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THE IMPACT OF ARTIFICIAL INTELLIGENCE USE ON E-COMMERCE IN ROMANIA

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Abstract

This study aims at identifying the tools used in e-commerce, able to optimize marketing campaigns. Managerial and marketing processes have been identified in the relevant body of knowledge that can be optimized using artificial intelligence; thus, a questionnaire has been designed within a quantitative research. The sample used in the research consists of 201 persons having managerial positions, who are involved in e-commerce, their companies' have been their company active in 2020, with at least one employee. The article highlights the managerial tools used in promoting products in the online environment and business processes that they want to optimize using artificial intelligence. At the same time, for the quantitative study, three hypotheses have been tested to identify the motivation to buy online, as well as the methods used by online store managers in the communication process. The limitations of this study are determined by the fact that only the managerial perspective is analysed, without considering the perception of the final consumer, which could have ethical implications. Optimizing the flow of stocks and logistics processes will be the subject of future research considering that it is the main challenge for management, as the quantitative research proved.

Keywords: e-commerce, m-commerce, artificial intelligence, marketing automation.

JEL Classification: M31, M15, O33

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Introduction

In the context of accelerated digitization, the role of online marketing in a company's strategy is expanding significantly, as proved by the increase in companies' investments within e-commerce activities. About a quarter of total marketing budgets (26%) are used by companies whose only business model is online commerce (Alvarez, 2013). In addition to the profitability and changes in customer behaviour, investments in digitization are argued primarily by their results, but also by the fact that they are easier to measure compared to those of traditional marketing (Pickton, 2005).

As customers interact more and more with companies through digital channels and social networks, marketers have recognized the need to track these interactions and measure their performances (Chaffey and Patron, 2012). To this end, companies need to adopt web analytics tools that help collecting, measuring, analyzing and reporting data to web visitors, in order to understand and optimize the use of e-commerce platforms, also called Big Data. Today, online marketing is an essential branch of e-commerce and includes different ways of promoting a company, such as email marketing, content marketing, social media, affiliate marketing and other marketing strategies. The diversity of content sharing channels on the Internet and the way it is presented, requires marketers to consider the location and how their customers communicate. Thus, new opportunities are noticed in Mobile Commerce (m-commerce), which becomes a valuable solution for improving e-commerce, which allows users to interact with merchants, anywhere and anytime. It is found that over a third of buyers have made at least one purchase through a smart mobile device in the last 6 months (Alvarez, 2013). Kang et al. (2015) highlighted the increased use of mobile communications, and the fast growth of mobile shopping technologies has considerable financial potential, especially for retail transactions between businesses and consumers.

The main objective of this research is to highlight the role of management teams from e-commerce companies to automate processes and streamline data flows through predictive analytical platforms based on artificial intelligence algorithms. The specific objectives aim at testing the correlations between the intention of managers to automate certain marketing processes through artificial intelligence algorithms and the intent to identify customer satisfaction, respectively the use of a Customer Relationship Management (CRM) application.

Starting from the general concepts related to e-commerce outlined in the literature review and presented in the first section of this article, Section 2 addresses the transition to e-commerce on mobile devices (m-commerce). Based on the trends of e-commerce in Romania discussed in Section 3, a quantitative research is conducted to analyse the perceptions of online store managers on artificial intelligence algorithms in Sections 4 and 5, the findings being presented in Section 6. Discussions of the results are highlighted in Section 7, and the last section illustrates the research conclusions.

1. Digital Commerce - general concept

E-commerce is increasingly used by traditional companies looking to expand in the online environment, as well as by companies that were established due to the benefits of the Internet, especially for B2C digital commerce (Chaparro-Peláez, Agudo-Peregrina and Pascual-Miguel, 2016). Taylor (2019) estimates that the growth rate of online commerce

adoption will reach an average of about 25% by 2026. The pillars for these predictions are given by the growth rates of over 30% found in 2015 and 2018 (Eurostat, 2018; Monnot, et al., 2019), being estimated similar values taking into account the context of the COVID-19 pandemic caused by coronavirus.

Although e-commerce has been promoted in developed countries from Western Europe and America, the developing regions of Eastern Europe and Asia have seen an exceptional expansion of the digital commerce industry in the last ten years. Countries like India, China and Singapore have developed a real culture for online business. Of these, China is the largest power in the digital market, with the largest volume of online sales in the world. China's progress in this area is largely due to Alibaba's digital commerce company, which monopolizes the local market (26.6%) and provides opportunities for local business development by marketing products online worldwide (Zhang, et al., 2020). Although the digital market offers many benefits, the lack of consumer confidence in the relationship with online merchants has been a major inhibitor to access the global market (Srinivasan and Barker, 2012). Buyers' trust in online companies is influenced by factors such as integrity, transparency, quality, location, ease of use of the online trading platform, confirmed by McKnight, Choudhury and Kacmar (2002). These factors become even more evident in the context in which consumer attention is divided between more and more screens of different sizes. One of the most researched areas of online marketing is the buying behaviour of users depending on the device used, areas of interest, searches and pages visited to make online purchases. Many companies have focused their efforts on identifying the probability that a visitor will complete a transaction, turning these tools into business models (Bucklin and Sismeiro, 2009).

