Autorul tezei de abilitare: Conf.dr. Marius BĂLĂȘESCU

Titlul tezei de abiloitare: Inovație și sustenabilitate într-o abordare de marketing

Domeniul: Marketing

Portofoliul de lucrări științifice relevante

1. Brătucu, G., Ciobanu, E., Chițu, I.B., Litră, A.V., Zamfirache, A., **Bălășescu, M.** - The Use of Technology Assisted by Artificial Intelligence Depending on the Companies' Digital Maturity Level, *Electronics,* Vol.13 (9), Aprilie 2024, ISSN: 20799292 WOS: 001219944900001 https://doi.org/10.3390/electronics13091687
2. Zamfirache, A., Neacșu, N.A., Madar, A., Bălășescu, S., **Bălășescu, M.,** Purcaru, I-M. Behavioural differences and purchasing experiences through online commerce or offline within mall-based retail structures*, Electronic Commerce Research*, Iulie 2024, ISSN: 1389-5753 WOS: 001270436400001 https://doi.org/10.1007/s10660-024-09879-6
3. Szakal, A.C., Brătucu, G., Ciobanu, E., Chițu, I.B., Mocanu, A.A., **Bălășescu, M.,** Ialomitianu, Gh. Evaluating the Impact and Perception of Influencer Marketing Among Romanian Consumers-Insights from Quantitative Research, *Administrative Sciences, Vol. 14(11) 276*, Octombrie 2024, **ISSN: 2076-3387** WOS::001363510100001 https://doi.org/10.3390/admsci14110276
4. Duguleana, L, **Bălășescu, M**., Duguleana, C, Bălășescu, S., Neacsu, N. A., Dovleac, L. - Dynamic analysis of European organic agricultural areas in the context of sustainable development, *Outlook on Agriculture, Vol. 47(1),* ISSN 0030-7270, Martie 2018, ISSN online 2043-6866, WOS: 000429905900004 https://www.webofscience.com/wos/woscc/full-record/WOS:000429905900004
5. Neacsu, A, N, Bălășescu, S., **Bălășescu, M.,** Anton, C.E. - Social responsibility in the textile industry in Romania,*Industria Textilă, 71(4),* ISSN 1222-5347, 2020, WOS:00057489380000 http://revistaindustriatextila.ro/images/2020/4/009%20NICOLETA%20ANDREEA%20NEAC%C5%9EU_Industria%20Textila%204_2020.pdf

6. Bălăsescu, S., Neacsu, N. A, Madar, A., Zamfirache, A., **Bălășescu, M.-** Research of the Smart City Concept in Romanian Cities, *Sustainability 14(16),* 10004, ISSN online 2071-1050, August 2022 WOS:000845364900001
   https://www.mdpi.com/2071-1050/14/16/10004
7. **Bălășescu, M. -** Innovation in retail, *Bulletin of the Transilvania University of Braşov, Series V: Economic Sciences, Vol. 14(63) No. 2–2021,* **ISSN (Print):** 2065-2194 **ISSN (CD ROM):** 2065-2208 **ISSN (Online):** 2971-9399 **ISSN-L:** 2065-2194
   https://doi.org/10.31926/but.es.2021.14.63.2.15

Data: 7.04.2025

Conf. dr. Marius BĂLĂȘESCU

electronics

MDPI

Article

The Use of Technology Assisted by Artificial Intelligence Depending on the Companies' Digital Maturity Level

Gabriel Brătucu, Eliza Ciobanu *, Ioana Bianca Chițu, Adriana Veronica Litră, Alexandra Zamfirache and Marius Bălășescu

Faculty of Economic Sciences and Business Administration, Transilvania University of Brasov, 500068 Brașov, Romania; gabriel.bratucu@unitbv.ro (G.B.); ioana.chitu@unitbv.ro (I.B.C.); adriana.litra@unitbv.ro (A.V.L.); alexandra.zamfirache@unitbv.ro (A.Z.); mariusbalasescu@unitbv.ro (M.B.)
* Correspondence: eliza.nichifor@unitbv.ro

Abstract: Major companies in the global market have made significant investments in artificial intelligence-assisted technology to increase the value of their products and services, which gives the implementation of artificial intelligence an extremely important role. Starting from these premises, the authors set out to evaluate the transformation level of companies in terms of adopting technology based on artificial intelligence according to their level of digital maturity. For this purpose, qualitative research was used by deploying the inductive method, which allowed five distinct categories of companies with unique characteristics to be identified, generating an interval scale that illustrates the level of digital maturity and the ability to adopt and implement viable solutions based on artificial intelligence technology. This paper, in addition to identifying the digital transformation level of companies, offers solutions and recommendations for addressing the challenges encountered by the business environment, thus contributing to the understanding and development of strategies adapted to each situation that may appear on the market.

Keywords: artificial intelligence; digital maturity; companies; digital marketing agencies; business strategies

Citation: Brătucu, G.; Ciobanu, E.; Chițu, I.B.; Litră, A.V.; Zamfirache, A.; Bălășescu, M. The Use of Technology Assisted by Artificial Intelligence Depending on the Companies' Digital Maturity Level. *Electronics* **2024**, *13*, 1687. https://doi.org/10.3390/electronics13091687

Academic Editor: George Angelos Papadopoulos

Received: 14 March 2024
Revised: 18 April 2024
Accepted: 23 April 2024
Published: 26 April 2024

1. Introduction

Major players in the global market have invested in artificial intelligence (AI)-assisted technology to improve their products and services. Notable examples include companies such as Google, IBM, Amazon, Tesla, Meta or Microsoft, Netflix, and Airbnb, which have implemented AI-based solutions within the actions related to the optimization of internal processes and up to the commercial strategies applied to offer innovative products and services on the market. Considering the tone set by large companies operating globally, the authors raised the issue of implementing solutions aligned to the 5.0 society to other companies of different sizes, medium or small, to which the trends and exigent requirements of consumers dominated by the typology of digital informers bring, for the most part, only challenges that are difficult to manage.

In this context, the authors intended to find out how ready companies are to adopt technology assisted by artificial intelligence. This aspect led to the formulation of the research question around which the entire paper was built. Starting from the premise that the importance of small- or medium-sized companies (SMEs) is crucial [1] for the digital development of society [2], this research aimed at identifying which companies are ready to use AI, as well as which companies are being pressured to adopt AI. The authors intended to build a theoretical framework aimed at evaluating companies readiness to integrate AI-assisted technology, with a particular focus on marketing agencies, based on their digital maturity level. Their objective was to address existing concepts and models to develop a tool for measuring readiness in this context. To achieve this goal, the

authors employed a qualitative research approach, specifically utilizing inductive research methods, to capitalize on existing models and relevant observations to their research topic. Consequently, an explanatory model was formulated, delineating five distinct categories of companies characterized by varying levels of digital maturity.

This research makes a significant scientific contribution to the specialized literature by not only advancing the theoretical understanding of the topic but also by providing practical solutions to the challenges that companies encounter in implementing artificial intelligence solutions based on digital maturity level. The objectives stated to this end were to (O1) classify companies in terms of digital maturity level, (O2) identify activities that can become more profitable through artificial intelligence, and (O3) highlight the challenges, limits, and opportunities for companies regarding the implementation of solutions based on artificial intelligence.

Carrying out the research allowed five typologies of companies to be determined, each of them being described in detail according to the explanation of the challenges and limits they present in relation to the adoption of technology based on artificial intelligence. In essence, the authors' work fills a crucial gap by providing a holistic perspective on the interplay between digital maturity and AI adoption readiness, thereby empowering organizations to make informed decisions and devise strategic plans to deploy technology for competitive advantage.

Considering the premises presented, the authors organized this paper into four main sections: a review of the existing literature, an explanation of the research methodology, an analysis of the obtained results along with supplementary discussions, and a final section comprising conclusions and suggestions for future research directions.

Literature Review

Artificial intelligence (AI) has attracted increasing interest recently, being considered by specialists and representatives of the business environment as a technology that will have an unprecedented impact on human development [3]. AI should not be seen as a single technology, as it represents a combination of technologies used in several industries which can improve the performance of companies in these fields [4]. The use of AI can lead to optimization of the structure of management processes [5] and to improvement of "the operational and business processes of organizations" [6].

AI can be a tool for building sustainable business models and innovative processes, leading to important economic, social, ethical, and legislative changes [7]. The implementation of AI imposes the need to analyze the specifics of each organization and the stage at which this implementation process is situated [8], creating favorable conditions for cultivating implementation, information, and understanding by managers and staff and studying both positive and negative aspects [9].

While concerns about bringing AI into business are not new, there is still a gap regarding the understanding of how AI can drive business value [10], of the concrete way success factors can have an impact on the adoption of AI [11], and the implications for environmental sustainability [12]. There are also negative aspects of artificial intelligence, such as the lack of control, the poor quality of data, and the insufficient training of personnel, that can generate inefficiency in the activity of companies and are studied too little by specialists [13]. Studies show the importance of employees' knowledge and understanding of AI processes, the need to create "sociotechnical capital", and the implementation of "AI socialization" to successfully integrate AI systems with employees [14,15]. Previous research has highlighted a number of issues that need to be resolved regarding the integration of AI, namely the modification and rethinking of the organizational structure, the skills required of employees and the education of the future workforce, ethical and legislative issues regarding data protection and defining the role of robots in society, and how these innovative tools can lead to predictions for future development [16]. The effective integration of these technologies indicates the digital maturity status of both a company and, at a broader scale, a country [17]. Specialists consider digital maturity as a pivotal factor

bridging the digital orientation of companies and their financial prosperity [18]. Also, the main goal of the digital transformation of companies is to rethink the business model to improve productivity and reduce costs [19].

The massive role artificial intelligence is playing in reshaping society cannot be denied. Beyond the undeniable opportunities it brings to development and progress, from economic and social points of view, AI is to a significant extent fraught with risks, at least in terms of privacy, transparency, and discrimination. Ethics in AI refers to a framework of moral values and methodologies designed to steer the ethical deployment of artificial intelligence, with the aim of safeguarding human welfare [20].

The first ethics guide in the field of AI was the Principles of Artificial Intelligence signed by governments in 2019—OECD [21]. In parallel, a code of ethical instructions in the field of AI was developed by the European Parliament [22], which underscores concerns regarding the ethical, legal, and economic dimensions linked with AI, impacting essential human rights and liberties. These concerns encompass the effects of AI and robotics technologies on employment, such as job displacement due to automation. There are also demands for evaluating the influence of algorithms and automated decision-making systems on safety and trust levels. Furthermore, considerations extend to digital currencies and transaction systems facilitated by networked computers, such as blockchain technology and the propagation of disinformation (fake news), as well as the potential military applications of algorithms (autonomous weapon systems and cyber security). Continuing these trends, UNESCO generated the first global standard in AI ethics "Recommendation on the Ethics of AI", recognizing that AI systems have the potential to bring privileges, to constitute a threat to human rights, to contribute to the degradation of the environment, etc. [23].

The most pressing ethical issues when considering AI in organizations' interaction with the human factor can be extracted from the literature. AI systems can perpetuate, by taking in a massive amount of data, the biased approach that is embedded in previously practiced social norms. If the algorithms are not unbiased or unrepresentative for all categories, the results generated by them may exclude minority categories [24]. Discrimination brought by algorithms can also be the result of wrong or biased input data or caused by the mathematical architecture of the algorithm [25]. Moreover, AI can limit autonomy to the extent that it provides predefined choices, and there is a risk of replacing interpersonal relationships when communication tends to take place exclusively through AI-generated assistants [26]. In some studies, transparency and responsibility are issues that appear as a priority in AI-related ethics, being assimilated to the concept of trustworthiness [27]. Relevant information provided to participants can help them make an assumed and agreed decision [28].

If, in the case of an artist making a work, they can assign copyright, when a digital work is generated with the help of AI, by an individual or an organization, given that the AI systems were generated by others, it is questioned which of the two parties is more entitled to being attributed the result [29]. Moreover, AI algorithms have the capability to produce misinformation, manipulate public sentiment, and exacerbate social divisions. AI systems multiply the ability to use personal data that can harm individual interests, through the ability to process data at an impressive level of power and speed [30]. AI systems may collect data that are not necessarily required, or even prohibited by the privacy policy, without users being notified. The extensive collection of data and their transfer can impact the confidentiality and privacy of individuals [31]. Simply obtaining consent does not solve the problem of ethics in AI [32]. As AI systems evolve, automation has the potential to replace human labor, creating unemployment and exacerbating social inequalities. Even with the development of new branches based on AI, the emergence of new jobs requires professional conversion measures and economic support for the transition of the workforce involved.

Organizations willing to implement AI systems face several difficulties, conceptual as well as practical. The challenges of using AI are divided, according to the study by

Mökander [33], into ethical, legal, and technical challenges. Another recent study [34] was able to categorize the barriers to AI adoption into three major areas: technological, organizational, and cultural. The same study demonstrated that the majority of the decision makers interviewed (91%) faced challenges in all three areas, citing the following major barriers: laws and regulations (which hinder innovation and learning because compliance is costly and restrictive); lack of employee experience in AI implementation; lack of understanding of AI, both in the organizational environment and among customers; resistance to change.

A challenge with their significant major impact on organizations is the very high costs of deploying and sustaining AI solutions [35]. Additional barriers identified in this paper include a lack of comprehension and confidence in AI, as also referenced in the literature [34]. Challenges highlighted encompass data quality and connectivity, involving the integration of data from diverse sources like suppliers, customers, and internal systems. Furthermore, there is the task of integrating AI into existing processes and workflows. Issues related to data quality and management, including concerns over data privacy and security, pose additional challenges. Moreover, inadequacies in IT infrastructure, reliance on external AI providers, and cultural and organizational barriers compound the issues faced. In order to be aware of the challenges in implementing AI and to propose strategies for managing and mitigating the risks associated with adopting AI in business, organizations need to develop deep business-wide analyses. These analyses start from evaluating the vision of the organization, the staff, the transformation of the processes and technologies used, and the availability of data [36]. At the same time, the major implications of managerial decisions [37] and different risk management assessment methodologies, as well as cyber security concerns, must be mentioned.

The data privacy barrier starts from the fundamental notion that having more data allows AI systems to become better. The strategic solution provided by [38] is the implementation of a data-sharing policy in the company, a method by which the need for data duplication is reduced. Related to the establishment of the AI team, a possible strategic managerial option (other than hiring dedicated staff) is to improve the skills of existing employees (by participating in dedicated development programs, training, experts who can make practical presentations within companies, etc.).

The study of Hopf [39] proposes a model that identifies challenges, tensions, and tactics in implementing AI in organizations. Among the tactics developed in the model, the following are mentioned: establishing verification tools on what AI can and cannot do, calling on external experts to start AI projects, training managers and establishing appropriate indicators, and creating bridges between AI and IT. From the specialized literature point of view, the optimal option regarding the personnel involved in the adoption of AI by companies has not yet been identified, each company having to carry out its own analysis and apply the personnel strategy considered appropriate.

2. Materials and Methods

In the initial phase of the methodology, the authors aimed to build a theoretical framework focused on evaluating companies' readiness to integrate AI-assisted technology, particularly within marketing agencies, based on their digital maturity level potential. This concept can be described as highlighting a particular level of social and economic consciousness that empowers businesses to adeptly deploy digital technologies in pursuit of their objectives [40]. In recent times, experts have concentrated on devising models to evaluate the digital maturity of small- and medium-sized enterprises (SMEs), outlining the stages they need to trace to realize their digital transformation aspirations [41] At the same time, there is the issue of proactively developing employees' skills and their mentality so that they can control digitization and see it as an opportunity [42]. A company is fully digitally mature when it uses technology in all activities and operations that take place within it, being, however, different from the level of digitization (since the latter refers to digital technology usage within systems, processes, and activities related to the company's services and products). This aim drove the authors to address existing concepts and

models, employing a qualitative research approach, specifically utilizing inductive research methods [43] based on existing models and observations identified as highly useful for the research topic, capitalizing on existing models and observations relevant to the research topic. Through this approach, the authors aimed to classify companies according to their digital maturity level, identify key activities for enhancement through artificial intelligence, and elucidate the challenges, limits, and opportunities surrounding the implementation of AI solutions. Subsequently, this research led to the determination of five typologies of companies, each meticulously described in terms of the challenges and limits they face in adopting AI-based technology. Each category was placed into a scale to be easier for practitioners and theorists to evaluate. Thus, the study contributes significantly to bridging the gap between digital maturity and AI adoption readiness, equipping organizations with the insights needed to make informed decisions and strategic plans for leveraging technology to gain a competitive edge.

The motivation behind this choice was the possibility to formulate some specific observations that turned into general ideas, making it possible for the authors to use a "bottom-up" method [44] and to develop a theoretical, explanatory model on the topic of the utilization of AI-assisted technology according to the digital maturity level of companies.

According to the evaluation tool originally developed for assessing non-profit organizations, and later developed for other organizations, the authors were able to develop an explanatory model that draws the boundaries of the levels and promotes, in the foreground, the status of five typologies created in accordance with the potential of using AI-assisted technology.

To reach the intended objective, the authors have structured this section into three parts. The first of them presents the methodology of digital maturity assessment and the creation of typologies that this model claims. The second part refers to the understanding of the classification of tasks performed by AI, mentioning and explaining three types of tasks, and the last one presents the motivation for choosing the case study of marketing agencies.

2.1. Digital Maturity Assessment Methodology and the Outlining of Typologies

To be able to build a measuring scale to analyze the level of digital maturity and AI-assisted technology integration for digital marketing agencies, the researchers utilized a standard questionnaire, developed by [45], which comprises 17 cross-referenced skills categorized into five stages of digital maturity. This questionnaire allowed researchers to assess digital marketing agencies' potential across various dimensions, providing insights into their digital maturity levels.

The questionnaire was structured around four key areas: attitudes and foundations, people, skills, and processes, systems and information, and outcomes and experiences. Through the respondents' answers, authors considered a percentage representing the level of digital maturity for each evaluated company, ranging from 0% to 100%. Based on the responses from the 2077 participants to the digital maturity study, the distribution of digital maturity assessment results across different areas was determined, as illustrated in Figure 1.

This analysis provided a comprehensive understanding of the digital maturity landscape, which was used for the marketing agencies case study because of its validity. Furthermore, research was elaborated into the classification of tasks performed by AI, categorizing them into banal tasks, formal tasks, and expert tasks. By elucidating the characteristics and examples of each task category, the authors aimed to facilitate a deeper comprehension of how AI can be applied across various processes and activities within this type of organization. Finally, they conducted a case study focused on digital marketing agencies to exemplify the practical implications of research findings. Through a rigorous analysis of specialized literature and identification of activities that can be made more efficient through AI implementation, the potential impact of AI on digital marketing processes is highlighted and presented in the next section.

