.J., Bush, V.D., Orr, L.M. and Rocco, R.A., 2007. Sales technology: help or hindrance to ethical behaviors and productivity? *Journal of Business Research*, 60(11), pp. 1198-1205.
- Clodfelter, R., 2010. Biometric technology in retailing: will consumers accept fingerprint authentication? *Journal of Retailing and Consumer Services*, 17(3), pp. 181-188.
- Dabholkar, P.A. and Bagozzi, R.P., 2002. An attitudinal model of technology-based self-service: moderating effects of consumer traits and situational factors. *Journal of Academy of Marketing Science*, 30(3), pp. 184-201.
- Dumitrana, M., Glăvan, M. and Dumitru, M., 2009. Pleading for the management controller profession in the trade area. *Amfiteatru Economic*, 11(25), pp. 91-102.
- Ellram, L.M., La Londe, B.J. and Weber, M.M., 1999. Retail logistics. *International Journal of Physical Distribution & Logistics Management*, 29(7/8), pp. 477-494.
- Gil-Saura, I., Berenguer-Contró, G. and Ruiz-Molina, M.E., 2009. Information and communication technology in retailing: a cross-industry comparison. *Journal of Retailing and Consumer Services*, 16(3), pp. 232-238.
- Grewal, D., Ailawadi, K.L., Gauri, D., Hall, K., Kopalle, P. and Robertson, J.R., 2011. Innovations in retail pricing and promotions. *Journal of Retailing*, 87(1), pp. S43-S52.

- Jones, E., Sundaram, S., and Chin, W., 2002. Factors leading to sales force automation use: a longitudinal analysis. *Journal of personal selling & sales management*, 22(3), pp. 145-56.
- Kallweit, K., Spreer, P. and Toporowski, W., 2014. Why do customers use self-service information technologies in retail? The mediating effect of perceived service quality. *Journal of retailing and consumer services*, 21(3), pp. 268-276
- Kim, H.Y. and Kim, Y.K., 2008. Shopping enjoyment and store shopping modes: the moderating influence of chronic time pressure. *Journal of retailing and consumer services*, 15(5), pp. 410-419.
- Kowatsch, T. and Maass, W., 2010. In-store consumer behavior: how mobile recommendation agents influence usage intentions, product purchases, and store preferences. *Computers in Human Behavior*, 26(4), pp. 697-704.
- Lee, H.J. and Yang, K., 2013. Interpersonal service quality, self-service technology (SST) service quality, and retail patronage. *Journal of Retailing and Consumer Services*, 20(1), pp. 51-57.
- Liljander, V., Gillberg, F., Gummerus, J. and van Riel, A., 2006. Technology readiness and the evaluation and adoption of self-service technologies. *Journal of Retailing and Consumer Services*, 13 (3), pp. 177-191.
- Lowson, R.H., 2001. Retail operational strategies in complex supply chains. *International Journal of Logistics Management*, 12(1), pp. 97-111.
- Luftman, J.N., Lewis, P.R. and Oldach, S.H., 1993. Transforming the enterprise: the alignment of business and IT strategies. *IBM Systems Journal*, 32(1), pp. 198-221.
- Mentzer, J.T. and Williams, L.R., 2001. The role of logistics leverage in marketing strategy. *Journal of Marketing Channels*, 8(3-4), pp. 29-48.
- Moiseeva, A. and Timmermans, H. 2010. Imputing relevant information from multi-day GPS tracers for retail planning and management using data fusion and context-sensitive learning. *Journal of Retailing and Consumer Services*, 17(3), pp. 189-199.
- Oh, L., Teo, H. and Sambamurthy, V., 2012. The effects of retail channel integration through the use of information technologies on firm performance. *Journal of Operations Management*, 30(5), pp. 368-381.
- Pantano, E. and Laria, G., 2012. Innovation in retail process: from consumers' experience to immersive store design. *Journal of Technology Management & Innovation*, 7(3), pp. 194-206.
- 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.
- Porter, M.E., 1997. Creating advantages. *Executive Excellence*, 14 (2), pp. 17-18.
- Rao, B.P., 2000. Improving retail effectiveness through technology: a survey of analytical tools for physical and on-line retailers. *Technology in Society*, 22(1), pp. 111-122.
- 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.
- Renko, S. and Ficko, D., 2010. New logistics technologies in improving customer value in retailing service. *Journal of Retailing and Consumer Services*, 17(3), pp. 216-223.

- Shankar, V., Inman, J.J., Mantrala, M., Kelley, E. and Rizley, R., 2011. Innovations in shopper marketing: current insights and future research issues. *Journal of Retailing*, 87S (1), pp. S29-S42.
- Soja, P., 2005. The impact of ERP implementation on the enterprise – An empirical study. In: W. Abramowicz, *8th International Conference on Business Information Systems*, Poznań, Poland.
- Sorescu, A., Frambach, R.T., Singh, J., Rangaswamy, A. and Bridges, C., 2011. Innovations in retail business models. *Journal of Retailing*, 87S (1), pp. S3-S16.
- Speir, C. and Venkatesh, V., 2002. The hidden minefields in the adoption of sales force automation technologies. *Journal of Marketing*, 66(7), pp. 98-111.
- Straub, E.T., 2009. Understanding technology adoption: theory and future directions for informal learning. *Review of Educational Research*, 79(2), pp. 625-649
- Trainor, J.K., Rapp, A., Beitelspacher, L.S. and Schillewaert, N. 2011. Integrating information technology and marketing: An examination of the drivers and outcomes of e-Marketing capability. *Industrial Marketing Management*, 40(1), pp. 162-174.
- Tsai, J.Y., Raghu, T.S. and Shao, B.B.M., 2013. Information systems and technology sourcing strategies of e-retailers for value chain enablement. *Journal of Operations Management*, 31(6), pp. 345-362.
- Varadarajan, R., Srinivasan, R., Vadakkepatt, G.G., Yadav, M.S. and Pavlou, P.A., Krishnamurthy, S. and Krause, T., 2010. Interactive Technologies and Retailing Strategy: A Review, Conceptual Framework and Future Research Directions. *Journal of Interactive Marketing*, 20(2), pp. 96-110.
- Venkatraman, N., 2000. Five steps to a dot-com strategy: how to find your footing on the web. *Sloan Management Review*, 41(3), pp. 15-28.
- Vieira, V.A., 2010. Visual aesthetics in store environment and its moderating role on consumer intention. *Journal of Consumer Behaviour*, 9(5), pp. 364-380.
- Weijters, B., Rangarajan, D., Falk, T. and Schillewaert, N., 2007. Determinants and outcomes of customers' use of self-service technology in a retail setting. *Journal of Service Research*, 10(1), pp. 3-21.