By the end of 2017, Google and Facebook became the two largest online companies occupying over 60% of the online advertising market in the US. E-commerce giants, such as Amazon and Alibaba, are experiencing exponential growth using smart promotional tools that exploit consumer behaviour on social media and search engines. The more and more varied these companies offer products, the more likely they are to buy for visitors and buyers, resulting in a faster flow of stock. Moreover, platforms such as Amazon have begun to develop these mechanisms for understanding the behaviour of internal users, better optimizing this flow and integrating it into their own systems such as Kindle, Amazon Prime Video and Alexa (Ritala, Golnam and Wegmann, 2014). Thus, in the digital trade, an economy has developed that favours the largest companies to the detriment of the small ones that have too little data to make relevant recommendations to customers. Other similar examples are Uber, the largest company in the taxi industry, eBay, which is the leader in online auctions C2C and Airbnb, which dominates the hotel market (Tadelis, 2015).

Despite this obstacle that small businesses face, the low cost of entering the digital market causes independent traders to operate in a niche where competition is low and which they can effectively exploit (Moriset, 2020). An alternative for entrepreneurs is to use new communication channels, which allow a similar analysis of consumer behaviour, which is currently expanding. The progress of mobile devices has resulted in the emergence of mobile commerce (m-commerce) (Zheng, et al., 2019). Unlike digital commerce, mobile commerce has advantages such as instantaneity, ubiquity, location, customization and identification (Wang, Ngamsiriudom and Hsieh, 2015). However, mobile digital transactions face the refusal of users to become customers due to fears and anxieties regarding the use of the smartphones in placing online orders (Jaradat, Moustafa and Al-Mashaqba, 2018).

A recently published study (Barnes, 2020) shows that during the spring 2020 lockdown due to the COVID-19 pandemic, online shopping increased by 207% in April alone, as consumers sought to buy products through available online channels. At the same time, there was a huge pressure at the level of online retailers globally, subject to massive delivery requests in the shortest possible deadlines (Bhatti, et al., 2020).

2. Online commerce on mobile devices (m-commerce)

Mobile targeting can increase the stake perceived by the consumer in online shopping, which influences consumers' perceptions and purchasing intentions. The hedonic value of shopping reflects the values that consumers receive from the multisensory, fantastic, and emotional aspects of their shopping experiences, such as entertainment and pleasure (Hirschman and Holbrook, 1982). With a mobile targeting feature, consumers can access multiple channels for similar products and services, which can usually lead to more informed decision-making and more attractive offers. As smartphones' penetration rate, app adoption and mobile browsing continue to grow, companies are increasingly leveraging the power of mobile devices to drive online sales.

As the use of applications continues to grow, m-commerce will make a major contribution to increasing sales, especially with the help of young people called Millennials and Generation Z who have significant purchasing power. These technologically equipped consumers are endowed with the ability to increase the sales volume because they are more likely to shop on their smartphones.

3. The influence of electronic commerce on the Romanian economy

In 2019, in Romania, the e-commerce sector reached a share of 4.3 billion euros, compared to 3.6 billion euros in the previous year, 2018, with an increase of 22%. On average, in 2019, the average value of the shopping cart made from desktop was 273 lei, compared to 204 lei in 2018. The average value per basket made from mobile increased from 170 lei in 2018 to 208 lei in next, to all these values being added VAT (Radu, 2020).

More empirical research on the Romanian e-commerce market is very necessary because the e-commerce industry has grown amazingly. The main advantages brought by the e-commerce activities to the Romanian companies indicate a higher productivity and an increased efficiency, followed by the superior positioning compared to the competitors. According to the study conducted by Kulcsar and Teglas (2017), web stores in Romania must formulate marketing policies and strategies depending on the development regions, because there is a significant relationship between ordered products, respectively the average value of orders and online customer residence.

The development of technology, artificial intelligence, augmented reality, and virtual reality will help consumers meet their needs in a simpler way (Enache, 2018). Since they have less time to shop in a physical store, they will prefer to buy products available online. Consumers will choose to buy from online retailers who sell various types of products and who ensure the transparency of product information, such as price and distribution, in order to be satisfied with the purchase made (Table no. 1).