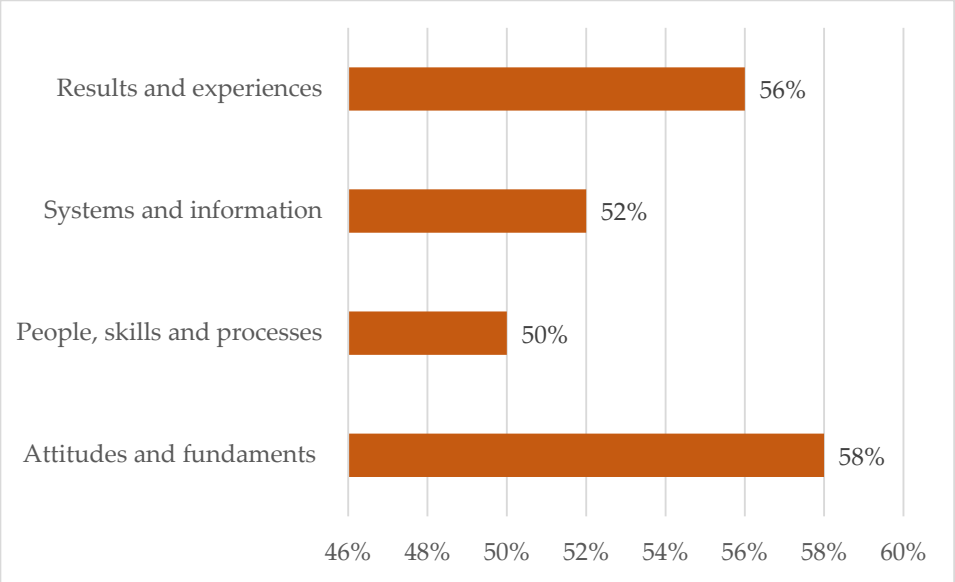

Figure 1. Distribution of digital maturity assessment results by area for 2077 companies: 0–29% (level 1); 30–49% (level 2); 50–69% (level 3); 70–89% (level 4); 90–100% (level 5). Source: (Digital Maturity, 2023).

2.2. Understanding the Classification of Tasks Performed by AI

Tasks performed through AI are divided into the following categories: banal tasks, formal tasks, and expert tasks [46–48]. For each type of classification there are examples of ways in which AI can be applied to facilitate various processes or activities. For example, in the category of banal tasks, AI can be implemented for operations related to computer vision or speech (related to perception), natural language processing (language generation or translation and understanding), or robotics (through interventions on locomotion). On the other hand, formal tasks are related to disciplines such as logic, mathematics or geometry, verification, and often proving a theory. Finally, expert tasks belong to scientific analysis, financial analysis, creativity, or even medical diagnosis. For humans, thanks to perception, speech, the use of language, and locomotion, banal tasks are the easiest to learn, followed by formal ones, the most difficult being those of expertise. In the case of technology, the advancement and implementation of certain very complex algorithms have meant that expert tasks can be handled easily. A relevant example is the use of AI in performing scientific analysis through the Cognos online application, created by IBM. Nowadays, it has become easy to generate graphs, tables, or conclusions about the questions that a researcher raises based on a file containing the raw data required for a complicated analysis, where it is even necessary to highlight some unexpected results.

Aspects were highlighted for an easy understanding of the category of tasks that AI performs to review that category needed in the development of the explanatory model, through which it was possible to answer how ready companies are to use AI-assisted technology.

2.3. Case Study of Digital Marketing Agencies

In focusing on marketing agencies, the authors recognize a crucial aspect of contemporary business operations [49]. Marketing agencies play a pivotal role when it comes to shaping brand perception, driving consumer engagement, and influencing purchasing decisions in the current digital landscape. [50,51]. As such, understanding the readiness of marketing agencies to embrace AI-assisted technology is paramount for several reasons.

Firstly, marketing agencies operate at the forefront of technological innovation [52], constantly seeking ways to optimize their strategies and deliver good results for their clients. The integration of AI into their operations has the potential to revolutionize marketing practices, enabling agencies to analyze vast amounts of data, personalize customer experiences, and streamline campaign management processes [53].

Secondly, marketing agencies serve a diverse range of clients across various industries, each with unique needs and challenges. Assessing the readiness of marketing agencies to adopt AI technology provides valuable insights into the broader trends and opportunities within the marketing industry. It offers a glimpse into the evolving landscape of marketing practices and the emerging technologies shaping the future of the industry. By uncovering the challenges, limitations, and opportunities associated with AI adoption in marketing agencies, this study offers good practices and actionable insights for marketers, business leaders, and industry stakeholders alike. It prompts discussions on the strategic implications of AI integration, the ethical considerations surrounding data-driven marketing approaches, and the skills and capabilities required to thrive in an AI-powered marketing ecosystem. By focusing on marketing agencies, the authors addressed a critical sector at the intersection of technology and business, offering valuable insights into the readiness of organizations to embrace AI and paving the way for future advancements in marketing practices.

Furthermore, as AI continues to reshape marketing practices, it becomes increasingly crucial for organizations and their decision makers to cultivate a culture of innovation and adaptability, equipping both employees and leadership with the skills and knowledge needed to harness the full potential of AI technologies in their day-to-day work. The specialized literature presents the theory of replacing manual tasks with AI tasks, emphasizing its impact on digital marketing. Experts from various industries say that the impact of using AI in marketing processes will be strongly felt in the coming years, with company administrators and decision makers having to prepare both organizations and employees to implement AI-based solutions in their day-to-day work [54]. Following a rigorous analysis of the specialized literature, eight activities were identified that digital marketing agencies can make more efficient by implementing AI.

3. Results and Discussions

The findings of this research emerged after assessing digital maturity and delineating typologies. Through the utilization of an analytical tool to gauge the digital maturity level of companies, five typologies were discerned (refer to Figure 2), each delineating distinct attributes across 17 dimensions: culture, leadership, collaboration, budget, innovation, capacity, recruitment, learning, project management, technology, data, reporting, insights, communication, optimizations, service delivery, and internal systems.

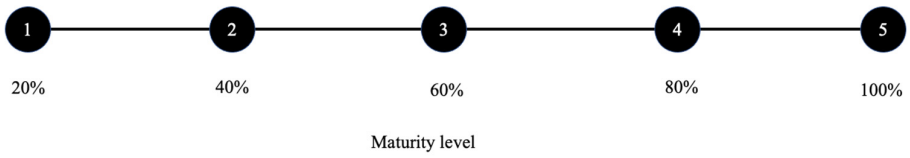

Figure 2. Interval scale of the digital maturity level of companies. Source: figure made by the authors.

The interval scale depicted in Figure 2 was established through a rigorous process of analyzing the convergence of response patterns determined from the survey's variants of responses. Rather than relying on explicit questions, the scale was derived from the intersection of various response variants provided by respondents, reflecting their inherent maturity levels within the assessed dimensions. By synthesizing these response patterns, the scale offers a detailed description for each individual level, providing insights into the nuanced progression of digital maturity within the studied context.

For ***Level 1***, the culture dimension describes this level as marked by staff who keep away from the digital domain and try to avoid it. At the management level, there is no orientation towards the digital approach, the company's budget covering only those basic aspects necessary for the activity, such as, for example, financing the hosting of the domain for the company's website. In companies at this level, innovation is not considered important or does not happen at all. In terms of work capacity, one person handles the

website and email. Also interesting is the fact that this person may not have a digital background or have a special skill set aligned to the field. Staff recruitment is carried out with an emphasis on technical skills only for the position aimed at website maintenance. In terms of the learning dimension, digital experts teach other employees on an ad hoc basis, and the budget allocated to training is very small. Another important aspect is that project management is performed differently for different projects. The existing systems within the company are limited and not integrated, not being secure. Data within the organization are scattered and mostly represent the company's offline activity. Performance indicators exist, but progress is measured ad hoc. Insights are collected but used inconsistently. The digital medium is used as a channel for communicating non-digital activity. Information is shared online, and traditional offline services are displayed on the website, with no will or budget to digitize systems or processes.

Level 2 of digital maturity is characterized by an organizational culture where employees are satisfied that specialists handle digital aspects. However, management sees the role of digital technology primarily as a tactical one, and the allocated budget supports the current setup without allowing for significant improvements. In terms of innovation, it occurs occasionally within existing projects, and basic digital skills are covered by experienced specialists. Recruitment includes specialized digital skills in specific roles that support engagement. There is a small budget for developing core digital skills in digital expert roles, and common principles are used in project management. Technological systems are not keeping pace with the needs of the organization, and data are considered important, improving their quality and use in various fields. Relevant KPIs are set and reported, but the lessons from these reports are not always put into practice. Insights from multiple sources are combined to build understanding, and digital advice is sought when deemed necessary. There is also some experimentation with service delivery using digital channels, but the availability and use of internal digital tools are irregular.

Level 3 of digital maturity is characterized by a deep understanding of digital value within the organization and its desire to learn more in this area. Management encourages the digital leader to take a strategic approach when time permits. The allocated budget allows for the testing of new ideas in priority areas, and there is an innovative reimagining of some aspects of the products or services. There is a core team of digital specialists, and extensive digital skills are required across all areas of the organization. Organizational training normalizes digital skills and projects heavily due to the structure and it being a very long process. The systems are stable and allow basic operations. There is a clear policy for data management, this being integrated and analyzed. Performance data are collected and linked, but access to them is difficult. Knowledge about people's identity is combined with behavioral insights. Digital technology is involved from the beginning in communication planning, and digital services are considered as important as traditional offline services. Good digital tools are available, and their support and integration are provided upon request.

Level 4 of digital maturity represents the stage at which digital technology is perceived to be key to success and are integrated into all aspects of the organization. There is a senior digital leader, and management is actively investing in digital technology. The budget is increasingly supporting digital ways of thinking and acting. There exists one or more teams, and digital opportunities are growing. Strategic digital skills are standard and included in job descriptions. Increasing digital skills represent a top priority for employees, with teams understanding their impact on digital changes. Project management principles and practices are used, with a launching, testing, and continuous improvement approach in place. Tools and systems bring improvements in efficiency. Quality and integrated data are used throughout the organization. Insights play a pivotal role in shaping both planning and delivery strategies. Communication strategies are predominantly designed with a digital-first approach. Providing online services is based on research and rigorous testing. Organizations prioritize investments in digital tools aimed at enhancing the overall work experience of their staff.

Level 5 of digital maturity highlights that digital technology is the primary way to reach the organization's mission. It is fundamentally integrated into the overall strategy, and digital leadership is present at all levels. A healthy budget for the continuous evolution of digital operations increases the impact of the organization. A structured innovation program creates transformative change. A very experimental digital leadership type exists across the organization, with effective teams. New hires present digital skills, and all job descriptions express a need for them. The learning function drives the development of digital skills and behaviors at all levels of the organization. Principles of digital project management are used consistently across all projects to improve efficiency and impact. Interconnected tools and systems provide a smooth and efficient experience for internal and external users. Real-time data are used across the organization to shape decisions and performance. Holistic performance data are always available and used strategically. All work is based on rich and constantly updated insights, being iteratively improved. The digital environment is used to create adaptive and integrated communications. Online services are iterative and integrated, generating impact and coverage never seen before. A large range of connected digital tools is used, with proactive staff support.

The characteristics of each level of digital maturity of the companies led not only to the description of the 17 dimensions according to each level but also to the outlining of related typologies (Figure 3).

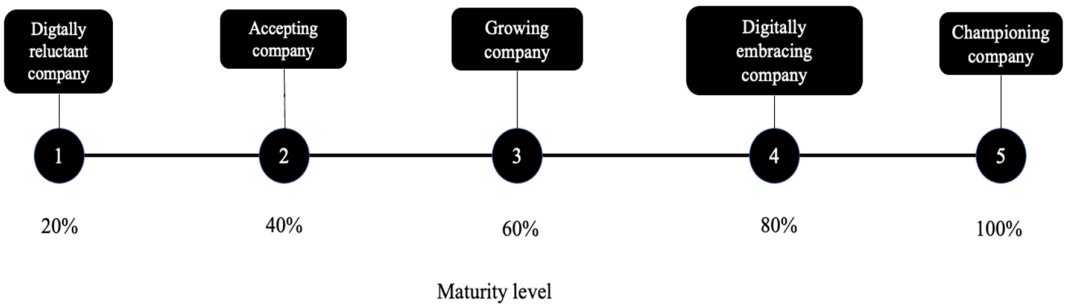

Figure 3. Interval scale of company typologies according to the level of digital maturity. Source: figure made by the authors.

The ***reluctant company*** typology shows that the organization is not convinced that digital technology can contribute to achieving its mission and goals. As a result, the digital environment is underrepresented and underfunded. Not only is the organization missing out on opportunities, but there is a risk that it will not keep up with trend alignment. Reluctant company workers prefer to do things the way they have always been done rather than experiment with new technologies, systems, and processes. A reluctance to evolve in line with the external environment makes the organization increasingly self-focused. In the case of this typology, it is necessary to change attitudes to establish bases in the digital field.

The ***accepting company*** typology shows that the organization's attitude towards the digital environment can be characterized as "accepting". In other words, the company has a good understanding of digital potential and allocates some resources to the basics. However, technology, systems, processes, and digital skills are disparate, and obtaining a budget for new digital projects is a difficult battle. The organization is open to considering innovative uses but has difficulty with adopting new and different ways of working.

The ***growing company*** typology and the ***technology-embracing company*** typology are actively using the digital environment to be more efficient and effective. It is not yet integrated in all aspects, but there is an organizational understanding that the digital environment is crucial to operations, culture, and the experience that customers have when interacting with the organization. Digital staff are supported and encouraged. Resources do not always match ambitions, meaning that people, systems, and digital processes are occasionally under pressure. In the case of this typology, simplification and improvement will increase efficiency, effectiveness, and well-being.

In the case of the ***champion company*** typology, digital maturity can be characterized as "promoting" or "championing". Individuals employed within the company perceive the digital environment as the primary means to actively engage with current and potential supporters. Digitalization serves as a central component for operational and engagement activities, encompassing a diverse array of functions including strategic leadership and communications planning, brand experience, user engagement, supporter services, program or service delivery, and technology development and maintenance, as well as innovation endeavors.

All these characteristics related to the activities that digital marketing agencies can make more efficient by implementing AI led to the highlighting of the challenges, limits, and opportunities presented in Table 1.

Table 1. Activities of advertising agencies made more efficient through AI according to the typology of the company regarding the level of digital maturity.

Activity	Description	Opportunities Depending on the Level of Digital Maturity *
1. Target audience segmentation and identification	By applying AI algorithms for advanced data analysis and identifying behavioral patterns, they allow marketing specialists to refocus their efforts on more relevant audience segments and deliver personalized content. Precise segmentation of the target audience using AI-based solutions can be achieved with the help of specific clustering and/or classification techniques. Also, through this technology, applied machine learning models can be used to identify consumer patterns and behaviors but also to use the information obtained in personalized marketing campaigns [55–57].	**For level 1.** Using basic tools for simple audience identification and segmentation.
2. Personalized recommendations	In the scope of this aspect, the operation of AI recommendation systems, in the form of collaborative filtering algorithms or neural networks, and how they are used to anticipate user preferences, but also to evaluate and optimize the performance of recommendation systems, were identified [58,59].	**For level 1.** Providing simple, generic recommendations based on basic data.
3. Automation of advertising campaigns	Analysis of different techniques and optimization of the process of making pay-per-click campaigns by allocating the budget in real time to maximize the effectiveness of digital marketing campaigns. Machine learning algorithms adapt to changes in user behavior and the data-driven online environment [60].	**For level 1.** Implementing simple automations in advertising campaigns.
4. Content creation	On this topic, the use of AI refers to the application of language generation models, such as recurrent neural networks (RNNs) or generative adversarial networks (GANs) and how they are used to produce relevant and engaging content. Also, for content creation, AI can be applied in operations related to the analysis of the quality and originality of the content generated in the context of the needs and preferences of the target audience [61].	**For level 2.** Using AI to generate simple and personalized content.

Table 1. *Cont.*

Activity	Description	Opportunities Depending on the Level of Digital Maturity *
5. Sentiment analysis and receiving feedback	Interpreting and analyzing user feedback and feelings about brands or products through AI technologies such as natural language processing (NLP) and sentiment classification algorithms. Around this topic, there are also discussions regarding ethics and the correct interpretation of collected sentiments and how this information can influence marketing strategies [62,63].	**For level 2.** Using AI to analyze feedback and sentiment from customer interactions
6. Search engine optimization	AI algorithms are used for search engine optimization purposes by identifying search trends and optimizing content for increased search engine visibility. Through specific techniques such as semantic analysis or machine learning, specialists can more efficiently create more relevant content [64].	**For level 3.** Implementing advanced search engine optimization strategies with the help of AI.
7. Customer support and assistance	With the help of the technologies that are the basis of the functionality of chatbots, namely natural language processing and dialog models, it is possible to provide automated assistance and personalized interaction with customers [65–67].	**For level 3.** Using AI to provide customer support and assistance through a more complex system.
8. Advanced forecasting and analyses	Through machine learning algorithms and predictive models used for marketing purposes, user behavior can be anticipated, and through advanced data analysis techniques it is possible to provide essential information for making strategic marketing decisions [68].	**For level 4.** Use of AI for predictive analyses and advanced analyses in various areas of business interest.

* **For level 5:** The mentioned activities are integrated into almost all operational and strategic aspects of the organization, including all the mentioned activities at lower levels, but using a varied and complex range of AI techniques to achieve advanced and integrated results. In other words, each level encompasses not only the specific tasks outlined for that level but also includes the activities listed at lower levels. This integration ensures a progressive and comprehensive approach to digital maturity, wherein the capabilities and techniques introduced at lower levels serve as foundational elements for the advanced and integrated results achieved at higher levels.

4. Discussions and Conclusions

The authors' study addresses a critical gap in the existing literature by offering a comprehensive understanding of the relationship between companies' digital maturity levels and their readiness to integrate technology assisted by artificial intelligence. While previous research has recognized the importance of digital maturity and AI adoption separately, there remains a lack of cohesive insight into how these factors intersect and mutually influence each other within organizational contexts. To bridge this gap, the authors developed a theoretical model that illuminates the preparedness level of companies in adopting AI-assisted technology based on their digital maturity. Drawing on insights from established models, empirical observations, and specialized literature, the authors synthesized a framework that harmonizes digital maturity assessments with AI adoption strategies. Notably, they established a nuanced interval scale, shaped by the convergence of answer variants within their questionnaire, to offer a detailed depiction of each digital maturity level.

Through this approach, the authors presented a comprehensive framework that not only evaluates companies' digital maturity but also guides strategic decision making concerning AI implementation. By effectively addressing this gap, their study contributes to both theoretical advancement and practical implications for organizations navigating the complexities of digital transformation in the AI era, whereas the scientific novelty of the work results from the evaluation tool of companies from the point of view of the level of digital maturity in relation to the use of technology assisted by artificial intelligence, outlining five typologies that describe the stages of digital adaptation of organizations, es-

pecially digital marketing agencies. This study's focus on marketing agencies is significant not only due to their pivotal role in the digital landscape but also because they serve as early adopters and trendsetters in the application of innovative technologies, such as AI. As pioneers in digital marketing, these types of agencies are at the forefront of deploying AI to enhance their operations and deliver superior results for clients. By examining the readiness of marketing agencies to embrace AI, the authors provided valuable insights that extend beyond individual firms to the broader marketing industry. Their research contributes to a deeper understanding of the challenges and opportunities associated with AI adoption in marketing, paving the way for the development of strategies and best practices that can drive transformative change across the sector.

The authors' research significantly advances the discussion on digital maturity levels and their implications for organizational readiness to adopt AI-assisted technology, especially for marketing agencies. While existing studies provide valuable insights into digital maturity assessment and its applications across diverse sectors [69–71], this study stands out for its focused investigation into creating an interval scale methodology and scrutinizing 17 dimensions across five distinct levels of digital maturity, offering a nuanced understanding of organizations' readiness to embrace AI technology. Whereas previously mentioned research may have offered broad assessments of digital maturity or concentrated solely on technological aspects, this paper focuses on organizational dynamics influencing digital readiness. By identifying typologies, the authors provided actionable insights into the unique characteristics and challenges associated with each level of digital maturity, thereby enabling targeted strategies for AI adoption and digital transformation initiatives. Furthermore, our research not only advances theoretical understanding but also provides practical guidance for organizations seeking to enhance their digital capabilities. By furnishing a comprehensive framework for assessing digital maturity and informing strategic decision making, our study addresses a crucial gap in the literature, empowering organizations to leverage AI-assisted technology effectively for competitive advantage and sustainable growth.

This study's managerial implications underscore the imperative for organizational leaders, particularly those in digital marketing agencies, to proactively instigate strategic shifts toward valuing the benefits of technology assisted by artificial intelligence. Leaders must adapt their approaches and refine their leadership models to cultivate a favorable environment for innovation and adaptation to new technological demands. Crucially, developing and implementing a robust HR strategy assumes paramount importance in this digital transformation journey. Cultivating an organizational culture that encourages continuous learning and adaptability is crucial in this digital transformation process. Moreover, integrating AI into management practices requires solid and transparent ethical approaches, as well as effective risk management to ensure appropriate and sustainable adoption of the technology within organizations. This study highlights the pivotal role of organizational leadership in driving the successful adoption of AI-assisted technology. By embracing proactive strategic changes and encouraging a culture of innovation and adaptability, leaders can position their organizations for successful digital transformation.

In terms of theoretical implications, this study presents the evolving landscape of artificial intelligence-assisted technology, offering valuable insights for researchers and theorists. By deepening existing models, a new theoretical paradigm was discussed to understand the foundation and deep implications of the application of AI in digital marketing areas. Additionally, the interval scale generated from this research holds relevance across diverse disciplines such as philosophy, psychology, cognitive science, computer science, and mathematics, all of which contribute to the development of fundamental theories underpinning AI. From mathematical models and learning algorithms to theories of consciousness and ethics, theoretical research seeks to explore and answer the fundamental and conceptual challenges involved in the development and use of AI, providing solid foundations for future progress and its implications in various fields of activity.

Qualitative research and inductive analysis are methods that have produced valuable results, but they also present certain limitations and challenges. One of the main limitations of qualitative research is the subjectivity involved in the process of data collection and interpretation. Being based on observation and interpretation, qualitative research can be influenced by the subjectivity of researchers. This may lead to different conclusions or varying interpretations of the same data, which may affect the validity and reliability of the results. Another limitation of qualitative research is the impossibility of generalizing the results. Because qualitative research focuses on in-depth study, it is difficult to extend results to the entire study population. These limitations do not invalidate the value of qualitative research or inductive analysis but emphasize the importance of awareness and management of these aspects to ensure the validity and relevance of the results obtained.

Following the results and findings obtained from the assessment of digital maturity and the outlining of typologies within companies, it is possible to identify some directions for future research, namely understanding how organizational culture influences the adoption and use of digital technology. Future research can explore how organizational cultures can be shaped to encourage greater responsiveness and adaptability to change regarding technological innovations. Further research could aim to clearly evaluate the effectiveness and impact of digital technology adoption in different business areas. This could include identifying and measuring specific performance indicators that are relevant to different levels of digital maturity, as well as assessing long-term benefits. Another direction could be to develop and test different strategies and approaches to increase the level of digital maturity in companies. Research could explore specific tools, methods, or programs to support organizations in their transition to higher levels of digital maturity, adapting to the specifics of each company.

Author Contributions: Conceptualization, G.B., E.C., I.B.C., A.V.L., A.Z. and M.B.; software, E.C. and A.Z.; validation, G.B., E.C., I.B.C., A.V.L., A.Z. and M.B.; formal analysis, E.C.; investigation, G.B. and E.C.; resources, I.B.C.; data curation, G.B. and E.C.; writing—original draft preparation, G.B., E.C., I.B.C., A.V.L., A.Z. and M.B.; writing—review and editing, I.B.C., A.V.L., A.Z. and M.B.; visualization, E.C.; supervision, G.B.; project administration, G.B.; funding acquisition, G.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Transilvania University of Brașov.

Data Availability Statement: Data are presented in the main text.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Ortiz, E.; Marín, S.; Thompson, P. The Role of Small- and Medium-Sized Practices in the Sustainable Transition of SMEs: Sustainable Transition and Professionals. *Environ. Dev. Sustain.* **2023**, 1–25. [CrossRef]
2. Skare, M.; de Obesso, M.D.L.M.; Ribeiro-Navarrete, S. Digital transformation and European small and medium enterprises (SMEs): A comparative study using digital economy and society index data. *Int. J. Inf. Manag.* **2023**, *68*, 102594. [CrossRef]
3. Brock, J.K.-U.; von Wangenheim, F. Demystifying AI: What Digital Transformation Leaders Can Teach You about Realistic Artificial Intelligence. *Calif. Manag. Rev.* **2019**, *61*, 110–134. [CrossRef]
4. Taguimdje, W.; Wamba, S.; Kamdjoug, K.; Wanko, T. Influence of Artificial Intelligence (AI) on Firm Performance: The Business Value of AI-Based Transformation Projects. *Bus. Process Manag. J.* **2020**, *26*, 1893–1924. [CrossRef]
5. Ilieva, R.; Nikolov, Y. AI Integration in Business Processes Management. In Proceedings of the 2019 International Conference on Creative Business for Smart and Sustainable Growth (CREBUS), Sandanski, Bulgaria, 18–21 March 2019; pp. 1–4.
6. Ribeiro, J.; Lima, R.; Eckhardt, T.; Paiva, S. Robotic Process Automation and Artificial Intelligence in Industry 4.0—A Literature review. *Procedia Comput. Sci.* **2021**, *181*, 51–58. [CrossRef]
7. Di Vaio, A.; Palladino, R.; Hassan, R.; Escobar, O. Artificial intelligence and business models in the sustainable development goals perspective: A systematic literature review. *J. Bus. Res.* **2020**, *121*, 283–314. [CrossRef]
8. Neumann, O.; Guirguis, K.; Steiner, R. Exploring artificial intelligence adoption in public organizations: A comparative case study. *Public Manag. Rev.* **2022**, *26*, 114–141. [CrossRef]
9. Cao, G.; Duan, Y.; Edwards, J.S.; Dwivedi, Y.K. Understanding managers' attitudes and behavioral intentions towards using artificial intelligence for organizational decision-making. *Technovation* **2021**, *106*, 102312. [CrossRef]

10. Enholm, I.M.; Papagiannidis, E.; Mikalef, P.; Krogstie, J. Artificial Intelligence and Business Value: A Literature Review. *Inf. Syst. Front.* **2021**, *24*, 1709–1734. [CrossRef]
11. Chen, H.; Li, L.; Chen, Y. Explore success factors that impact artificial intelligence adoption on telecom industry in China. *J. Manag. Anal.* **2020**, *8*, 36–68. [CrossRef]
12. Feroz, A.K.; Zo, H.; Chiravuri, A. Digital Transformation and Environmental Sustainability: A Review and Research Agenda. *Sustainability* **2021**, *13*, 1530. [CrossRef]
13. Rana, N.P.; Chatterjee, S.; Dwivedi, Y.K.; Akter, S. Understanding dark side of artificial intelligence (AI) integrated business analytics: Assessing firm's operational inefficiency and competitiveness. *Eur. J. Inf. Syst.* **2021**, *31*, 364–387. [CrossRef]
14. Makarius, E.E.; Mukherjee, D.; Fox, J.D.; Fox, A.K. Rising with the machines: A sociotechnical framework for bringing artificial intelligence into the organization. *J. Bus. Res.* **2020**, *120*, 262–273. [CrossRef]
15. Asatiani, A.; Malo, P.; Nagbøl, P.R.; Penttinen, E.; Rinta-Kahila, T.; Salovaara, A. Sociotechnical Envelopment of Artificial Intelligence: An Approach to Organizational Deployment of Inscrutable Artificial Intelligence Systems. *J. Assoc. Inf. Syst.* **2021**, *22*, 325–352. [CrossRef]
16. Loureiro, S.M.C.; Guerreiro, J.; Tussyadiah, I. Artificial intelligence in business: State of the art and future research agenda. *J. Bus. Res.* **2020**, *129*, 911–926. [CrossRef]
17. Tutak, M.; Brodny, J. Business Digital Maturity in Europe and Its Implication for Open Innovation. *J. Open Innov. Technol. Mark. Complex.* **2022**, *8*, 27. [CrossRef]
18. Nasiri, M.; Saunila, M.; Ukko, J. Digital orientation, digital maturity, and digital intensity: Determinants of financial success in digital transformation settings. *Int. J. Oper. Prod. Manag.* **2022**, *42*, 274–298. [CrossRef]
19. Nichifor, E.; Brătucu, G. How the Digital Maturity Level Is Shaping the Connected Consumer Future? *J. Smart Econ. Growth* **2021**, *6*, 19–39.
20. Lawton, G. AI Ethics (AI Code of Ethics). Available online: https://www.techtarget.com/whatis/definition/AI-code-of-ethics (accessed on 21 December 2023).
21. Cole, M.; Cant, C.; Spilda, F.U.; Graham, M. Politics by Automatic Means? A Critique of Artificial Intelligence Ethics at Work. *Front. Artif. Intell.* **2022**, *5*, 869114. [CrossRef] [PubMed]
22. European Parliament. EU Guidelines on Ethics in Artificial Intelligence: Context and Implementation; European Parliamentary Research Service. 2019. Available online: https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/640163/EPRS_BRI(2019)640163_EN.pdf (accessed on 16 April 2024).
23. UNESCO. Ethics of Artificial Intelligence | UNESCO. 2023. Available online: https://www.unesco.org/en/artificial-intelligence/recommendation-ethics (accessed on 16 April 2024).
24. Grote, T. Randomised controlled trials in medical AI: Ethical considerations. *J. Med. Ethics* **2021**, *48*, 899–906. [CrossRef] [PubMed]
25. Shin, D.; Park, Y.J. Role of fairness, accountability, and transparency in algorithmic affordance. *Comput. Hum. Behav.* **2019**, *98*, 277–284. [CrossRef]
26. Brendel, A.B.; Mirbabaie, M.; Lembcke, T.-B.; Hofeditz, L. Ethical Management of Artificial Intelligence. *Sustainability* **2021**, *13*, 1974. [CrossRef]
27. Kieslich, K.; Keller, B.; Starke, C. Artificial intelligence ethics by design. Evaluating public perception on the importance of ethical design principles of artificial intelligence. *Big Data Soc.* **2022**, *9*, 20539517221092956. [CrossRef]
28. Jacobson, N.C.; Bentley, K.H.; Walton, A.; Wang, S.B.; Fortgang, R.G.; Millner, A.J.; Coombs, G.; Rodman, A.M.; Coppersmith, D.D.L. Ethical dilemmas posed by mobile health and machine learning in psychiatry research. *Bull. World Health Organ.* **2020**, *98*, 270–276. [CrossRef] [PubMed]
29. Capitol Technology University. *The Ethical Considerations of Artificial Intelligence*; Capitol Technology University: Washington, DC, USA, 2023. Available online: https://www.captechu.edu/blog/ethical-considerations-of-artificial-intelligence (accessed on 4 March 2024).
30. Zhang, Y.; Wu, M.; Tian, G.Y.; Zhang, G.; Lu, J. Ethics and privacy of artificial intelligence: Understandings from bibliometrics. *Knowledge-Based Syst.* **2021**, *222*, 106994. [CrossRef]
31. Gooding, P.; Kariotis, T. Ethics and Law in Research on Algorithmic and Data-Driven Technology in Mental Health Care: Scoping Review. *JMIR Ment. Health* **2021**, *8*, e24668. [CrossRef] [PubMed]
32. Bouhouita-Guermech, S.; Gogognon, P.; Bélisle-Pipon, J.-C. Specific challenges posed by artificial intelligence in research ethics. *Front. Artif. Intell.* **2023**, *6*, 1149082. [CrossRef] [PubMed]
33. Mökander, J.; Sheth, M.; Gersbro-Sundler, M.; Blomgren, P.; Floridi, L. Challenges and best practices in corporate AI governance: Lessons from the biopharmaceutical industry. *Front. Comput. Sci.* **2022**, *4*, 1068361. [CrossRef]
34. Ångström, R.C.; Björn, M.; Dahlander, L.; Mähring, M.; Wallin, M.W. Getting AI Implementation Right: Insights from a Global Survey. *Calif. Manag. Rev.* **2023**, *66*, 5–22. [CrossRef]
35. Hangl, J.; Behrens, V.J.; Krause, S. Barriers, Drivers, and Social Considerations for AI Adoption in Supply Chain Management: A Tertiary Study. *Logistics* **2022**, *6*, 63. [CrossRef]
36. Yablonsky, S. AI-driven platform enterprise maturity: From human led to machine governed. *Kybernetes* **2021**, *50*, 2753–2789. [CrossRef]
37. Fu, H.-P.; Chang, T.-H.; Lin, S.-W.; Teng, Y.-H.; Huang, Y.-Z. Evaluation and adoption of artificial intelligence in the retail industry. *Int. J. Retail. Distrib. Manag.* **2023**, *51*, 773–790. [CrossRef]

38. Herremans, D. aiSTROM–A Roadmap for Developing a Successful AI Strategy. *IEEE Access* **2021**, *9*, 155826–155838. [CrossRef]
39. Hopf, K.; Müller, O.; Shollo, A.; Thiess, T. Organizational Implementation of AI: Craft and Mechanical Work. *Calif. Manag. Rev.* **2023**, *66*, 23–47. [CrossRef]
40. Brodny, J.; Tutak, M. Assessing the level of digital maturity of enterprises in the Central and Eastern European countries using the MCDM and Shannon's entropy methods. *PLoS ONE* **2021**, *16*, e0253965. [CrossRef] [PubMed]
41. Borštnar, M.K.; Pucihar, A. Multi-Attribute Assessment of Digital Maturity of SMEs. *Electronics* **2021**, *10*, 885. [CrossRef]
42. Ostmeier, E.; Strobel, M. Building skills in the context of digital transformation: How industry digital maturity drives proactive skill development. *J. Bus. Res.* **2021**, *139*, 718–730. [CrossRef]
43. Azungah, T. Qualitative research: Deductive and inductive approaches to data analysis. *Qual. Res. J.* **2018**, *18*, 383–400. [CrossRef]
44. Ortega, A.; Pérez, A.; Saz-Carranza, A. Social Cohesion, Global Governance and the Future of Politics Innovating Global Governance: Bottom-Up, the Inductive Approach. 2018. Available online: https://t20argentina.org/wp-content/uploads/2018/07/TF8-8.4-Inductive-Governance-OrtegaPerezSa.pdf (accessed on 16 April 2024).
45. Digital Maturity. Making the Best Use of Digital Technology and Its Associated Culture and Networks. Available online: https://digitalmaturity.org (accessed on 16 April 2024).
46. Gmyrek, P.; Berg, J.; Bescond, D. Generative AI and Jobs: A Global Analysis of Potential Effects on Job Quantity and Quality. *SSRN Electron. J.* **2023**. [CrossRef]
47. Ghimire, P.; Kim, K.; Acharya, M. Opportunities and Challenges of Generative AI in Construction Industry: Focusing on Adoption of Text-Based Models. *Buildings* **2024**, *14*, 220. [CrossRef]
48. Belzner, L.; Gabor, T.; Wirsing, M. Large Language Model Assisted Software Engineering: Prospects, Challenges, and a Case Study. In *Bridging the Gap between AI and Reality, Proceedings of the AISoLA 2023, Crete, Greece, 23–28 October 2023*; Steffen, B., Ed.; Lecture Notes in Computer Science; Springer: Cham, Switzerland, 2024; Volume 14380, pp. 355–374. [CrossRef]
49. Junaedi, S.R.P.; Victoriani, S.; Edmond, D. Successful Digital Marketing Techniques for Business Development. *Startupreneur Bus. Digit. (SABDA J.)* **2024**, *3*, 19–25.
50. Babatunde, S.O.; Odejide, O.A.; Edunjobi, T.E.; Ogundipe, D.O. The role of ai in marketing personalization: A theoretical exploration of consumer engagement strategies. *Int. J. Manag. Entrep. Res.* **2024**, *6*, 936–949. [CrossRef]
51. Punjabi, P.; Aruna, V.; Patil, S. Navigating the New Wave; Unveiling the Transformation Effects of social media On Digital Marketing in The Emerging Era. *J. Informatics Educ. Res.* **2024**, *4*, 1. [CrossRef]
52. Olazo, D.B. Marketing competency, marketing innovation and sustainable competitive advantage of small and medium enterprises (SMEs): A mixed-method analysis. *Asia Pac. J. Mark. Logist.* **2022**, *35*, 890–907. [CrossRef]
53. Chaisatitkul, A.; Luangngamkhum, K.; Noulpum, K.; Kerdvibulvech, C. The power of AI in marketing: Enhancing efficiency and improving customer perception through AI-generated storyboards. *Int. J. Inf. Technol.* **2023**, *16*, 137–144. [CrossRef]
54. Ribeiro, T.; Reis, J.L. Artificial Intelligence Applied to Digital Marketing. In *Trends and Innovations in Information Systems and Technologies*; Springer: Cham, Switzerland, 2020; pp. 158–169.
55. Abiodun, O.I.; Jantan, A.; Omolara, A.E.; Dada, K.V.; Umar, A.M.; Linus, O.U.; Arshad, H.; Kazaure, A.A.; Gana, U.; Kiru, M.U. Comprehensive Review of Artificial Neural Network Applications to Pattern Recognition. *IEEE Access* **2019**, *7*, 158820–158846. [CrossRef]
56. Górriz, J.M.; Ramírez, J.; Ortíz, A.; Martínez-Murcia, F.J.; Segovia, F.; Suckling, J.; Leming, M.; Zhang, Y.-D.; Álvarez-Sánchez, J.R.; Bologna, G.; et al. Artificial intelligence within the interplay between natural and artificial computation: Advances in data science, trends and applications. *Neurocomputing* **2020**, *410*, 237–270. [CrossRef]
57. Amiri, Z.; Heidari, A.; Navimipour, N.J.; Unal, M.; Mousavi, A. Adventures in data analysis: A systematic review of Deep Learning techniques for pattern recognition in cyber-physical-social systems. *Multimedia Tools Appl.* **2023**, *83*, 22909–22973. [CrossRef]
58. Kim, M.W.; Kim, E.J.; Ryu, J.W. Collaborative Filtering for Recommendation Using Neural Networks. In Proceedings of the International Conference on Computational Science and Its Applications, Singapore, 9–12 May 2005; pp. 127–136.
59. Cai, X.; Bain, M.; Krzywicki, A.; Wobcke, W.; Kim, Y.S.; Compton, P.; Mahidadia, A. Collaborative Filtering for People to People Recommendation in Social Networks. In *AI 2010: Advances in Artificial Intelligence, Proceedings of the AI 2010: Advances in Artificial Intelligence, Adelaide, SA, Australia, 7–10 December 2010*; Li, J., Ed.; Lecture Notes in Computer Science; Springer: Berlin/Heidelberg, Germany, 2010; Volume 6464, pp. 476–485. [CrossRef]
60. Singh, V.; Nanavati, B.; Kar, A.K.; Gupta, A. How to Maximize Clicks for Display Advertisement in Digital Marketing? A Reinforcement Learning Approach. *Inf. Syst. Front.* **2022**, *25*, 1621–1638. [CrossRef]
61. Serrano, W. The Deep Learning Generative Adversarial Random Neural Network in data marketplaces: The digital creative. *Neural Networks* **2023**, *165*, 420–434. [CrossRef] [PubMed]
62. Daisy, A. Sentiment Mining: A Data-Driven Approach for Optimizing Digital Marketing Strategies. In *The Use of Artificial Intelligence in Digital Marketing: Competitive Strategies and Tactics*; Teixeira, S., Remondes, G., Eds.; IGI Global: Hershey, PA, USA, 2023; pp. 208–225. [CrossRef]
63. Kyaw, K.S.; Tepsongkroh, P.; Thongkamkaew, C.; Sasha, F. Business Intelligent Framework Using Sentiment Analysis for Smart Digital Marketing in the E-Commerce Era. *Asia Soc. Issues* **2023**, *16*, e252965. [CrossRef]
64. Cutler, K. ChatGPT and Search Engine Optimisation: The Future Is Here. *Appl. Mark. Anal. Peer-Rev. J.* **2023**, *9*, 8–22.