Table no. 1. The evolution of electronic commerce in Romania between 2015-2018

Electronic commerce issues	2015	2016	2017	2018
Romania's population (millions of people)	19.8	19.7	19.6	19.5
Internet users (millions of people)	11	11.2	11.2	11.7
Internet penetration rate (%)	56	58	58	70
Smartphone penetration rate (%)	31.6	38.8	46	52.5
Orders placed online from mobile devices (%)	25-30	35-40	45	54
The value of online shopping (e-tail) (billion €)	1.4	1.8	2.8	3.5
Average value of online shopping / day (€ million)	3.8	4.9	7.6	9.8
Average number of transactions / day	8.2	8.4	8.7	9
Black Friday sales (€ million)	100	130	200	250
Online payment by card (million €)	514	745	980	1300

Source: Data processed by authors based on reports available on www.gpec.ro and www.statista.com

Even if approximately 13.6 million bank cards are active in Romania (Dospinescu, Anastasiei and Dospinescu, 2019), only 17% chose to use them for online payments, the others preferring cash on delivery (Pavel, 2019). In 2018, e-commerce covered 8% of the total value of the Romanian retailing market (Pavel, 2019), but for the next period it is estimated that these values will increase taking into account the degree of adoption of smart mobile devices. Despite limitations related to small screen sizes and processing power, the growth of commerce on mobile devices is more accelerated reaching 3.79 billion lei in 2019 (Pantelimon, Georgescu and Posedaru, 2020). International e-commerce retailers, with subsidiaries in Romania, have recognized the importance and necessity of their online presence on various social platforms, developing in this sense a sustained activity in the cyberspace. Online retailers should always try to innovate and change the features and performance of products and services so that they can best meet customer expectations and preferences (Dabija, Bejan and Tipi, 2018).

4. Artificial intelligence algorithms in e-commerce

The increased attention paid by researchers to the field of e-commerce proves the awareness of digital transformation importance (Rogers, 2016) and the impact on sustainable development, being obvious the continuous quest to identify new methods to optimize processes using artificial intelligence algorithms. These two emerging paradigms, e-commerce and artificial intelligence, can have an impact on social standards of interaction between consumers and retailers, but also on public policies that govern and regulate the legal framework in which these actors operate (Vanneschi, et al., 2018).

The fast growth of e-commerce has stimulated applications for extracting and understanding the data generated by customers' financial transactions. Currently, the exploitation of financial data has been one of the most important research topics in the data mining community, which has resulted in a considerable workload for the academic community (Akter and Wamba, 2016).

E-commerce communities have spawned a substantial amount of consumer-generated information, including online product or vendor reviews, online transaction assessments, and industry-specific metrics using crowdsourcing applications. Most of the time, this

information is used for a continuous development of e-commerce from a technical perspective, abandoning the marketing-centric approach. The flows of user-generated content reflect full acceptance of Web 2.0 key features, such as user-centric design and information sharing. User-generated content, usually product reviews, can be exploited through econometric models and data extraction analysis, to better understand consumer behaviour (Zoghbi, Vulić and Moens, 2016). Marketers need reliable tools to interact with real-time data to obtain actionable information. Most of the time, these software tools have only a one-way approach, being used as support for the end customer, without focusing on what data is relevant or what marketing analyses can be leveraged in customer interaction (Kakatkhar and Spann, 2019).

Developments in deep learning algorithms and accelerated innovation in digital image recognition (computer vision) have the potential to endow managers and marketers with the ability to improve the performance of e-commerce and digital marketing campaigns. In practice, however, the application of deep learning and digital image recognition as a subset of artificial intelligence has been limited due to technical challenges (e.g. accuracy and reliability) to be used in the managerial decision process. These challenges are a result of the dynamic and complex nature of marketing and the challenges related to acquiring data on consumer behavior. Before making any business decision, Business Intelligence is a necessary and essential tool for marketing managers. Business Intelligence (BI) is a set of techniques for analyzing big data and presenting information in a way that is actionable to management teams (Massaro, et al., 2019).

The techniques based on artificial intelligence, such as decision tree (DT), vector support machine (SVM), neural network (NN) and deep learning, are used to make decisions about e-commerce campaigns. They are frequently used by online retailers' engines that train algorithms in systems based on artificial intelligence (Lu, et al., 2018). As the effectiveness of value chains for e-commerce depends on the transparency and use of data across IT systems, researchers are encouraged to continue to use big data in the cloud to develop tools that help practitioners make better and faster decisions in B2B and B2C environments, through artificial intelligence applications and innovations, data mining, machine learning tools, as well as the integration of blockchain technology, especially in the areas of e-commerce order management process and predicting online shopping behaviour (Leung, et al., 2019).

The marketing manager has access to a wide range of digital tools, which allows him to better understand marketing trends and gather specific information on how he can improve new products. However, compared to data collected from customer marketing surveys, Big Data (BD) obtained from data mining process within consumer behaviour in the online environment has contrasting characteristics. For example, a large volume of online reviews is displayed on e-commerce sites, such as Amazon.com or emag.ro, without a specific aggregate meaning. On these websites, customers are encouraged to share their views on previously purchased products only for human validation and content indexing in search engines. E-commerce platforms are not the only places where consumers' preferences can be observed, data can also be found on social networking sites such as Twitter.com, on review sites such as tripadvisor.com, on media sites such as Cnet.com. While researchers' attention has been focused on using deep learning and computer vision to monitor consumer behaviour in physical stores, there is a wealth of data available, as online text content can be turned into intelligence actionable by marketers (O'Mahony, et al., 2019). In addition, as new tools and devices allow customers to create more versatile content in the

form of images, text, audio and video, search options increase even more, as long as there are appropriate tools for interpreting all this information.

In the field of computer science, machine learning, which is a subset of artificial intelligence (Jordan and Mitchell, 2015), has been widely applied in areas such as natural language processing (NLP), speech recognition (Agarwalla and Sarma, 2016) and computer vision. Conventional machine learning approaches are limited in their ability to process data in their raw form (LeCun, Bengio and Hinton, 2015). The inability to process data is due to the fact that a considerable amount of knowledge in programming and fields is required for the design of a feature extractor (LeCun, Bengio and Hinton, 2015). But in 2018, in a project funded by Amazon, Shin and Choi (2015) managed to create a nomenclature that automatically extracts and indexes their specific products and attributes.

Machine learning refers to the techniques needed to work intelligently with a large amount of data, by developing useful algorithms in synthesizing, classifying or sorting this data. It would be impossible for a human user to perform search activities in a short time, as the Google search engine succeeds. This is where machine learning comes into play, an integral part of artificial intelligence (Ballestar, Grau-Carles and Sainz, 2019).

Deep learning is a representation method that can be used to automatically extract sophisticated features at high levels of abstraction. This method can also learn from data with multiple levels of end-to-end representations (LeCun, Bengio and Hinton, 2015). By combining deep learning methods (neural networks) with computer visualization, specific elements or products from images can be extracted and used for managerial decisions or marketing strategies. A particular type of deep learning method that has been widely used is CNN (Convolutional Neural Network), which has managed to outperform other neural networks in terms of image classification (Krizhevsky, Nair and Hinton, 2020), object detection, and their targeting. In-depth learning has allowed the development of applications based on computer vision, for example, in the case of autonomous vehicles and in the automatic diagnosis of some forms of cancer (Mehta and Shah, 2016), but also for e-commerce operations (Koehn, Lessmann and Schaal, 2020).

5. Research method

The analysis was based on 201 computer-assisted telephone interviews, representing approximately 9% of all managers and people with managerial position of online stores in Romania (2329). Initially, a campaign to complete the questionnaire by e-mail was launched, but the success rate was extremely low. The contact information database for online stores was collected from two sources:

- contact details from the website listafirme.ro - Companies have been identified that have the NACE code 4791 - retail through the order houses or through the Internet. Because the contact details of the companies are public data, they are not subject to GDPR according to regulation no. 679 of April 27, 2016.
- contact details obtained from the contact pages of online stores - A database was created with online stores indexed in price comparators, websites that manage affiliate marketing campaigns and events dedicated to e-commerce.

This analysis has identified the functions of artificial intelligence-based e-commerce platforms that management teams considers compulsory and intend to develop in the future

in e-commerce businesses. The differences they encounter in the behaviour of customers on mobile devices compared to desktop ones were also taken into account, thus formulating the following hypotheses:

H₀₁ (null hypothesis) – There is no correlation between management's intention to automate certain marketing processes and the desire to identify customer satisfaction.

H_{a1} (alternative hypothesis) – There is a correlation between management's intention to automate certain marketing processes and the desire to identify customer satisfaction.

H₀₂ (null hypothesis) – There is no statistical correlation between the managerial intention to automate flows in marketing processes and the use of a customer relationship management application

H_{a2} (alternative hypothesis) – The managerial intention to automate flows in marketing processes is statistically correlated with owning a CRM application.

H₀₃ – There is no statistical correlation between the use of artificial intelligence algorithms in online store management processes and the position held by the respondent in the company

H_{a3} – There is a statistical correlation between the use of artificial intelligence algorithms in online store management processes and the position held by the respondent in the company.