65. Fotheringham, D.; Wiles, M.A. The effect of implementing chatbot customer service on stock returns: An event study analysis. *J. Acad. Mark. Sci.* **2022**, *51*, 802–822. [CrossRef]
66. Hsu, C.-L.; Lin, J.C.-C. Understanding the user satisfaction and loyalty of customer service chatbots. *J. Retail. Consum. Serv.* **2023**, *71*, 103211. [CrossRef]
67. Wang, L.; Huang, N.; Hong, Y.; Liu, L.; Guo, X.; Chen, G. Voice-based AI in call center customer service: A natural field experiment. *Prod. Oper. Manag.* **2023**, *32*, 1002–1018. [CrossRef]
68. Rathore, B. Digital Transformation 4.0: Integration of Artificial Intelligence & Metaverse in Marketing. *Eduzone Int. Peer Rev./Ref. Multidiscip. J.* **2023**, *12*, 42–48.
69. Brodny, J.; Tutak, M. Assessing the level of digital maturity in the Three Seas Initiative countries. *Technol. Forecast. Soc. Chang.* **2023**, *190*, 122462. [CrossRef]
70. Polyanska, A.; Savchuk, S.; Zapukhliak, I.; Zaiachuk, Y.; Stankovska, I. Digital Maturity of the Enterprise as an Assessment of Its Ability to Function in Industry 4.0. In *Lecture Notes in Mechanical Engineering Advances in Manufacturing*; Springer: Berlin/Heidelberg, Germany, 2022. [CrossRef]
71. Hein-Pensel, F.; Winkler, H.; Brückner, A.; Wölke, M.; Jabs, I.; Mayan, I.J.; Kirschenbaum, A.; Friedrich, J.; Zinke-Wehlmann, C. Maturity assessment for Industry 5.0: A review of existing maturity models. *J. Manuf. Syst.* **2023**, *66*, 200–210. [CrossRef]

Electronic Commerce Research
https://doi.org/10.1007/s10660-024-09879-6

Behavioural differences and purchasing experiences through online commerce or offline within mall-based retail structures

Alexandra Zamfirache[1] · Nicoleta Andreea Neacșu[1] · Anca Madar[1] · Simona Bălășescu[1] · Marius Bălășescu[1] · Ioana-Mădălina Purcaru[1]

Accepted: 10 July 2024

Abstract
Due to the economic changes in recent decades, the purchasing behaviour of consumers has significantly shifted. Buyers are no longer just seeking a place to shop but also experiences to live through. This study aims to conduct an in-depth analysis of the differences in behaviour and shopping experiences in online versus offline environments, specifically within malls. To achieve this, a quantitative marketing research was conducted, collecting data from a sample of 1030 respondents. The study results indicate that respondents perceive both online and offline commerce to evolve concurrently. These commerce modes will be strongly influenced by various factors, including technological advancements, which are considered to impact both forms of commerce. Among the study's conclusions, there is the confirmation of behavioural differences between online and mall shopping. The outcomes can be beneficial for improving the activities of retailers by offering new shopping experiences and developing new communication methods with customers.

Keywords Buying behaviours · Online commerce · Retail commerce · Shopping Experiences · Mall

1 Introduction

Because of the increasing number of malls, consumers tend to be more selective [1], and that is the most powerful reason for the managers to find the appropriate ways of attracting and retaining the customers.

From a retailer's standpoint, the major factor that has always dominated modern retail has not changed at all, and this remains: *the location*. Other essential facilities are

✉ Alexandra Zamfirache
alexandra.zamfirache@unitbv.ro

[1] Faculty of Economic Sciences and Business Administration, Transilvania University of Brașov, 500036 Brasov, Romania

accessibility [2], security [3], climate comfort, and an attractive physical environment [4]. One study about Romanian shopping malls [5] identified as the most important elements for customer satisfaction inside malls: the assortment, the price, communication, décor, and service. But all these aspects are no longer sufficient to work efficiently.

Today's retail tenants need well and clearly defined strategies for: tenant mix, marketing strategies, but also various activities for spending the time, without the immediate necessity to shop. Examples include: sophisticated leisure activities, appealing gastronomy concepts, exceptional event planning, and extraordinary brand attractiveness) [6].

Due to the changes of the last decades (online sales, growth of urbanization, aging population, people's need to socialize), shopping malls have to change the role they play in people's lives. Buyers are not only looking for a place to shop, but also for experiences far beyond traditional commercial. Therefore, shopping malls must incorporate value-added items like concerts, art centres, spas, fitness clubs, farmers' markets, dining venues, places where to spend quality time with friends and family.

The study of Venkateswarulu & Uniyal [7], shows that the appeal of a mall depends of factors such as: convenience, amenities, ambiance, personnel, parking, and seating.

This study sets out to analyse the differences in shopping behaviours and experiences both online and in person in malls before and after COVID-19. To this end, the authors have undertaken a quantitative marketing analysis.

The four objectives of this research were identified by reviewing the relevant literature. The study continues with presenting the methods used, including detailed explanations of the project's components: Questionnaire development, Data collection, location of the survey and sample, and Data Analysis Techniques. The fourth section of the work presents the results and discussion, grouped by the research objectives. Principal component analysis (a multivariate data analysis technique), which draws conclusions and introduces the two new variables. These have been generically named by the authors 'Respondents' preference for buying from the online environment represented by a series of advantages' and 'Barriers in respondents' preference for choosing online shopping'. This analysis is extremely important as its results confirm once again the behavioural differences researched here.

The article ends with a conclusions and implications section that includes the study's limits and future work.

The current study is an important step to a more thorough understanding of the evolution of shopping behaviours and preferred buying experiences of the consumers. In particular, the study is unique in presenting the effect of the COVID-19 pandemic on these aspects.

2 Literature review

To be successful, any organization must adopt a strong marketing strategy. Since the late 1990s, a growing emphasis has been laid on customer experiences, as value-added to the sold products. Mastering the concept and execution of exceptionally good customer experience is a real challenge, but an essential one in today's rapidly changing business environment [8, 9]. According to Oxford

English Dictionary, experience means 'to gain knowledge or skills by doing, seeing, or feeling things; something that happens to you, that affects your feelings; something that you have to do with, that happened to you or that you felt [10]. 'Experience' is the key to success.

The innovative retailers have recognized the value of experiential marketing. For this reason, the trend is to create an engaging environment for the buyer. Also, for the same reason, a host of product options are offered that cater to a wide range of buyers and their lifestyles.

So, we can say that customers are no longer just interested in buying goods, they want experiences. It becomes essential for mall owners to keep up with the continuously changes, to maintain the enthusiasm of customers, and to adapt to their needs.

Customer experience comes from a set of interactions between the client and product, a company, or a part of its organization, which causes a reaction. This is strictly personal and supposes the client's involvement at different levels (rational, emotional, sensory-physical, and spiritual) [11]. Memorable experiences can change the client and this kind of moment cannot be replicated because they are personal and powerful. Experience marketing has as its main purpose the strengthening of the emotional connection between the customer and the brand, thus managing to lead to the loyalty of buyers. Sometimes, the commercial experience is closer to a journey, as in the case of a 'story' [12].

To create notable experiences for the company, four elements are important, such as the process of achieving the experience, the employees, the company performance, and the possibilities to create these experiences. The most memorable customer experiences involve interaction with the employees; they are simply the custodians of customer experience [13].

The achievement of these experiences can be discussed from two standpoints. The first one refers to the client's participation in the experience. In this situation, the client's participation can be passive, in which case the consumer should not affect the performance of the products and services. Furthermore, customers can actively participate in the created experience. The second dimension of the experience describes the relationship with the environment, which introduces the client into the event and into the achieved experience [14].

New technologies are opportunities for engaging consumers throughout the decision-making process of purchase. Through the trend registered by the spectacular growth of technology (through social networks but also digital interactions), customers have come to put pressure on companies to create competitive experiences for them [15].

In this article, the authors have set out to study the differences in shopping behaviours and experiences both online and offline in mall, before and after COVID-19. The study follows the four objectives set after reviewing the literature, as follows:

- **O1**. Identifying offline shopping behaviours and analysing the motivations behind visiting malls.
- **O2**. Identifying online shopping behaviours and the reasons behind choosing this particular type of commerce.

- **O3**. Determining the differences between online and offline shopping experiences.
- **O4**. Identifying the differences in shopping behaviour before and after the COVID-19 pandemic.

2.1 O1. Identifying offline shopping behaviours and analysing the motivations behind visiting malls

As shown previously, consumers do not visit malls simply to shop, but seek various additional experiences to enrich their time spent in these spaces. Srinivasan [16] shows that while marketing experiences are open to all clients, their assimilation is deeply personal. They depend on not only the wishes and needs, but also the self-image, social objectives, latent emotions and the values and deeply rooted wants of the consumer. The same author shows that an important element in creating an experience is the brand's identity, because the consumer pays not for the product or service, but for the experience.

This is why commerce specialists must devise more attractive shopping experiences for the visitors of malls [17].

As Flavián [18] states, one of the research topics in the field aims to identify the way in which these experiences have evolved over time and their influence on the consumers' behaviour. These studies have shown that positive experiences resulted in emotional responses like enthusiasm, fun, escapism [19] and determined what makes customers loyal to a brand or a retailer [20].

Kim et al. [21] suggest that the motivation for offline shopping is to reduce the perceived risk and make better purchases through obtaining more information and sharing the experience. Consumers consider that the information gained directly from shop clerks is more genuine than that available online, associating a higher risk and incertitude with online shopping [21].

Based on their study, Mittal & Jhamb [1] have concluded that there are four dimensions to the sixteen attributes of a commercial centre/mall's attractiveness: (1) Merchandising, (2) Variety and selection, (3) Method and facilities and (4) Convenience.

2.2 O2.Identifying online shopping behaviours and the reasons behind choosing this particular type of commerce

The pandemic, as we have all seen, caused a portion of purchases to migrate online, given the restrictions on the population's movement and that many people avoided offline shopping to prevent becoming ill [22–24].

Some studies [25, 26] elucidated that, in the USA, online shopping accounted for 10–15%, and Amazon held about 40% of these sales. In March 2020, Amazon clients spent 35% more capital on the platform compared to the same time of year in previous years to buy essentials. This droves Amazon to employ 175.000 more workers to meet demand.

In Sweden, Gardshol [27], determined that in the second term of 2020, the volume of online purchase increased with 49% compared to 2019, especially for foodstuffs, which rocketed to 119% higher. In Italy, 2020 was projected to bring a 26% increase in online shopping compared to the previous year, but in reality, this increased by 56%, according to Digital4 [28], (2020).

Online shopping offers access to a large variety of products and simply the delivery process, which led to an increase in this type of purchases [29]. They are convenient for customers, and retailers should exert themselves to improve the online shopping experience [30, 31]. Alaimo et al. [32], suggests that other benefits include the option to compare more products that are not always found in stores and being able to access more information about products [33].

According to Kuoppamaki et al. [34], some of the most important drivers for online shopping include: age, education, access to technology, perception about the benefits of online shopping, and the customer's attitude and trust towards online purchases.

As Rita et al. [35], state, the challenge for online retailers is to offer and maintain client satisfaction, which requires a strategy focused on services. One necessary step towards this goal is the creation of a good quality website, with excellent information and electronic services [36]. The same idea is underlined by the study of Saha et al. [37], which shows that the intention to shop is increased by client satisfaction and prior experiences. This is why online retailers need to find strategies to make online shopping as pleasant as possible.

Bajdor [38] analysed the relationship between client experience of online shopping and variables such as the speed and interactivity of the purchasing process, the access to products/services traditionally unavailable and to sales and offers, how intuitive and transparent the ordering process is, the convenience, the level of satisfaction and whether it is beyond expectations. The study's results show that online shopping meets the customers' needs.

One of the aspects that prevents some customers from shopping online is how retailers process customer data. The study of Gouthier et al. [39], showed the importance of a fair and transparent relationship between companies and online consumers.

2.3 O3.Determining the differences between online and offline shopping experiences

As early as 2004 Browne et al. [40] identified that in spite of the similarities of online and offline shopping, there are some major differences between the two.

Previous studies identified one of the differences between the experience of online and offline shopping as the time and cost of collecting information about the products to be purchased [41]. These studies show that consumers prefer searching for information online because it reduces the time and cost of the search (no time lost in traffic to reach the shops, prices can be compared between more products in a shorter time, the availability of reviews from other customers) [42–44]. The lack of tactile information that can only be obtained offline is compensated by a surplus

of information about the product online. Despite this, some customers feel the need to consult with the shop clerk about some specific aspects of the products when they decide to shop (placing a high level of trust in the shop clerk, but also a need to socialise).

Another difference that was identified was that when customers shop offline, they immediately have the product at their disposal, while if the purchase is made online, they have to wait a while until the product arrives. It was also determined that younger customers have a stronger desire to have access to the product immediately [45].

At the same time, the price can be different. Usually, offline prices are higher than the ones displayed online. If this difference is significant, customers might decide to make the purchase online [46].

However, more and more customers combine shopping online with making purchases offline to minimise cost and increase benefits [47].

2.4 O4.Identifying the differences in shopping behaviour before and after the COVID-19 pandemic

It is known that the COVID-19 pandemic led to an unprecedented increase in online shopping, in particular for basic items, and produced major changes in the customers' shopping behaviour [48].

Mainly, there have been marked changes in the way in which the internet is used and the activities that are undertaken in this medium. In a study by Chmielarz et al. [24], it is shown that the most popular uses of the internet were: social media use, watching movies and TV series online, and listening to music online (19% each, respectively). After COVID-19, the ranking has changed to: online shopping (13%), searching for information on the Internet (13%), and telemedicine visits (over 8%). The highest increase (11–12%) could be observed in searching for information on the web and online commerce.

Sheth [49] identified eight immediate changes in shopping behaviour due to the pandemic: (1) hoarding behaviour (consumers stock essential products for daily use, which leads to shortages and the items being out of stock); (2) improvising (consumers learn to improvise when met with shortcomings. Existing habits are abandoned and new ways to consume goods are invented); (3) adoption of digital technologies (due to pure necessity, consumers have adopted more and more new technologies and applied them); (4) discovering new talents (with more time at home to spend in flexible ways, consumers have experimented with recipes, exercised their talents and discovered new ways to create and play music, to share their learning process and buy online in a more creative way); (5) restrained demand (in times of crises and incertitude, the general tendency is to postpone the purchase and consumption of products or discretionary services); (6) Shops relocate to homes (due to strict lockdown rules, stores must be brought into the consumer's home, just like work and education. This reverses the balance between work, education, health, purchases and consumerism; (7) blurring the lines between work and personal life (consumers are confined to their homes, with limited space and too many discrete activities like

work, learning, shopping and socialising); (8) reunions with friends and family (the COVID-9 pandemic led to a desire to contact estranged friends and family, both to check on their wellbeing, but also to share stories and experiences).

Some of these changes could develop into habits which could have long term effects [49, 50].

3 Research method

The authors performed a study that is part of quantitative marketing research by using a survey. The data was analysed to discover opinions, attitudes and behaviours in relation to shopping. The overarching aim of this research is to detect the characteristics of online versus offline (particularly in malls) shopping behaviours.

3.1 Objectives and hypotheses

The main objective of this marketing research is to identify perceptions, behaviours and attitudes in relation to shopping and the differences between online and offline purchasing experiences. Given the work's focus, the following objectives were outlined:

- **O1.** Identifying offline shopping behaviours and analysing the motivations behind visiting malls.
- **O2.** Identifying online shopping behaviours and the reasons behind choosing this particular type of commerce.
- **O3.** Determining the differences between online and offline shopping experiences.
- **O4.** Identifying the differences in shopping behaviour before and after the COVID-19 pandemic.

The following hypotheses were formulated:

1. *Hypothesis 1 (**H1**)* There is no correlation between the respondents' income and the frequency of visiting malls during sales;
2. *Hypothesis 2 (**H2***. There is no correlation of the respondents' gender and the increase in online orders with the number of online orders placed after the COVID-19 Pandemic.

3.2 Questionnaire development

To fulfil these objectives, the data was collected through a survey created after a thorough review of specialist literature and existing studies, with the addition of the author's professional experience (specialists in different interdisciplinary domains).

Before the questionnaire was distributed to the pool of participants, an initial test was performed on a sample of 25 respondents. This was done to identify and

eliminate all possibilities of ambiguity. The final version of the questionnaire, developed after the results of the pre-testing, consists of 32 multiple choice questions grouped into multiple sections that thoroughly cover the study's focus and fulfil the objectives. The last set of questions (Q27–Q32) aim to provide a profile of the respondents (gender, age, income etc.), while the other questions (Q1–Q26) seek to fulfil the study's objectives. The link between the questions asked in the survey and their respective objective are presented in Table 1.

3.3 Data collection, location of the survey and sample

For data collection, the Computer assisted web interviewing (CAWI) technique was employed. This method involves displaying the questionnaire on a web page, with respondents providing direct responses within their web browser. The data collection period spanned from August to September 2023, and the completion of the questionnaire took an average of 15–20 min.

The targeted respondents were individuals residing in Romania who had visited a mall at least once and had made at least one online purchase both before and after the pandemic. The questionnaire commenced with two filter questions regarding mall visits and online shopping. In cases where respondents selected the 'no' response, the questionnaire was terminated.

Participant selection was based on the assumption that these individuals were most capable of providing relevant information. A panel of 1030 respondents was interviewed, consisting of individuals who had visited a mall at least once and had placed an online order before and after the pandemic (excluding respondents who answered negatively to the initial 2 filter questions). To address the research question accurately, the authors employed convenience sampling, deemed most suitable and commonly utilized in practice. Given the non-random nature of this sampling method, the data cannot be extrapolated to the whole population. The demographic breakdown of respondents included in the sample is reproduced in Table 2.

As evident from Table 2, the majority of respondents exhibit a prominent demographic concentration among young individuals, aged between 18 and 35, comprising 79.6%. This underscores that they are the most dedicated visitors and consumers of malls. This finding aligns with the observations made by Kuruvilla [51] in their study, asserting that malls are substantially reliant on the patronage of young visitors, who also constitute the highest spenders.

3.4 Data analysis techniques

The obtained data were processed using the SPSS software program, employing various data analysis methods. The authors meticulously orchestrated and oversaw the entire research process, from the formulation to the implementation of the questionnaire data analysis.

A series of data analysis techniques were chosen to be consistent with the research objectives. To this end, the program IBM SPSS Statistics 20 was employed

Table 1 List of survey questions and the objective each one fulfils. *Source* created by the authors

	Questions	Objectives
Q1	Have you been to a mall at least once so far?	O1
Q2	Have you ever made an online purchase so far?	O2
Q3	How often do you visit a mall?	O1
Q4	What is the last mall you have visited?	O1
Q5	Do you go to the mall more during sales seasons?	O1
Q6	How do you prefer to do your shopping?	O3
Q7	Overall, how satisfied are you with the attractions on offer in malls?	O1
Q8	Please state your main motivation for visiting malls.	O1
Q9	What time of the week do you prefer to go to the mall?	O1
Q10	What part of the day do you prefer to go to the mall?	O1
Q11	How do you find the interior (image, atmosphere, ambiance) of the malls your frequent?	O1
Q12	What is the number of stores you visited in your last mall visit?	O1
Q13	What category do the commercial spaces that you visit in malls fit into?	O1
Q14	What is the approximate expense you made on your last mall visit?	O1
Q15	Please express your opinion on the following affirmations:	O1
	Visiting malls makes me feel important.	
	Mall visits are an exciting experience.	
	The mall is a dynamic place where interesting things happen all the time.	
	The mall is the definition of modern living.	
	The shopping experience in malls is like an adventure full of surprises.	
	Sometimes the crowds present in malls at peak times bother me.	
	I am happy with the level of security in malls.	
	I think I could spend a whole day in the mall without getting bored.	
	I always spend more money than initially planned when I go to the mall.	
	The atmosphere in malls is full of energy.	
	I am willing to pay more for products and services in malls because I know they are part of an experience.	
Q16	What experiences do you think are on offer offline, in malls, over the online shopping experience?	O3
Q17	During the COVID-19 pandemic, how did you prefer to purchase your essential items?	O4

Table 1 (continued)

	Questions	Objectives
Q18	Please express your opinion on the following affirmations:	O2, O3, O4
	The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic.	
	The convenience of online shopping made me place more orders	
	I believe that by placing online orders I avoid wasting time	
	The quick online search for products and the availability of offers are advantages of online shopping	
	The possibility of my order being damaged in transit made me pay careful attention to what types of products I ordered online	
	The online payment for ordered products represents a barrier that makes me careful when I place online orders	
	I know how to protect myself against cybernetic attacks and online payments	
Q19	After COVID-19, have you chosen to reduce the time you spent in malls?	O4
Q20	How did the COVID-19 pandemic influence your choices with regards to visiting malls?	O4
Q21	How did the COVID-19 pandemic influence your choices with regards to spending money, correlated with the number of visits you have made to malls?	O4
Q22	After the COVID-19 pandemic, meetings with friends at the mall have been...?	O4
Q23	What are the experiences you seek when going to the mall?	O1
Q24	Please express your opinion on the following affirmations:	O2
	I was able to easily find the products I needed on websites	
	I think apps for clothing/shoe shopping are beneficial	
	The products I received were adequately packaged	
	I have encountered situations in which the products I received were not the same as what I had ordered	
	I trust online clothing stores	
	I have had trouble with finalising transactions online	
Q25	What is the payment method you use most often for online shopping?	O2
Q26	What do you think will be the future of physical malls in rapport to online shopping?	O3
Q27	Your gender	Profiling question
Q28	Your age belongs to what interval?	Profiling question
Q29	Main activity	Profiling question
Q30	Highest level of completed education	Profiling question

Table 1 (continued)

	Questions	Objectives
Q31	Net income of your household	Profiling question
Q32	Background	Profiling question

for: estimating descriptive analysis and illustrating respondent characteristics; conducting analyses (χ^2, Kolmogorov–Smirnov); and performing Principal Component Analysis (a method within multivariate data analysis).

For descriptive and statistical indicators, the following measures were employed: the median, the mean, the frequency, one correlation matrix, and the Varimax rotation method [52–54].

In the Principal Component Analysis PCA, variables were measured using numerical scales with equal distances between levels (interval scales), each scale comprising 5 levels ranging from 5–total agreement to 1–total disagreement. The evaluated activities focused on characteristics related to changes in purchasing behaviour (online versus physical) after the COVID-19 pandemic and included 7 variables.

Based on these 7 variables, the aim was to identify 2 principal components (factors) that would synthesize the majority of information held by the respective variables and streamline the interpretation of the results.

4 Results and discussion

Results are presented and grouped by the study's objectives, and the analyses that were performed are presented in a logical succession which permitted the authors to obtain the relevant results.

4.1 O1. Identifying offline shopping behaviours and analysing the motivations behind visiting malls

The results obtained for Question 3 indicate that the majority of respondents (42.2%) visit malls on a weekly basis, while 32% do so on a monthly basis. Only 1% of respondents claimed to visit malls daily, and 24.8% occasionally. Based on responses to Question 4, the authors generated a map (Fig. 1) illustrating the distribution of malls visited by respondents. The majority are situated in Bucharest, the capital of the country (34.0%), followed by Brasov (11.7%), located in the central part of the country and a tourist area. Constanta (7.8%), with access to the seaside, and Prahova (7.8%), positioned near the capital, each accounted for an equal percentage. The results indicate a relatively homogeneous dispersion of the locations of malls visited by respondents.

Table 2 The sample structure. *Source* created by authors based on the results of the quantitative analysis

Criteria	Sample structure				
Sample (1030 respondents)	Men 25.7%		Women 74.3%		
Background	Urban 74.3%		Suburban 3.4%	Rural 22.3%	
Net income per household	0–500 euro 19.9%	501–1.000 euro 34.5%	1.001–1.500 euro 18.4%	Over 1.500 euro 27.2%	
Highest level of completed education	Secondary school 1%	High school/vocational school 48.5%	Undergraduate degree 31.6%	Masters degree 16.5%	Doctorate 2.4%
Main activity	Employed 59.7%	Entrepreneur 5.8%	Student 32%	Stay-at-home 1.9%	Pensioner 0.5%
Age	18–25 years old 47.1%	26–35 years old 32.5%	36–45 years old 11.2%	46–55 years old 8.7%	Over 55 years old 0.5%

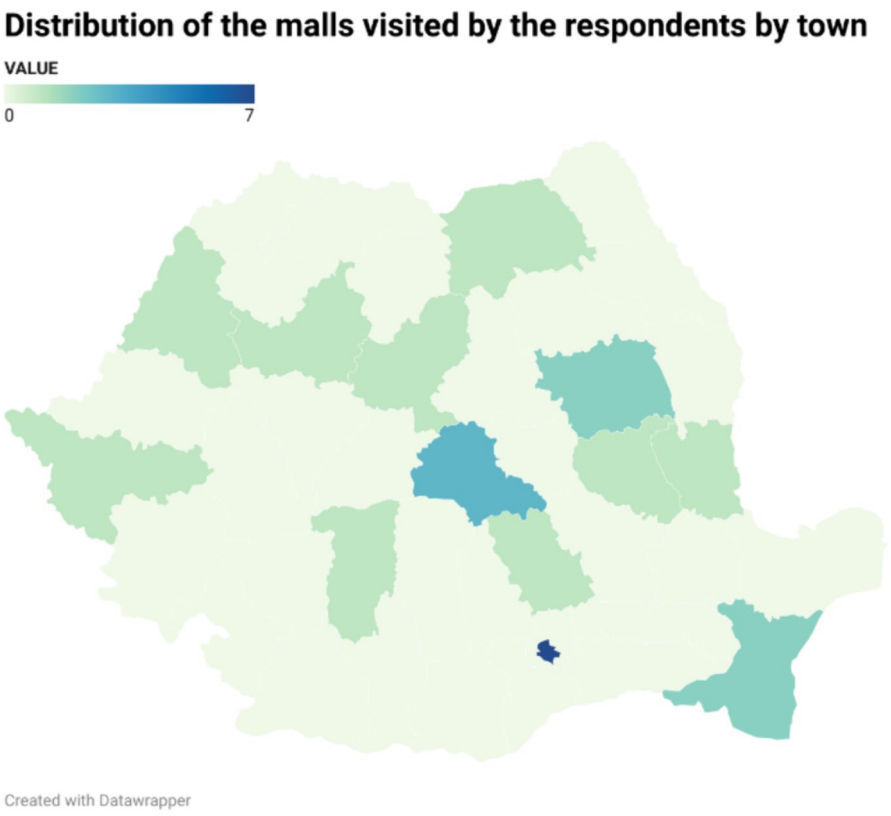

Fig. 1 Distribution of the malls visited by respondents. *Source:* created by authors based on the results of the quantitative analysis

The analysed sample members visited an average of 5.09 stores during their last mall visit, with the minimum recorded at 1 store/visit and the maximum at 30 stores/visit. This resulted in an amplitude of 29 stores, representing the difference between the maximum and minimum values.

To examine whether promotional discount periods influence respondent behaviour, Question 5 was posed. The recorded values are divided as follows: 49% of subjects provided negative responses, 36.4% affirmative responses, and 14.6% of respondents selected the response 'don't know/cannot pronounce.' The conclusion is that almost half of the respondents are not influenced by discounts to visit malls more frequently than usual.

Question 7 implemented a semantic differential scale (with scores assigned from 1 to 5 for each level, where 1 represents 'totally dissatisfied' and 5 'very

satisfied'). Frequency distribution indicates a high level of satisfaction regarding mall attractions. Approximately 70% of valid responses indicated that respondents are satisfied and very satisfied with mall attractions. The intermediate level (neither–nor) was indicated by 27.7% of those who responded to this question, while only 2.4% considered themselves dissatisfied with mall attractions. Response option 1 (very dissatisfied) did not receive any responses. In general, the conclusion is that respondents are satisfied and very satisfied with mall attractions.

The primary reason respondents visit malls is related to shopping, a motive that accounted for 69.4% of total responses. The least common responses were recorded for dining (3.9%), relaxation (8.3%), and event participation (0.5%). Under the 'other' category (registering 1.5%), respondents mentioned: free parking, information about products.

Respondents frequent malls at a rate of 55.3% on weekdays and the remaining 44.7% on weekends. Regarding the time intervals during which respondents visit malls (Q10), the majority (70.9%) prefer going between 3 and 8 pm, while 1% visit malls after 9 pm. A possible explanation for the received responses could be the operating hours of malls (usually open until 10 pm) and respondents' working hours (typically until 5 pm).

Through Question 11, the authors aimed to determine respondents' opinions regarding the interior aspect (image, atmosphere, environment) of the malls they frequent. The recorded responses, both in terms of median and mode values, confirm that the interior aspect of the mall is situated at level 4 (68.4%), representing the response option 'well-organized.' The mean for this question is 3.97 on a scale from 1 to 5. Fewer responses were recorded on the negative side of the scale, with only 3.4% of respondents considering the interior aspect of the mall not organized or poorly organized.

When asked 'What category do the commercial spaces that you visit in malls fit into?' (Q13), respondents had the option to choose multiple answers, resulting in a total of 3780 responses. The study results demonstrate that the main commercial spaces visited by respondents are: 25.8% clothing and footwear stores, 16.1% restaurants and fast-food establishments, and 15.8% supermarkets and hypermarkets. The least visited commercial spaces in malls are: 0.4% travel agencies, 1.3% children's play areas, and 1.9% flower shops and other gift stores or services.

Kuruvilla [51] reveals that young girls are inclined to visit stores, whereas young boys show a greater interest in recreational areas.

Regarding the amounts spent by respondents during their last mall visit (Q14), the majority of responses (50%) fell within the range of 100–299 lei (approximately 20–59.8 €). A percentage of 13.6% spent 0–99 lei (approximately 0–19.8 €) on their last mall visit, 37.4% spent between 200 and 399 lei (approximately 40–79.8 €), and 22.8% spent over 400 lei (approximately 80 €).

Question 15 aimed to identify subjects' opinions on various aspects and experiences related to physical commerce and malls (Table 3). Observations indicate that respondents do not feel important when visiting the mall (mean = 2.1 points on a scale of 1–5). Statements such as 'Mall visits are an exciting experience.' scored 2.89 points, 'The mall is a dynamic place where interesting things happen all the time.'—2.87 points, 'The mall is the definition of modern living.'—3.11 points,

and 'The shopping experience in malls is like an adventure full of surprises.'—3.01 points, all recorded averages at the neutral level 3, indicating a neutral opinion toward these statements.

One aspect that bothers respondents when visiting the mall during peak hours is related to congestion, with 84% of respondents agreeing or strongly agreeing, obtaining an average of 4.23 points on a scale of 1–5. Regarding satisfaction with security and safety measures in the mall, an average of 3.54 points was recorded, with most responses indicating agreement from respondents, accounting for 42.2%.

Respondents tend to spend more money in the mall than initially planned, with 32% of responses indicating agreement. However, they believe that they cannot spend the entire day in the mall without getting bored, with 61.7% of responses reflecting this sentiment.

Concerning the statement 'The atmosphere in malls is full of energy.' there were 380 responses, representing 36.9%, for a neutral response and 375 responses, representing 36.4%, in agreement with the statement.

The final statement, which pertains to paying a higher price for products and services in the mall as part of an experience, received mostly negative responses, with 50.5% of respondents disagreeing with sacrificing their budget for an experience. This statement obtained an average of 2.52 points on a scale of 1–5.

The primary experiences sought by respondents at the mall are related to the purchase of goods and services, as indicated by 54.6% of respondents, followed by going to the cinema (31.8%) and socializing (11.4%). Participation in events does not attract respondents, with only 2.2% expressing interest in this experience.

The authors employed the Chi-Square test (Table 4) to examine the presence of an association between respondents' income and the heightened frequency of visits to malls during discount periods.

Regarding Question 5, elevated frequencies for the negative response were observed across all income groups of respondents, except for the initial category with incomes ranging from 0 to 500 euros. It is evident that individuals within this income bracket exhibit greater sensitivity to pricing in comparison to their counterparts in other income groups. Further analysis is required to determine the significance of this observed difference.

It is noted that the critical ratio attains a value of 29.305, surpassing the theoretical ratio $\chi^2_{0.05;6} = 12{,}592$. This discrepancy implies a 95% probability that within the research population, disparities exist between the expected and observed frequencies. In conclusion, a discernible connection exists between respondents' income and the heightened frequency of visits to malls during discount periods. This assertion is reinforced by comparing the minimum level of significance to the value of 0.000, which is less than the predetermined threshold $\alpha = 0.05$.