The Chi-Square test is used in the statistical analysis due to the fact that categorical data were collected through the interview. For this research, a significance level of 95% ($p < 0.05$) was selected, the results below this level being accepted in the academic field as a valid scientific result or implicit truth. However, Amrhein, Greenland and McShane (2019) proposed a more specific way of communication through which all statistical reporting should implicitly include the p-value - the statistical probability used in the test. The hypotheses testing in this empirical study was performed using the SPSS software, version 21.0.14.

6. Findings

The study reveals that many digital online store managers use artificial intelligence algorithms in tools provided by third-party companies to promote their products. Table 2 shows how social media promotion campaigns are the most used (169 out of 201) by Romanian online store managers and less than a quarter of them ($n=40$) use artificial intelligence algorithms available on the platform.

Table no. 2. Promotional tools that use artificial intelligence in e-commerce

Digital campaigns types	Used	Use the AI option of the platform
Google Adwords campaigns	141	33
Search engine optimization	83	11
Social media campaigns	169	40
Content marketing	66	7
Marketing newsletter	77	12
Direct marketing	63	4
Influencer marketing	36	1
Conversion rate optimization solutions	14	3
I don't know / I don't answer / Not applicable	3	3

The second most used Digital Marketing tool that uses artificial intelligence algorithms is Google Adwords (Table 2), the platform that allows merchants to display paid ads when customers search for certain products online. Moreover, Google Adwords allows the placement of banners and advertisements on the Google Display Network on approximately 60% of all online websites. This also becomes very valuable in the process of collecting data to map and calibrate consumers' buying intentions for certain products, using artificial intelligence algorithms (Figure no. 1).

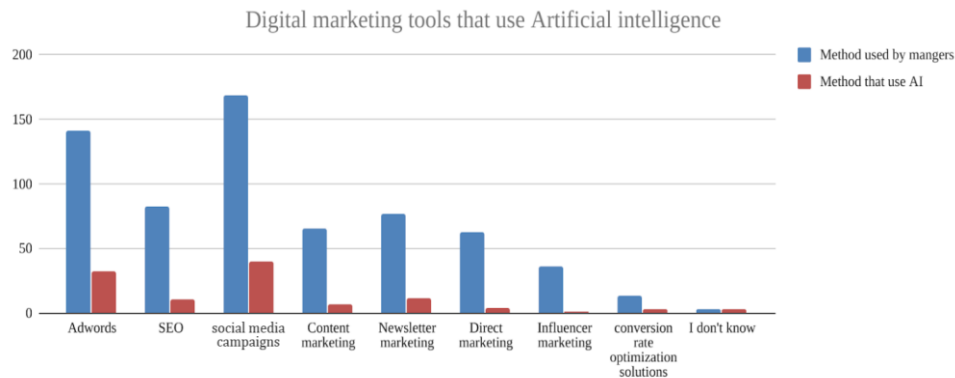


Figure no. 1. The most popular tools for promoting products online

Regardless of the platform for promoting digital products and stores, the objective of management teams is focused on automating processes and streamlining the data flows to engage the customer to buy more. Marketing is only one of the activities that management teams carry out in managing the activity of an online store, but others can be automated (Table 3).

Table no. 3. Processes that can be automated in online commerce using AI algorithms

	It has been already automated	It requires automation	I don't know / I don't answer
Product management	103	50	11
Delivery	95	44	14
Refund operations	81	46	12
Accounting report	93	46	10
Marketing campaigns	77	47	10
Relationship with suppliers	66	36	11
Customer support	72	44	10

Obviously, considering the large number of products, the biggest challenge is to manage the products, delivery and refund operations. It can be seen in Figure 2 that in certain processes, for example the relationship with suppliers, management does not prove a high level of automation and is not interested in addressing this issue.

Online commerce on mobile devices is gaining attention among Romanian consumers, the big players like emag.ro, altex.ro and aboutyou.ro use aggressive campaigns to encourage customers to download and use their own applications. For example, customers who use mobile apps have priority access to Black Friday or public holiday promotional campaigns

and receive real-time notifications about the status of their placed order. Management teams have access to essential data about customers and their behaviour online and offline (e.g. location) and have also a communication channel open all the time with them for the submission of promotional offers and product recommendations. Another emerging technology that can be framed as an alternative to mobile applications is represented by PWA (progressive web app) solutions, which allow accessing the solution in the browser but also installing the application, if the customer wishes (Figure no. 3).