Table 3 Summary of statistical results regarding the respondents' opinions on a series of affirmations. *Source* created by authors based on the results of the quantitative analysis

Affirmations	Response options					
	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Average
Visiting malls makes me feel important.	35.4	29.1	27.2	6.3	1.9	2.10
Mall visits are an exciting experience	13.6	17	40.3	24.8	4.4	2.89
The mall is a dynamic place where interesting things happen all the time	13.1	21.4	36.9	22.8	5.8	2.87
The mall is the definition of modern living	12.1	18	26.2	34	9.7	3.11
The shopping experience in malls is like an adventure full of surprises	11.2	16.5	40.8	22.8	8.7	3.01
Sometimes the crowds present in malls at peak times bother me	4.4	3.4	8.3	32.5	51.5	4.23
I am happy with the level of security in malls	4.9	5.8	33.5	42.2	13.6	3.54
I think I could spend a whole day in the mall without getting bored	41.3	20.4	22.3	9.7	6.3	2.19
I always spend more money than initially planned when I go to the mall	6.3	16.5	24.8	32	20.4	3.44
The atmosphere in malls is full of energy	8.3	9.7	36.9	36.4	8.7	3.28
I am willing to pay more for products and services in malls because I know they are part of an experience	27.2	23.3	25.2	18.9	5.3	2.52

Table 4 Critical report for the Chi-Square analysis. *Source* created by authors based on the results of the quantitative analysis

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.305[a]	6	0.000
Likelihood ratio	30.040	6	0.000
Linear-by-linear association	0.029	1	0.865
N of valid cases	1030		

[a]0 cells (0,0%) have expected count less than 5. The minimum expected count is 27.67

4.2 O2.Identifying online shopping behaviours and the reasons behind choosing this particular type of commerce

To facilitate the identification of respondents' motivation for ordering online, a series of statements were presented, and respondents were asked to express their opinions. The synthesis of the obtained results is presented in Table 5.

The analysis of responses highlights that among the analysed statements, the highest average is recorded for the statement 'The products I received were adequately packaged' (mean = 4 points on a scale from 1 to 5). Conversely, the lowest average is recorded for the statement 'I have had trouble with finalising transactions online '(mean = 2.7 points on a scale from 1 to 5). It can be concluded that logistics plays a crucial role, and the packaging used is effective. However, an issue arises concerning the online payment of ordered products.

Simultaneously, for the first four analysed statements, it is observed that the highest percentages are recorded for the agreement response, while for the last two statements, the majority of responses fall into the neutral category, representing neither agreement nor disagreement. It is evident that a significant portion of respondents (44.7%) holds a neutral opinion regarding the trust they have in online clothing stores.

The most frequent payment method for online shopping is online card payment for more than half of the subjects (51.5%), followed by cash payment upon delivery (48.1%). A small percentage of respondents (0.5%) prefer payment by money order. These results closely correlate with the responses recorded above for the statement 'I have had trouble with finalising transactions online.' This may represent a reason why a substantial portion of respondents does not prefer online payment.

To ascertain respondents' opinions regarding online commerce, a series of statements on the characteristics of online orders were presented, and the synthesis of the obtained results is outlined in Table 6.

From the analysis of responses, it is evident that the average for all statements is close to the level of 3, indicating a neutral stance. The lowest average (3.2 points on a scale from 1 to 5) suggests that online payment is a barrier for respondents. Additionally, for all analysed statements, the highest percentages are observed for the agreement response, emphasizing respondents' optimistic and positive orientation in their answers.

Table 5 Summary of statistical results regarding the respondents' opinions on a series of affirmations about motivations for choosing online orders. *Source* created by authors based on the results of the quantitative analysis

Affirmations	Response options					
	Strongly disagree (%)	Strongly disagree (%)	Strongly disagree (%)	Strongly disagree (%)	Strongly disagree(%)	Strongly disagree
I was able to easily find the products I needed on websites	2.4	6.8	28.2	40.8	21.8	3.73
I think apps for clothing/shoe shopping are beneficial	2.4	4.9	31.6	38.3	22.8	3.74
The products I received were adequately packaged	0.5	2.9	17	55.3	24.3	4.00
I have encountered situations in which the products I received were not the same as what I had ordered	10.7	21.4	23.3	27.7	17	3.19
I trust online clothing stores	2.4	12.6	44.7	29.6	10.7	3.33
I have had trouble with finalising transactions online	19.9	24.8	29.6	17	8.7	2.70

The findings from this study concerning the motives for online purchases align with the results of other studies on this topic. The crucial factors related to online product/service purchases are the optimal quality/price ratio (17% of opinions) and the best price and delivery costs (14% each), reflecting primarily economic factors [24]. Nigar & Miah [55] demonstrated that three factors positively impacting the online buying behaviour of Bangladeshi shoppers during the pandemic are celebrity approval, promotional tools, and online reviews.

Regarding customer satisfaction with online shopping, analysing two dimensions, namely the process and outcome dimensions, Alaimo et al. [32] reveal that the process dimension, linked to the ease of using online tools in the phases of search and online purchase, generates a higher satisfaction level than the outcome dimension measured in terms of service utility. In other words, online customer satisfaction is higher if they can easily access information, if the website is attractive and user-friendly, if customer services are good, and if customer security is enhanced [50, 56].

4.3 O3.Determining the differences between online and offline shopping experiences

A significant difference between online and offline commerce is identified in the swift online product search with the possibility of comparing offers, providing an advantage to online shopping. For this statement (Q18), the mean response is 3.88 points on a scale from 1 to 5. The recorded responses indicate that 41.7% of respondents agree, followed by 29.6% in complete agreement. A percentage of 19.9% marked a neutral response, neither agreeing nor disagreeing, and the options of disagreement and complete disagreement have low values (disagreement is indicated by 4.9% of subjects, while complete disagreement is mentioned by 3.9%).

62.6% of respondents stated that it is easier for them to find desired products on websites than to go to the mall. These responses correlate with those for the statement ‘I believe that by placing online orders I avoid wasting time’ with 68.9% of respondents answering in agreement or complete agreement.

The research has shown that another difference between online and in-store purchases concerns the possibility of receiving different or incorrect products than those ordered online. Responses indicate that 44.7% of respondents have encountered this situation, which may lead them to reconsider online purchases.

The online transaction payment, the occurrence of difficulties in completing transactions, or mistrust in the safety of online payment represent another aspect creating differences between the two types of purchases (online and offline), with some respondents being reserved about such transactions.

When respondents were asked to specify their perception of the future of physical malls in relation to online commerce, the majority, specifically 36.06%, believe that they will operate in parallel, much like they do now, and that malls will not be affected by online commerce because malls offer the advantages of socialization, product quality verification, and there are still consumers who prefer physical shopping. Negative opinions about the future of physical malls were mentioned

Table 6 Summary of statistical results regarding the respondents' opinions on a series of affirmations about the characteristics of online orders. *Source* created by authors based on the results of the quantitative analysis

Affirmations	Response options					
	Strongly disagree (%)	Strongly disagree (%)	Strongly disagree (%)	Strongly disagree (%)	Strongly disa-gree(%)	Strongly disagree
The convenience of online shopping made me place more orders	6.3	13.1	25.2	36.4	18.9	3.49
I believe that by placing online orders I avoid wasting time	3.4	6.8	20.9	39.8	29.1	3.84
The possibility of my order being damaged in transit made me pay careful attention to what types of products I ordered online	2.9	8.7	29.1	39.8	19.4	3.64
The online payment for ordered products represents a barrier that makes me careful when I place online orders	13.1	16	26.2	27.2	17.5	3.2
I know how to protect myself against cybernetic attacks and online payments	4.9	10.7	26.7	39.8	18	3.55

by 21.15% of respondents, who believe that fewer people will frequent malls, leading to a loss of popularity, as online commerce and VR and AR technologies gain momentum. Additionally, they consider prices to be higher in malls. At the same time, 19.71% of respondents envision an evolution in the future of physical malls because they provide experiences that online commerce cannot offer, and they do not consider it safe or trustworthy.

4.4 O4.Identifying the differences in shopping behaviour before and after the COVID-19 pandemic

During the COVID-19 Pandemic, research findings indicate that consumer behaviour involved visiting grocery stores, while opting to order other types of products online (49.5%). The response to choosing to order all necessary products online recorded 31.1%. Some respondents preferred not to make any online orders, opting to go to physical stores and adhere to the protective measures imposed by authorities (19.4%).

These results align with a study conducted by Truong & Truong [57], revealing that approximately 46.1% of respondents spent more on online purchases, 42.9% spent more on curb side pickup purchases, and 39.2% spent more on in-store purchases. The article indicates that this behaviour was primarily driven by two factors: health concerns, economic apprehension, as well as age, gender, race, income, and marital status. Another research by Meister et. Al. [58] and Eger et al. [59] indicates that during the pandemic, 13% of food product purchase options were replaced by online shopping. The study demonstrates that this increase is evenly distributed among groups with and without prior experience in online food shopping.

To identify changes in consumer behaviour after the COVID-19 Pandemic, the questionnaire continued with the question: 'After COVID-19, have you chosen to reduce the time you spent in malls?' (Q19). The recorded results show that more than half of the respondents did not reduce the time spent at the mall (55.3%), while 22.7% did reduce it following the pandemic. A relatively large percentage (17%) mentioned that they do not know, suggesting an undecided behaviour.

To further analyse consumer behaviour, the influence of the COVID-19 Pandemic on mall visitation behaviour is presented. It is observed that the majority of respondents (39.3%) reduced mall visits, followed by 29.6% who stated that the COVID-19 Pandemic did not influence their mall visitation behaviour. Some subjects (15%) mentioned that they visit the mall as before the pandemic but have nevertheless reduced the time spent there. A percentage of 12.1% of respondents chose not to frequent malls anymore, influenced by the challenging period of the pandemic. The lowest percentage recorded (3.9%) among respondents stated that they go to the mall more often after all the restrictions imposed by authorities.

A delicate yet crucial topic of discussion is the influence of the COVID-19 Pandemic on respondents' financial decisions correlated with the number of mall visits. Half of the subjects (50%) mentioned that it had no influence. A relatively high percentage of respondents (46.1%) decided to reduce expenses, while a small portion of them (3.9%) chose to spend more money.

Table 7 Calculated values for the Kolmogorov–Smirnov test. *Source* created by authors based on the results of the quantitative analysis

Test Statistics[a]		
		The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic
Most extreme differences	Absolute	0.146
	Positive	0.000
	Negative	−0.146
Kolmogorov–Smirnov Z		2.042
Asymp. Sig. (2-tailed)		0.000

[a]Grouping variable: Gender

Meetings with friends at the mall, from the respondents' perspective, were not influenced to any extent (41.3%) by the COVID-19 Pandemic. Similar percentages were recorded for meetings at the mall with fewer friends (27.7%) and meetings with the same number of people (26.2%). A relatively low percentage (4.4%) of respondents stated that they do not meet friends at the mall, and 0.5% mentioned that they have increased the group size. In the study by O'Meara et al. [60], it is shown that during the COVID-19 pandemic, many consumers (91.3%) reduced the number of outings in town for meals, while 75.8% of respondents said they preferred to cook at home or consumed more fruits and vegetables.

For the statement 'The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic' recorded responses show that most respondents remained neutral, marking the response option neither agree nor disagree. A percentage of 33% of subjects marked the agree option, and 15.5% marked the completely agree option. Lower percentages are recorded for disagree (12.1%) and completely disagree (4.9%). It is concluded that most respondents placed more online orders after the COVID-19 Pandemic.

The authors used the Kolmogorov–Smirnov test (Table 7) to determine whether there is a connection between respondents' gender and the increase in online orders after the COVID-19 Pandemic.

The value of $D_{calculating} = 14.6\%$, is compared with its theoretical value $D_{\alpha} = 136 * \sqrt{\frac{265+765}{265*765}} = 9.69\%$, for $\alpha = 0.05$. The calculated value is higher than the theoretical one, which indicates a difference between male and female respondents with regard to the increase in online orders after the COVID-19 pandemic.

4.5 Principal component analysis (PCA)

To identify simultaneous interdependencies among the 7 research variables, the PCA method was employed. The purpose of this analysis is to derive a reduced

number of components explaining respondents' attitudes toward changes in buying behaviour (online versus physical mall shopping) after the COVID-19 pandemic.

Based on the obtained means (Table 8), it is observed that respondents prioritize time savings through online orders and quick product searches online (considered an advantage). Positioned at the midpoint of the scale with a mean of 3.2, online payment is identified as a barrier for respondents.

After extracting the two factors representing the principal components in the proposed model, correlation coefficients between the analysed variables and the principal components are calculated in Table 9.

The first four variables (The increase in online offerings positively influenced me, resulting in more online orders after the Pandemic; The convenience offered by online prompts me to order more frequently; Through online orders, I save time in my Favor; Quick searching of products online is an advantage), along with the last variable (I know how to protect myself against cyber-attacks), strongly correlate with the first component. Meanwhile, preferences regarding the possibility that ordered products may not remain intact at home, making me choose product types carefully, and online payment is a barrier are strongly correlated with the second component.

It can be concluded that the first component is determined by (Table 10) online shopping behaviour, while the second component is particularly determined by preferences for physical shopping (in malls, in this case).

Results regarding the correlation coefficients between the analysed variables and the two principal components obtained after axis rotation using the Varimax method are presented in the table below.

It is observed that after axis rotation, there are no substantial changes in the correlation coefficient values compared to the previously presented situation (Fig. 2).

The purpose of reducing the analysed variables (the 7) to only two main components is to identify the existence of some connections between the components. Based on the average individual values of the variables included in each component, the 2 main components are created. Thus, the variable 'Respondents' preference for buying from the online environment represented by a series of advantages' was obtained, consisting of the positive influence of the increase in online offerings, the convenience offered by online orders, time saved through online orders, quick searching of products online, knowledge of protection against cyber-attacks, while the variable 'Barriers in respondents' preference for choosing online shopping' was obtained based on the other variables (the risk that ordered products may not remain intact online, respectively, online payment is a barrier).

Essentially, the findings highlight major differences between online and offline buying behaviour, emphasizing a significant impact of the COVID-19 pandemic on purchasing behaviour. Figure 3 presents the most relevant research results.

Table 8 The average of the 7 variables introduced into the model. *Source* created by authors based on the results of the quantitative analysis

Descriptive statistics			
	Mean	Std. deviation	Analysis N
The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic	3.42	1.044	1030
The convenience of online shopping made me place more orders	3.49	1.127	1030
I believe that by placing online orders I avoid wasting time	3.84	1.027	1030
The quick online search for products and the availability of offers are advantages of online shopping	3.88	1.013	1030
The possibility of my order being damaged in transit made me pay careful attention to what types of products I ordered online	3.64	0.984	1030
The online payment for ordered products represents a barrier	3.20	1.272	1030
I know how to protect myself against cybernetic attacks and online payments	3.55	1.055	1030

Table 9 Component matrix[a] . *Source* created by authors based on the results of the quantitative analysis

	Component	
	1	2
The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic	0.807	−0.214
The convenience of online shopping made me place more orders	0.847	−0.192
I believe that by placing online orders I avoid wasting time	0.836	−0.047
The quick online search for products and the availability of offers are advantages of online shopping	0.793	−0.119
The possibility of my order being damaged in transit made me pay careful attention to what types of products I ordered online	0.442	0.730
The online payment for ordered products represents a barrier	0.204	0.846
I know how to protect myself against cybernetic attacks and online payments	0.499	−0.052

Extraction Method: Principal Component Analysis

[a]2 components extracted

Table 10 Correlation between variables and factors after axis rotation. *Source* created by authors based on the results of the quantitative analysis

	Component	
	1	2
The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic	0.834	0.010
The convenience of online shopping made me place more orders	0.868	0.041
I believe that by placing online orders I avoid wasting time	0.818	0.178
The quick online search for products and the availability of offers are advantages of online shopping	0.796	0.097
The possibility of my order being damaged in transit made me pay careful attention to what types of products I ordered online	0.231	0.821
The online payment for ordered products represents a barrier	−0.030	0.870
I know how to protect myself against cybernetic attacks and online payments	0.495	0.083

Extraction method: Principal component analysis

Rotation method: Varimax with Kaiser normalization

Rotated component matrix: Rotation converged in 3 iterations

5 Conclusions and implications

On a global scale, retail conducted within mall-type commercial structures has been continuously evolving in recent years until the pandemic crisis, adapting to market changes and consumer behaviours. Prior to the pandemic, the global economy, in general, experienced growth, and population incomes increased, leading to higher demand for products and services. Retailers invested in malls and product diversification to meet consumer needs.

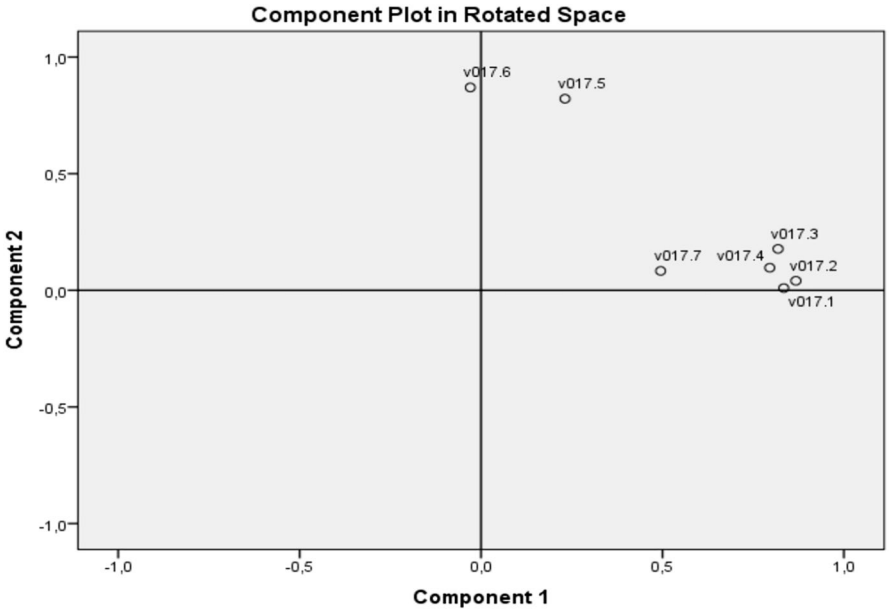

Fig. 2 Graphical representation of the correlation between variables and factors. Source: created by authors based on the results of the quantitative analysis, V017.1 = The increase of what electronic commerce offers had a positive influence on me, leading me to place more online orders after the COVID-19 pandemic, V017.2 = The convenience of online shopping made me place more orders, V017.3 = I believe that by placing online orders I avoid wasting time, V017.4 = The quick online search for products and the availability of offers are advantages of online shopping, V017.5 = The possibility of my order being damaged in transit made me pay careful attention to what types of products I ordered online, V017.6 = The online payment for ordered products represents a barrier, V017.7 = I know how to protect myself against cybernetic attacks and online payments

Simultaneously, another significant trend in retail is the development of online commerce, which has seen significant growth in recent years. Many retail companies have established online sales channels to reach various market segments and adapt to new consumer buying behaviours. Retail markets are dynamic and competitive, presenting good growth opportunities for companies that can adapt to consumer needs and preferences.

The entire context of the evolution of commerce in mall-type structures and online commerce, defined on the one hand by factors influencing demand (demographics, income, lifestyle, urbanization, etc.) and supply (retail concepts, innovation and technologies, infrastructure, etc.), was strongly affected by the pandemic crisis. The COVID-19 pandemic had a significant impact on the mall-type retail industry, altering consumer buying behaviour and affecting sales. The pandemic led to the closure of many physical stores in malls, severely impacting this type of commerce. At the same time, the transition to online commerce and home deliveries accelerated, resulting in a significant increase in online sales. Additionally, the pandemic increased online demand for essential products such as food, cleaning supplies, and medical products but had a negative effect on offline demand for

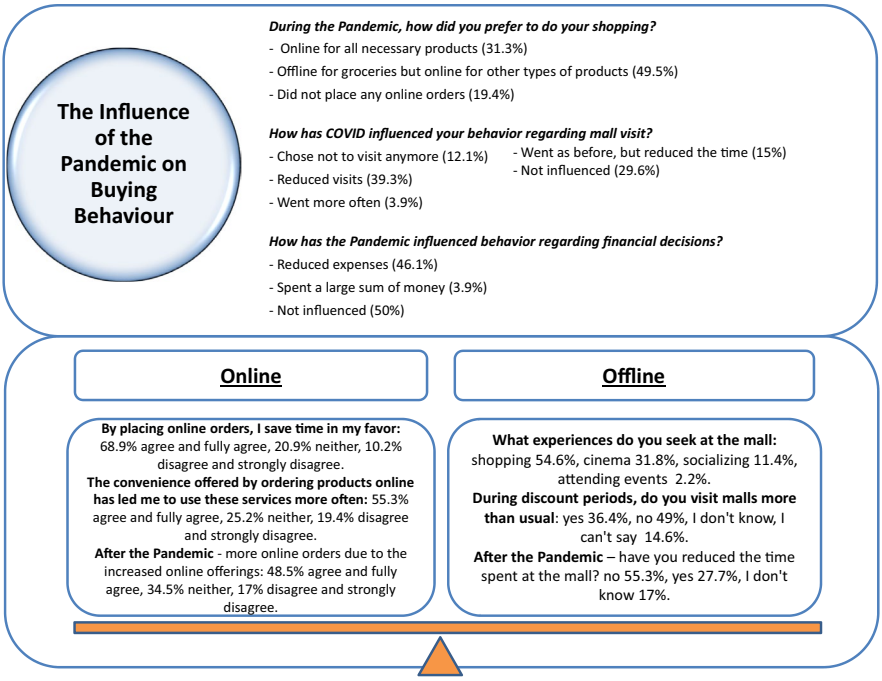

Fig. 3 Synthesis of the most relevant research results. *Source:* created by authors based on the results of the quantitative analysis

other products such as clothing, footwear, or cosmetics. However, the COVID-19 pandemic was a major factor that energized online commerce, as many consumers who were hesitant about online shopping during the pandemic were forced to learn to interact with online shopping.

Online and offline retail are two ways in which people can make purchases. There are advantages and disadvantages to both forms of retail, and the choice depends on various variables (demographic, socio-economic, psychographic, cultural, technological, ecological, etc.) that manifest in specific purchasing and consumption behaviours. Online retail has the advantage of being accessible from anywhere, at any time, with just a few mouse clicks or taps on a mobile phone. Additionally, online retail offers a wider range of products, making it easier to find rare or hard-to-find items compared to physical stores. Quick product searches and time savings through online ordering were the preferred responses of the surveyed subjects in the quantitative research conducted. Moreover, prices can be lower in online retail due to reduced inventory and transportation costs or other logistics costs. As for the disadvantages of online commerce, the research revealed issues such as receiving products that do not match expectations and a lack of trust in online payment methods from a significant portion of the respondents.

Despite the development of online commerce and the accelerated growth pace post-pandemic, offline retail in malls retains several advantages. For example, physical stores provide consumers with a sensory experience, allowing them to see, touch,

and test products before purchasing. Additionally, offline retail offers the opportunity, through specialized staff, to provide advice and recommendations, consultancy for those who need help in choosing the most suitable purchase solutions.

The study results also indicate that subjects appreciate that both online and offline commerce in malls will evolve in parallel, influenced by various factors. It is clear that technological evolution will impact both forms of commerce, but the strategies employed remain to be seen (there are companies that started as online startups and later added an offline component, such as eMAG, which created a network of showrooms).

The current study related to offline shopping shows that in Romania, most of the respondents visit malls weekly, mainly to buy products and services. Among the factors driving this type of shopping, the following have been identified: attractions in the mall, their organization (all types of stores are found in one place), the immediate entry into the possession of the product, actual product viewing, as well as the safety measures in place. Previous studies show that there are seven reasons why consumers visit offline stores: character, product, spending time, entertainment, photography, giving a gift and curiosity [61].

As this article shows, during the COVID-19 pandemic, online shopping has exploded, especially for food, cleaning and disinfecting products, and cosmetics. These results are consistent with the results of other studies such as: results of a study developed by The Food Industry Association (2020) [62] whose results found that approximately 77% of participants chose to buy food products online; The COVID-19 pandemic has made online grocery shopping a more popular and viable option, and this popularity has led to significant changes in transportation and supply chain management [63]; in the Lebanese society, during the COVID-19 pandemic a significant number of respondents started making fashion purchases online [64].

The results of the article show that for Romanian buyers, the main advantages of online shopping are the ease of finding and comparing offers, as well as saving time spent on shopping. A study conducted by by Kulkarni and Barge [65] found that convenience and instant satisfaction were the most influential factors for online shoppers. And the study developed by Chmielarz et al. (2022) [24] shows that during the pandemic, the structure of internet activities has changed, with the biggest increases being online shopping (11%).

This study, like others, is not exempt from limitations. A limitation is that it was impossible to perform random sampling. However, the mentioned limitation does not reduce the value of the research. Among the limitations of the study is the impossibility to assist and answer the respondents in real time (in case of possible erroneous interpretations of the questions in the questionnaire), but also the distribution of the questionnaire only in the online environment (there is a possibility that some may not be able to access the completion link of the questionnaire).

The exploration of concepts and components of experience design that online commerce will develop and how the mall, from an experiential design perspective, will respond constitutes a potential future research direction. It is noteworthy that many firms operating in malls are focusing on integrating offline and online

commerce, offering a holistic approach to meet the changing purchasing behaviours and needs, providing new shopping and consumption experiences.

Based on the above research, this paper provides a clear foundation for understanding the behavioural differences and shopping experiences in the online versus offline (malls in our case) environments.

The research conducted and presented in this article is current and highly important. From a managerial perspective, our findings can be utilized by managers in the retail industry to develop effective marketing strategies aimed at improving activity by offering new shopping experiences and developing new ways of online communication with customers, ultimately increasing customer satisfaction and contentment.

The present study highlighted the practical implications of the differences in shopping behavior and experiences of online and offline shopping in shopping malls, from a national level. Although the results are presented at the level of Romania, they can also be of real use at the macro level, where retailers can similarly establish their strategies. As can be concluded, the managerial implications indicate the priority of implementing differentiated business strategies, depending on the targeted environment (online and offline), to then shape marketing strategies adapted to the buying behavior. The most important detail that business owners must understand is related to the different motivation of the consumer depending on the type of trade targeted, but also to the major influences it can have (eg: periods of crisis, Pandemic, etc.). By knowing factors such as buying behavior, customer experience, modern technology that is experiencing spectacular growth, organizations can differentiate their marketing strategies that must keep pace with the continuous changes in the market, maintain customer enthusiasm and adapt to their needs. Finally, this investigation, correlated with other specialist research, can be useful to micro and macro factors interested in trade. Consequently, this study contributes to how retailers (both offline and online) must adapt to changes in consumer behavior, but also to the measures they must use to attract consumers.

Funding Universitatea Transilvania din Brasov

Declarations

Conflict of interest All authors state that there are no conflicts of interest.

References

1. Mittal, A., & Jhamb, D. (2016). Determinants of shopping mall attractiveness: The Indian context. *Procedia Economics and Finance, 37*, 386–390. https://doi.org/10.1016/S2212-5671(16)30141-1
2. Teller, C., & Reutterer, T. (2008). The evolving concept of retail attractiveness: What makes retail agglomerations attractive when customers shop at them? *Journal of Retailing and Consumer Services, 15*(3), 127–143. https://doi.org/10.1016/j.jretconser.2007.03.003
3. Hoffman, K. D., & Turley, L. W. (2002). Atmospherics, service encounters and consumer decision making: An integrative perspective. *Journal of Marketing Theory and Practice, 10*(3), 33–47. https://doi.org/10.1080/10696679.2002.11501918
4. Hira, F., & Mehvish, R. (2012). Determining the factors affecting consumer loyalty towards shopping malls. *Global Advanced Research Journal of Management and Business Studies, 1*(4), 134–140.
5. Abrudan, I. N., & Dabija, D. C. (2014). Measuring clients' satisfaction toward shopping centers—Empirical evidences from Romania. *Procedia Economics and Finances, 15*, 1243–1252. https://doi.org/10.1016/S2212-5671(14)00584-X
6. Bitzer, J.F. (2015, May 18). *Shopping centers in europe—50 years of change?* Across Magazine. Retrieved May 11, 2023, from https://www.across-magazine.com/commercial-centers-in-europe-50-years-of-change-2/
7. Venkateswarulu, A., & Uniyal, D. P. (2007). Concept of a mall: Measuring attitude and perception of shoppers towards malls of Mumbai. *Indian Retail Review, 1*, 7–16.
8. McKinsey & Company (2016, July 1). *Customer experience: Creating value through transforming customer journeys*. Growth, Marketing & Sales. Retrieved August 25, 2023, from https://www.mckinsey.com/capabilities/growth-marketing-and-sales/our-insights/customer-experience-creating-value-through-transforming-customer-journeys
9. Lupșa-Tătaru, D. A., & Lixăndroiu, R. (2022). YouTube channels, subscribers, uploads and views: A multidimensional analysis of the first 1700 channels from july 2022. *Sustainability, 14*(20), 13112. https://doi.org/10.3390/su142013112
10. Sung, C. H., & Peng, L. H. (2014). Educational research and experience design of Taiwanese traditional pickles' visualization. *Procedia—Social and Behavioral Sciences, 112*, 348–356. https://doi.org/10.1016/j.sbspro.2014.01.1174
11. Gentile, C., Spiller, N., & Noci, G. (2007). How to sustain the customer experience: An overview of experience components that co-create value with the customer. *European Management Journal, 25*(5), 395–410. https://doi.org/10.1016/j.emj.2007.08.005
12. Solanki, A. (2015). Retailers in Distress, Retrieved August 12, 2023, from http://knowledge-leader.colliers.com/anjee-solanki/experiential-commercial-more-than-just-a-store/
13. Barnes, J. (2000). *Secrets of Customer Relationship Management.* McGraw-Hill Companies.
14. Pine, J., & Gilmore, J. (1998). *Welcome to the Experience of Economy*. Harvard Business School Press.
15. Leachman, L., & Scheibenreif, D. (2023, May 17). *Using Technology to Create a Better Customer Experience*. Harvard Business Review. Retrieved September 21, 2023, from https://hbr.org/2023/03/using-technology-to-create-a-better-customer-experience
16. Srinivasan, S. R., & Srivastava, R. K. (2010). Creating the futuristic retail experience through experiential marketing: Is it possible? An exploratory study. *Journal of Retail & Leisure Property, 9*(3), 193–199. https://doi.org/10.1057/rlp.2010.12
17. Fung Business Intelligence. (2019, May 27). *China's department stores report 2018–2019*. Retail and e-commerce, Retrieved April 27, 2023, from https://www.fbicgroup.com/report/chinas-department-stores-report-2018-2019/
18. Flavián, C., Gurrea, R., & Orús, C. (2020). Combining channels to make smart purchases: The role of webrooming and showrooming. *Journal of Retailing and Consumer Services, 52*, 101923. https://doi.org/10.1016/j.jretconser.2019.101923
19. Roschk, H., & Hosseinpour, M. (2020). Pleasant ambient scents: A meta-analysis of customer responses and situational contingencies. *Journal of Marketing, 84*(1), 125–145. https://doi.org/10.1177/0022242919881137
20. Pekovic, S., & Rolland, S. (2020). Recipes for achieving customer loyalty: A qualitative comparative analysis of the dimensions of customer experience. *Journal of Retailing and Consumer Services, 56*, 102171. https://doi.org/10.1016/j.jretconser.2020.102171

21. Kim, J., Kim, M., Choi, J., & Trivedi, M. (2019). Offline social interactions and online shopping demand: Does the degree of social interactions matter? *Journal of Business Research, 99*, 373–381. https://doi.org/10.1016/j.jbusres.2017.09.022
22. Beckers, J., Weekx, S., Beutels, P., & Verhetsel, A. (2021). COVID-19 and retail: The catalyst for e-commerce in Belgium? *Journal of Retailing and Consumer Services, 62*, 102645. https://doi.org/10.1016/j.jretconser.2021.102645
23. Loginova, O. (2022). Branded websites and marketplace selling: Competing during COVID-19. *Journal of Economic Behavior and Organization, 203*, 577–592. https://doi.org/10.1016/j.jebo.2022.09.020
24. Chmielarz, W., Fandrejewska, A., Zborowski, M., & Nowackib, R. (2022). Determinants of Internet use regarding shopping preferences, COVID-19 pandemic occurrence, perception of security and Internet marketing—a case study of Poland. *Procedia Computer Science, 207*, 4463–4476. https://doi.org/10.1016/j.procs.2022.09.510
25. Del Ray, J. (2020, April 10). *Amazon Was already powerful. The coronavirus pandemic cleared the way to dominance*. Technology. Retrieved January 31, 2023, from https://www.vox.com/recode/2020/4/10/21215953/am azon-fresh-walmart-grocery-delivery-coronavirus-retail-store-closures
26. Dustin, J., & Rana, A. (2020, April 30). *Amazon Sees Possible Second-Quarter Loss as it Forecasts $4 Billion in Covid-19-Related Costs*. Reuters, from https://www.reuters.com/article/us-amazon-com-results-iduskbn22c3o6?Taid=5eab738506bb9b000140343e&utm_campaign=trueanthem:+Trending+Content&utm_medium=trueanthem&ut m_source=twitter
27. Gardshol, A. (2020). *E-barometern Q2 2020 - PostNord i samarbete med Svensk Digital Handel och HUI Research,* 1–34, from https://www.postnord.se/siteassets/pdf/rapporter/e-barometern-q2-2020.pdf
28. Digital4. (2020, July 8). *Acquisti online, crescita record grazie al lockdown: +26%*. Digital 4 Marketing. ECommerce. Retrieved January 31, 2023, from https://www.digital4.biz/marketing/ecommerce/acquisti-online-2020-polimi-netcomm
29. Adibfar, A., Gulhare, S., Srinivasan, S., & Costin, A. (2022). Analysis and modeling of changes in online shopping behavior due to Covid-19 pandemic: A Florida case study. *Transport Policy, 126*, 162–176. https://doi.org/10.1016/j.tranpol.2022.07.003
30. Walmart (2020, September 1). *Walmart Introduces Walmart+*. Business. Press Center. Retrieved February 6, 2021, from https://corporate.walmart.com/news/2020/09/01/walmart-introduces-walmart
31. Duarte, P., CostaeSilva, S., & Ferreira, M. B. (2018). How convenient is it? Delivering online shopping convenience to enhance customer satisfaction and encourage e-WOM. *Journal of Retailing and Consumer Services, 44*, 161–169. https://doi.org/10.1016/j.jretconser.2018.06.007
32. Alaimo, L. S., Fiore, M., & Galati, A. (2022). Measuring consumers' level of satisfaction for online food shopping during COVID-19 in Italy using POSETs. *Socio-Economic Planning Sciences, 82*, 101064. https://doi.org/10.1016/j.seps.2021.101064
33. Gutiérrez Rodríguez, P., Villarreal, R., Valino, P. C., & Blozis, S. (2020). A PLS-SEM approach to understanding E-SQ, e-satisfaction and e-loyalty for fashion e-retailers in Spain. *Journal of Retailing and Consumer Services, 57*, 102201. https://doi.org/10.1016/j.jretconser.2020.102201
34. Kuoppamaki, S.-M., Taipale, S., & Wilska, T.-A. (2017). The use of mobile technology for online shopping and entertainment among older adults in Finland. *Telematics and Informatics, 34*(4), 110–117. https://doi.org/10.1016/j.tele.2017.01.005
35. Rita, P., Oliveira, T., & Farisa, A. (2019). The impact of e-service quality and customer satisfaction on customer behavior in online shopping. *Heliyon, 5*(10), e02690. https://doi.org/10.1016/j.heliyon.2019.e02690
36. Sharma, G., & Lijuan, W. (2015). The effects of online service quality of e-commerce websites on user satisfaction. *The Electronic Library, 33*(3), 468–485. https://doi.org/10.1108/EL-10-2013-0193
37. Saha, S. K., Duarte, P., Silva, S. C., & Zhuang, G. (2022). The role of online experience in the relationship between service convenience and future purchase intentions. *Journal of Internet Commerce, 22*(2), 244–271. https://doi.org/10.1080/15332861.2022.2045767
38. Bajdor, P. (2021). Simulations of the relationship between the experience level of e-commerce customers and the adopted variables—implications for management in the area of online shopping. *Procedia Computer Science, 192*, 2576–2585. https://doi.org/10.1016/j.procs.2021.09.027
39. Gouthier, M. H. J., Nennstiel, C., Kern, N., & Wendel, L. (2022). The more the better? Data disclosure between the conflicting priorities of privacy concerns, information sensitivity and