e-Commerce process that managers want to optimize/automate

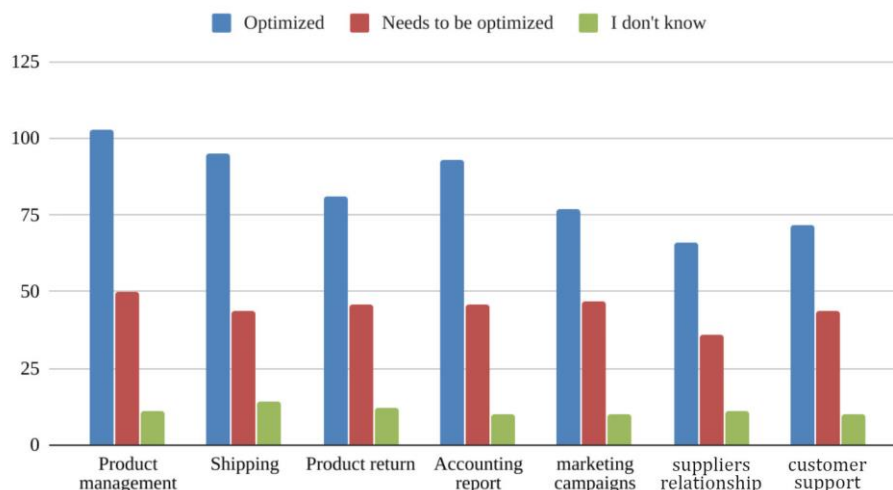


Figure no. 2. Analysis of automated processes in e-commerce

Mobiles app usage in Romanian e-commerce

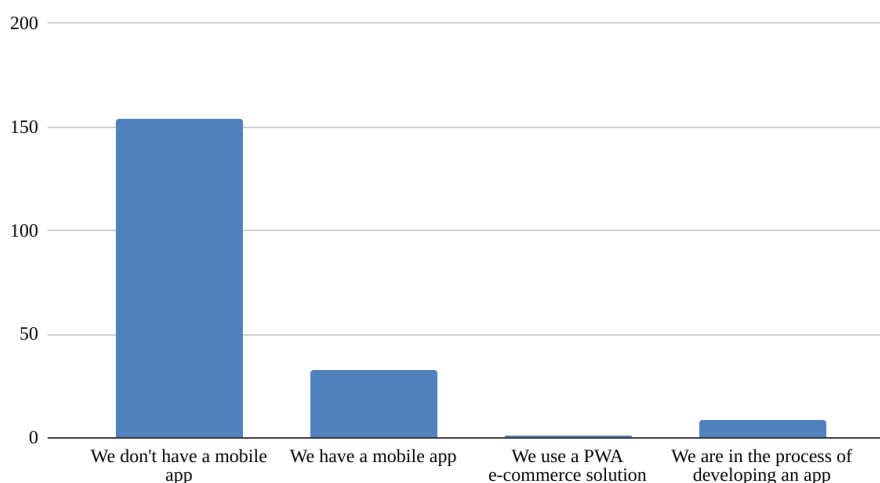


Figure no. 3. Online stores managing their own application

The high cost of developing a mobile app makes this solution extremely unpopular among online store managers, only 33 confirmed that they already have an application and 9 are in the process of developing one. Mobile applications have much higher user engagement rates than online store websites, generating significantly higher conversion rates.

Because this study was conducted in the period May-July 2020, one of the questions addressed to management representatives of online stores was related to how the COVID-19 pandemic affected online sales. Figure 4 shows how the number of sales during the COVID-19 pandemic had a noticeable increase for companies whose activity in the online environment is below 25%, between 50 and 75%, respectively over 75% of yearly turnover.

Online sales before and after COVID-19 outbreak

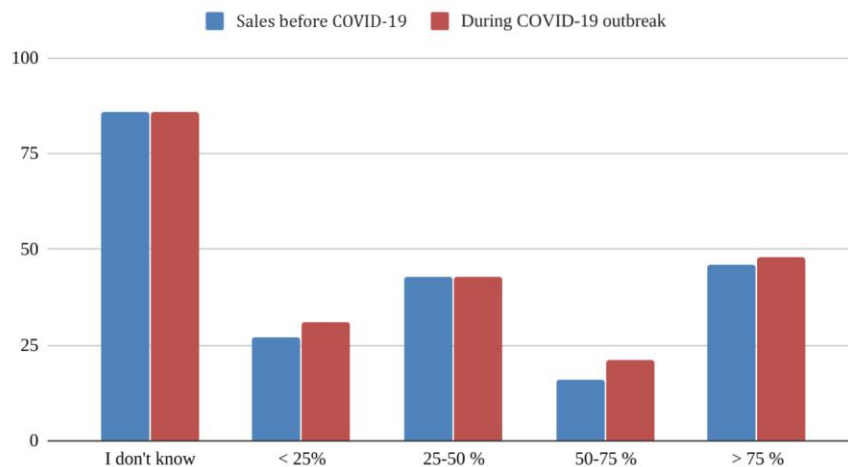


Figure no. 4. The effect of COVID-19 on online sales

Currently, CRM (Customer Relationship Management) systems in e-commerce platforms are the main tools used in automating marketing flows. These systems were available on the market long before e-commerce platforms and the Internet as we know it today. Their main purpose is to monitor the relationship with customers and monitor the sales process.

From 201 respondents, 57 use dedicated customer relationship management (CRM) solutions, the remaining 144 using only the standard functions integrated in the e-commerce platform. Solutions developed specifically for e-commerce platforms are currently available on the market, but to the open-ended question *What CRM system do you use?* addressed on the telephone, no respondent named a specific e-commerce platform. All managers use platforms that have telesales or B2B sales as their first utility, not being completely adapted to the e-commerce sales process. Most likely, this is the point where the confirmation of the following hypothesis starts:

H_{a1} – The intention of managers to automate flows in marketing processes is statistically correlated with owning a CRM application.

The null hypothesis is rejected with p value=0.032 and Phi=0.185, the results are presented in Table 4.

Table no. 4. First hypothesis Test Results

Statistical indicator	Value	Degrees of freedom	Asymptotic significance
Pearson Chi-Square	6.883	2	0.032
Phi	0.185	2	0.032
Cramer's V	0.185	2	0.032
Number of cases validated	201		

Source: Data processed by the authors through the statistical software SPSS

H_{a2} – There is a statistical correlation between the management of online stores that intend to automate marketing processes using artificial intelligence and the use of questionnaires to identify customer satisfaction.

From 201 respondents who accepted the interview by phone, 77 believe that they are currently automating marketing processes, 57 intend to do so in the near future and 67 believe that there is no need to automate. Most of them (40) use machine learning tools in managing social media campaigns (an option that was introduced 2 years ago), followed by 33 managers using the same option on Google Adwords (3-4 years expertise) and email marketing (12). For the use of machine learning algorithms on Google Adwords, a statistical correlation was identified with the intention of marketing process automation managers ($p=0.034$) and users who conducted marketing campaigns on Google Adwords ($p=0.001$). However, this correlation does not have a significant managerial implication. The most unexpected result of this test is the fact that managers who are interested in automating certain marketing processes are exactly the ones who check customer satisfaction through marketing questionnaires. The hypothesis was validated with p value=0.041 and $\Phi=0.179$ (Table no. 5).

Table no. 5. Second hypothesis Test Results

Statistical indicator	Value	Degrees of freedom	Asymptotic significance
Pearson Chi-Square	6.407	2	0.041
Phi	0.179	2	0.041
Cramer's V	0.179	2	0.041
Number of cases validated	201		

Source: Data processed by the authors through the statistical software SPSS

H_{a3} – There is a statistical correlation between the use of artificial intelligence algorithms in online store management processes and the position held by the respondent in the company.

From 201 respondents, 50 are employed in Middle Management positions, of which only 6 use systems based on artificial intelligence algorithms, 116 are entrepreneurs, of which 43 systems based on artificial intelligence algorithms, 11 are managers, of which 7 systems based on artificial intelligence algorithms, and 24 are top managers, of which 11 systems based on artificial intelligence algorithms.

The cross-tabulation analysis shows that entrepreneurs, directors and top managers are more interested in using artificial intelligence algorithms than are employees from Middle Management. This is statistically validated by the p value=0.001 (Table 6).

Table no. 6. Second hypothesis Test Results

Statistical indicator	Value	Degrees of freedom	Asymptotic significance
Pearson Chi-Square	17.201	3	0.001
Phi	0.293	3	0.001
Cramer's V	0.293	3	0.001
Number of cases validated	201		

Source: Data processed by the authors through the statistical software SPSS

The level of Cramer's correlation $V=0.293$ is much higher than other tests performed in this research, so a moderate correlation can be emphasized.

7. Discussion on findings

Considering the development and involvement of artificial intelligence in the e-commerce industry, it can be anticipated that by the end of 2021, approximately 90% of customer interactions through e-commerce portals will be treated and managed without people, the role of chatbots becoming crucial (Soni, 2020).

Most studies focused on the benefits of integrating artificial intelligence algorithms into e-commerce platforms have not considered the managerial perspective on capitalizing on these advantages. Thus, a study by Wei, Huang and Fu (2007) reveals that personal referral systems can not only reduce search time for interesting articles, but have the ability to improve e-commerce portal sales by converting visitors into actual buyers, increasing cross-selling, and consumer loyalty. Our study contributes with the results regarding the perception of the investigated managers on the processes that can be automated in online commerce using artificial intelligence algorithms.

Evaluating key performance indicators is an excellent technique for monitoring an e-commerce website that connects consumers to regularly updated offers. Artificial intelligence algorithms allow e-commerce store managers to choose key performance indicators appropriate to the internal processes of online sales portals (Ahmed, et al., 2017). In addition to this finding, our study demonstrates the relevance of CRM systems that integrate artificial intelligence algorithms into the vision of online store managers.

The results of the research conducted by Ballestar, Grau-Carles and Sainz (2019) offers companies a predictive model (based on machine learning algorithms) to customize the economic incentives for each referral according to the quality of the leads it brings to a company involved in e-commerce operations, thus optimizing marketing investments. Our study also presents the typology of online marketing campaigns that may involve similar machine learning algorithms.

Various machine learning libraries are available to review the anticipated value of each parameter in an e-commerce system, being extremely useful to online store managers, who will enter the platform where artificial intelligence algorithms are integrated to generate scenarios on online sales. Consistent with this finding reflected in the study by Wang, Cai and Zhao (2020), the results of our research highlight the high interest of online store managers in Romania towards the predictive value of e-commerce systems based on artificial intelligence.

In a pandemic context such as COVID-19, high levels of perceived concerns motivate consumers to rely more on e-commerce portals for transactional activities that have a high potential to build confidence and reduce risks (Tran, 2020). Our study confirms through its results the role of e-commerce platforms in facilitating communication between online retailers and buyers based on strengthening trust and credibility, in the context of the COVID-19 pandemic.

Recognizing the innovative valences of artificial intelligence in e-commerce, the results of this study add value to the body of knowledge through the managerial vision of how artificial intelligence algorithms provide e-commerce portals predictive capabilities, especially in CRM systems. Thus, the results of our study align with the main contributions of research coordinated by Soni (2020), proving that one of the most significant and common uses of artificial intelligence in e-commerce is that it can help estimate sales, helping experts analyze huge volumes. customer data so that they can obtain useful and appropriate information for strategic, tactical and operational decisions.

Conclusions

This article develops the theoretical framework based on previous research on e-commerce and the use of artificial intelligence algorithms, the theoretical contributions being useful to managers and researchers alike, in designing strategies for digital business transformation, given the new challenges of digital age, where access to data is extremely easy, and actionable managerial information establishes the market leader. In e-commerce, the consumer can compare and analyse products and services without costs related to their transport in a short time. The same can be done by competitors who can establish their pricing strategies based on the market offer or can identify high-performance products in the digital catalogues of similar stores. Artificial intelligence can be a useful tool in identifying these opportunities and capturing them in marketing campaigns. However, understanding these algorithms and their efficient use is a managerial challenge, which reveals that less than a quarter of online store managers use or have used such tools. The value of this article for the academic community is given by understanding managerial needs in a new economic branch, digital commerce and how modern technologies that use artificial intelligence can be used to streamline internal processes.

By accepting the third alternative hypothesis, this study confirms that the interest in using artificial intelligence algorithms in e-commerce arises from top management level. This finding has significant implications in competitive areas where management must perform consistently. At the same time, it is the management team responsibility to have control over the key processes in the business and to constantly streamline production costs. This study was largely focused on how artificial intelligence can be used in marketing campaigns and validates by testing the second alternative hypothesis that management's interest in these algorithms stems from the need to maintain high customer satisfaction. The deepest managerial implication for intelligent e-commerce algorithms is the management of online sales forecasting processes and the logistics of packages and products. An important issue that online store managers need to consider is the proper training of staff in the direction of recent technological advances in the field of artificial intelligence, their ongoing skill development in this regard. Online store managers should focus on ways they can raise awareness of the role of artificial intelligence systems in e-commerce platforms,

given that research has found that this is the key to discover the way for predictive strategies in analysing customer behaviour in the online environment.

The descriptive analysis also identifies other processes in e-commerce that could be optimized in terms of internal workflows, but in this study, they are not deepened using statistical studies. Inevitably the use of data collected in the use of machine learning algorithm training has an impact on the perception of employees and customers who interact with e-commerce platforms. These privacy policy considerations were not addressed at this time, but according to the European rules on the protection of personal data - GDPR, managerial teams are responsible for the management of this data.

In the future research agenda, it is important to address methods of storage optimization and logistics of goods. E-commerce completely changes the sale-purchase process and the process innovations that management is currently looking for can certainly be identified. A future configurational study based on the method of Qualitative-Comparative Analysis (QCA) will focus on causal recipes of factors that lead to capitalizing on the benefits of applying artificial intelligence algorithms in an online store. The lack of fully understanding these concepts limits management in integrating such tools. The easier evaluation of an online store benefits helps to increase the degree of adoption and can lead to the development of web software solutions that can be integrated into the e-commerce platform.

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