personalization in e-commerce. *Journal of Business Research, 148*, 174–189. https://doi.org/10.1016/j.jbusres.2022.04.034
40. Browne, G. J., Durrett, J. R., & Wetherbe, J. C. (2004). Consumer reactions toward clicks and bricks: Investigating buying behaviour on-line and at stores. *Behaviour & Information Technology, 23*(4), 237–245. https://doi.org/10.1080/01449290410001685411
41. Chiu, Y.-P., Lo, S.-K., Hsieh, A.-Y., & Hwang, Y. (2019). Exploring why people spend more time shopping online than in offline stores. *Computers in Human Behavior, 95*, 24–30. https://doi.org/10.1016/j.chb.2019.01.029
42. Park, J., Chung, H., & Yoo, W. S. (2009). Is the internet a primary source for consumer information search? Group comparison for channel choices. *Journal of Retailing and Consumer Services, 16*(2), 92–99. https://doi.org/10.1016/j.jretconser.2008.11.002
43. Shin, D.-H., & Biocca, F. (2017). Explicating user behavior toward multi-screen adoption and diffusion: User experience in the multi-screen media ecology. *Internet Research, 27*(2), 338–361. https://doi.org/10.1108/IntR-12-2015-0334
44. Arora, S., & Sahney, S. (2018). Consumer's webrooming conduct: An explanation using the theory of planned behavior. *Asia Pacific Journal of Marketing and Logistics, 30*(4), 1040–1063. https://doi.org/10.1108/APJML-08-2017-0185
45. Aw, E.C.-X. (2019). Understanding the webrooming phenomenon: Shopping motivation, channel-related benefits and costs. *International Journal of Retail & Distribution Management, 47*(10), 1074–1092. https://doi.org/10.1108/IJRDM-01-2019-0026
46. Manss, R., Kurze, K., & Bornschein, R. (2019). What drives competitive webrooming? The roles of channel and retailer aspects. *The International Review of Retail, Distribution and Consumer Research, 30*(3), 233–265. https://doi.org/10.1080/09593969.2019.1687104
47. Gensler, S., Verhoef, P. C., & Bohm, M. (2012). Understanding consumers' multichannel choices across the different stages of the buying process. *Market Lett, 23*, 987–1003. https://doi.org/10.1007/s11002-012-9199-9
48. Dionysiou, G., Fouskas, K., & Karamitros, D. (2021). The Impact of Covid-19 in ECommerce. Effects on Consumer Purchase Behavior. In *Strategic innovative marketing and tourism in the COVID-19 Era*, 9th ICSIMAT conference 2020, 99–210, Springer International Publishing. https://doi.org/10.1007/978-3-030-66154-0_22
49. Sheth, J. (2020). Impact of Covid-19 on consumer behavior: Will the old habits return or die? *Journal of Business Research, 117*, 280–283. https://doi.org/10.1016/j.jbusres.2020.05.059
50. Kim, H.-R. (2005). Developing an index of online customer satisfaction. *Journal of Financial Services Marketing, 10*(1), 49–64. https://doi.org/10.1057/palgrave.fsm.4770173
51. Kuruvilla, S. J., & Ganguli, J. (2008). Mall development and operations: An Indian perspective. *Journal of Retail & Leisure Property, 7*(3), 204–215. https://doi.org/10.1057/rlp.2008.14
52. Howitt, D., Cramer, D., Popescu, A., & Popa, C. (2006). *Introducere in SPSS Pentru Psihologie*. Polirom.
53. Malhotra, N. (2004). *Marketing research, an applied orientation, Chap. 19* (4th ed., pp. 558–582). UK: Pearson Education LTD. Harlow.
54. Constantin, C. (2006). *Sisteme informatice de marketing: Analiza si prelucrarea datelor de marketing: Aplicatii in SPSS*. Informaket, Brasov.
55. Nigar, N., & Miah, M. R. (2020). Shifts in consumer behavior due to corona pandemic: A case of tourism and hospitality sector in Bangladesh. *International Journal of Science and Business, IJSAB International, 4*(12), 123–135.
56. Maditinos, D. I., & Theodoridis, K. (2010). Satisfaction determinants in the greek online shopping context. *Information Technology & People, 23*(4), 312–329. https://doi.org/10.1108/09593841011087789
57. Truong, D., & Truong, M. D. (2020). How do customers change their purchasing behaviors during the COVID-19 pandemic? *Journal of Retailing and Consumer Services, 67*, 102963. https://doi.org/10.1016/j.jretconser.2022.102963
58. Meister, A., Winkler, C., Schmid, B., & Axhausen, K. (2023). In-store or online grocery shopping before and during the COVID-19 pandemic. *Travel Behaviour and Society, 30*, 291–301. https://doi.org/10.1016/j.tbs.2022.08.010
59. Eger, L., Komárková, L., Egerová, D., & Mičík, M. (2021). The effect of COVID-19 on consumer shopping behaviour: Generational cohort perspective. *Journal of Retailing and Consumer Services, 61*, 102542. https://doi.org/10.1016/j.jretconser.2021.102542

60. O'Meara, L., Turner, C., Coitinho, D. C., & Oenema, S. (2022). Consumer experiences of food environments during the COVID-19 pandemic global insights from a rapid online survey of individuals from 119 countries. *Global Food Security, 32*, 100594. https://doi.org/10.1016/j.gfs.2021.100594
61. Junghwan, K., Mideum, C., & Shin, Y. H. (2019). Circulation of loyalty: Relationships between mobile instant messenger and offline character emoticon store. *Telecommunications Policy, 43*, 101851.
62. Food Industry Association. (2020). *Grocery shopping in the time of COVID-19*. from https://www.fmi.org/blog/view/fmi-blog/2020/04/02/grocery-shopping-in-the-time-of-covid-19
63. Perboli, G., & Rosano, M. (2019). Parcel delivery in urban areas: Opportunities and threats for the mix of traditional and green business models. *Transportation Research Part C: Emerging Technologies, 99*, 19–36. https://doi.org/10.1016/j.trc.2019.01.006
64. Samer, E. (2023). Factors influencing buying behavior of Lebanese consumers towards fashion brands during economic crisis: A qualitative study. *Journal of Retailing and Consumer Services, 71*, 103224. https://doi.org/10.1016/j.jretconser.2022.103224
65. Kulkarni, S. R., & Barge, P. (2020). Effect of COVID-19 on the shift in consumer preferences with respect to shopping modes for groceries: An exploratory study. *International Journal of Management, 11*, 10.

administrative sciences

MDPI

Article

Evaluating the Impact and Perception of Influencer Marketing Among Romanian Consumers—Insights from Quantitative Research

Anita Cornelia Szakal *, Gabriel Brătucu, Eliza Ciobanu, Ioana Bianca Chițu, Ana Alexandra Mocanu, Marius Bălășescu and Gheorghe Ialomițianu

Faculty of Economic Sciences and Business Administration, Transilvania University of Brașov, 500036 Brașov, Romania; gabriel.bratucu@unitbv.ro (G.B.); eliza.nichifor@unitbv.ro (E.C.); ioana.chitu@unitbv.ro (I.B.C.); ana.mocanu@unitbv.ro (A.A.M.); mariusbalasescu@unitbv.ro (M.B.); gheorghe.ialomitianu@unitbv.ro (G.I.)

* Correspondence: anita.szakal@unitbv.ro

Abstract: Currently, one of the most widely used marketing techniques is influencer marketing, but is its true impact on Romanians truly understood? This article aims to establish the perception of influencer marketing activities by Romanian consumers. A quantitative study was conducted, gathering 618 responses through an online questionnaire. It was found that 92% of the respondents made at least one purchase based on content creator recommendations, with Instagram being perceived as the most impactful platform for such campaigns. However, the success of these campaigns relies on several strategic elements. These include selecting content creators who align with the product or service being promoted and ensuring that the influencer's audience demographics match the target audience. Companies must also prioritize transparency and the seamless integration of products into influencers' daily lives, as well as considering factors like content type, the frequency of posts, and budget. The results indicate that well-structured influencer partnerships, particularly on Instagram, enhance consumer trust and enhance marketing impact. These insights offer valuable guidance for developing effective digital marketing strategies emphasizing to specific business needs.

Keywords: social media; consumer behavior; social media marketing; influencer marketing; digital marketing; consumers' purchase behavior; consumer opinions

Citation: Szakal, Anita Cornelia, Gabriel Brătucu, Eliza Ciobanu, Ioana Bianca Chițu, Ana Alexandra Mocanu, Marius Bălășescu, and Gheorghe Ialomițianu. 2024. Evaluating the Impact and Perception of Influencer Marketing Among Romanian Consumers—Insights from Quantitative Research. *Administrative Sciences* 14: 276. https://doi.org/10.3390/admsci14110276

Received: 27 August 2024
Revised: 22 October 2024
Accepted: 23 October 2024
Published: 25 October 2024

1. Introduction

The behavior of consumers has changed significantly due to technological innovation and the ubiquitous adoption of wearable devices, directly contributing to how people interact and use social platforms to make decisions and shop online. The increasing use of digital marketing and social networks has positively influenced consumers' attitudes toward online shopping, with a growing market share for e-commerce-focused organizations (Sarwar-A Alam et al. 2019).

The widespread utilization of social media platforms in contemporary times has resulted in a notable surge in individuals employing these channels for the acquisition of information conducive to informed purchasing decisions. The perspectives of both subject matter experts and non-specialists, colloquially termed as amateurs, have become increasingly sought after. This inclination arises from the perceived sincerity inherent in these viewpoints, readily accessible across diverse social media platforms (Hu et al. 2020; Jacobson et al. 2020). Hence, the inclination of individuals to peruse diverse reviews and numerous earnest feedback in the online milieu has motivated certain individuals to articulate their opinions via social networks in a professional capacity (Audrezet et al. 2020). These individuals, referred to as "influencers", represent third parties and independent actors distinguished by their capacity to systematically influence the attitudes of their audiences within the realm of social media (Belanche et al. 2021).

The aim of this article is to elucidate how consumers perceive the activities of influencers and, more importantly, their attitudes toward influencer marketing campaigns conducted across various social media platforms. The research findings are extremely valuable as they can serve as a foundation for future marketing strategies. Collaborative campaigns with content creators are becoming increasingly prevalent, highlighting the relevance and utility of the subject matter. The research was conducted to obtain responses to the following inquiries:

1. To what extent do users of social media platforms place trust in the recommendations put forth by content creators?
2. What are the determinants influencing the credibility of an influencer marketing campaign?
3. How frequently do respondents engage in the purchase of products advocated by influencers?
4. On which social media platforms do influencer marketing campaigns exhibit a more pronounced impact?
5. What constituent elements of an influencer marketing campaign have induced respondents to discontinue following specific content creators on social media platforms?

The present work is structured into six sections, commencing with the introduction, followed by the literature review in the Section 2, while the methodology is expounded within Section 3. The results of the quantitative research are outlined in the Section 4 and elaborated upon in Section 5. The article concludes with sections on conclusions, managerial and academic implications, limitations, and future research directions.

2. Literature Review

Social media networks represent an opportunity for entrepreneurs to achieve fast, cost-effective, and direct communication with target markets (Pakura and Rudeloff 2023). They can be used in marketing strategies to create commitment and represent an "intangible benefit related to marketing communication objectives" (Rosário and Dias 2023). Advertisements disseminated on social networks are defined as "any promotional content published through social media platforms to reach customers" (Adetunji et al. 2018). Therefore, advertisements conducted on platforms such as Facebook, Twitter, Instagram, and YouTube are referred to as social media advertisements (Taylor et al. 2011). Companies are using social networks to achieve additional value for companies and their brands (Okazaki and Taylor 2013; Wang et al. 2021), strengthening their brand image and enhancing consumer feedback (Khaleeli 2020).

Through social networks, companies can communicate both product information and details about future events, campaigns, or contests. Social media platforms have a significant impact on online sales. According to Suprapto et al. (2020), companies with online stores could increase sales and market share through promotion on social media platforms. Dabbous and Barakat (2020) highlighted how the quality of content provided on social networks strongly influences brand awareness and serves to mediate consumers' purchase intent.

With the advent of new technologies and the widespread use of social media tools, promotional activities have become increasingly effective. Among the most prevalent are visual elements, as these tend to imprint more strongly in the minds of consumers, facilitating a more seamless association of the visual image with the brand. According to a study conducted by Aytan and Telci (2014) marketing activities carried out by a company through the medium of social media platforms yield significant results, exerting a strong impact on brand image. Similar conclusions were drawn by Saydan and Dülek (2019) in their research, stating that "advertising practices on social media platforms of brands have been an effective factor in establishing brand awareness".

Among the most widely utilized social networks are Facebook, Instagram (a photo-sharing application), Snapchat (an instant photo messaging application), Twitter (a microblogging platform), LinkedIn (a career and business-oriented social networking service),

and Pinterest (a "catalog of ideas" or a photo-sharing website). All the aforementioned social platforms have different features (Van Dijck 2013; Vandenbosch et al. 2022).

The COVID-19 pandemic period has led to the growth of digitization in marketing strategies as well, with many companies turning more and more to influencers in their marketing strategies (Khurshid et al. 2024) or even micro-influencers with greater influence (Gerlich 2022) or a new type of influencer: the virtual influencer (Gerlich 2023). Even if the importance of digital marketing is recognized, consumers' skepticism towards these potential techniques is noted, with researchers highlighting realism and trust as particularly important (Gökerik 2024). Studies show that there are fraudulent influencers who can become very credible and misinform consumers (Bahar and Hasan 2024), and there are four motivations for following influencers on Instagram, with each one having effects on trust and buying: "authenticity, consumerism, creative inspiration, and envy" (Lee et al. 2022).

According to a survey conducted by datareportal.com in January 2023, there were 17.82 million internet users in Romania, representing 88.9% of the total population. A total of 13.50 million individuals were users of social networks, accounting for 67.3% of the overall population. As per Meta's data at the beginning of 2023, Facebook had 9.55 million users in Romania, while Instagram had 4.90 million. During the same period, TikTok had 7.58 million users aged 18 and above in Romania, according to ByteDance. Other social media platforms used by Romanians at the beginning of 2023 include LinkedIn (3.6 million), Youtube (13.50 million), Snapchat (2.55 million), Twitter (1.25 million), and Pinterest (2.01 million) (DATAREPORTAL 2023).

Influencer marketing has existed for decades and, until recently, involved engaging individuals with significant social impact (such as journalists with well-regarded restaurant columns or celebrities) to authentically advertise products. However, the advent of social media networks has profoundly altered the way marketing information is employed to promote products and to stimulate, shape, or generate new consumer demand (Goanta and Ranchordás 2020).

Influencers have been characterized as individuals perceived to be situated somewhere between friends and celebrities. Much like friends sharing common interests, values, and lifestyles on their Instagram accounts, using a common language, influencers disseminate information and advice to their followers on specific topics of mutual interest, aiming to establish enduring relationships (Jin and Ryu 2020). The career of influencers is cultivated on social networks, where they build and sustain direct relationships with numerous users with the purpose of informing, entertaining, and potentially influencing their thoughts, attitudes, and behaviors, especially in terms of purchasing behaviors (Dhanesh and Duthler 2019).

3. Materials and Methods

This quantitative research was grounded in two qualitative studies conducted among experts and consumers, respectively. A focus group study was conducted among Romanian consumers, and a series of individual interviews were carried out among influencers in Romania. The findings from these two qualitative investigations yielded information that served as the foundation for the objectives and hypotheses formulated in the present study.

To conduct the quantitative research providing answers to the five questions formulated in Section 1, a survey-type questionnaire was employed, as it offers the advantage of formulating highly diverse questions that aid in gaining insights into various aspects of the studied population (Lefter et al. 2006; Murphy 2023). The data collection instrument is a questionnaire, administered in an online environment. The questionnaire comprises 29 questions (Appendix A), which are based on the information obtained from the analysis of the results of the two qualitative studies conducted earlier, as well as the questions posed by the researcher in the initial phase of the research. The questionnaire was pretested beforehand, and minor modifications were subsequently made regarding the wording of the questions. This process was conducted to ensure that all questions were correctly

understood, to ensure that the terms used were familiar to the Romanian respondents, to assess the time required to complete the questionnaire, and to identify any potential issues that may arise. Pre-testing is a specific step in the questionnaire development process.

The questionnaire was formulated based on the objectives set by the researchers:

(O1) Assessing the level of trust that subjects place in recommendations from social media content creators;

(O2) Determining the factors influencing the credibility and authenticity of influencer marketing campaigns;

(O3) Identifying the frequency with which Romanians purchase products recommended by content creators in the online environment;

(O4) Identifying the social media platform where influencer marketing campaigns have the greatest impact on users;

(O5) Understanding the elements within influencer marketing campaigns that may lead Romanians to cease following a content creator online.

Numerous phenomena related to the researched topic in this study can be elucidated through research hypotheses. These were defined by researchers in the initial phase of the process, with statistical hypotheses subsequently tested and either validated or rejected, while general hypotheses can be affirmed or negated based on the analysis of the collected data.

Hypothesis 1 (H_1): *A majority of respondents believe that the authenticity and credibility of influencer marketing campaigns are influenced by how content creators incorporate products into their daily lives. Furthermore, it is crucial for there to be alignment between the product and their field of activity.*

Hypothesis 2 (H_2): *The percentage of Romanians who have made at least one purchase based on an influencer's recommendation is different from 60%.*

Hypothesis 3 (H_3): *There is no correlation between the agreement level with the statement "I believe that influencers' suggestions help me make purchasing decisions" and the respondents' background.*

Hypothesis 4 (H_4): *The social media platform where influencer marketing campaigns have the greatest impact on subjects is Instagram.*

Hypothesis 5 (H_5): *The reason the majority of Romanians have stopped following a specific influencer is that the influencer conducted a marketing campaign for a product not aligned with their field of activity.*

The studied population comprises individuals aged 18 and above from Romania who have an account on at least one social media platform and are familiar with the term "influencer marketing". According to data published in August 2023 on the website of the National Institute of Statistics, the population of Romania aged 18 and above as of 1 January 2023 was 19051562 individuals (INSSE 2024), with minors numbering 3820097 individuals (UNICEF 2023).

In March 2023, there were 12.243 million Facebook users in Romania (STATISTA 2023). According to figures published by Meta, Instagram had 4.90 million users in Romania at the beginning of 2023, with the company's recently revised figures suggesting that the coverage of Instagram advertisements in Romania equated to 24.4% of the total population at the beginning of the year (DATAREPORTAL 2023).

To determine the sample size, a 95% confidence interval was considered, with a precision level of estimation (permissible error), α, set at $\pm 5\%$. The coefficient z was identified as 1.96, as obtained from the normal distribution table for a 95% confidence interval and a $\pm 5\%$ error ($\alpha = 0.05$).

Therefore, the sample size "n" was calculated as follows:

$$n = \frac{z^2 \times p \times q}{E^2},$$

where:

E = permissible error (%);
z = the value from the distribution table for $\alpha = 0.05$, i.e., 1.96;
p = the estimation of the percentage in case of success;
q = 1 − p, the estimation of the percentage in case of failure;

"p" and "q" are unknown, and the authors considered the maximum level they could attain;

p = 50%;
q = 50%;
z = 1.96;
E = ±3%.

Thus, the following was obtained:

$$n = \frac{1.96^2 \times 50 \times 50}{3^2} = 1067$$

The sample size (n) is 1067 subjects; however, due to time and material constraints, a sample of 618 individuals was obtained.

In this situation, the error was calculated as follows:

$$E = \sqrt{\frac{z^2 \times p \times q}{n}} = \sqrt{\frac{1.96^2 \times 50 \times 50}{618}} = \sqrt{\frac{9604}{618}} = \sqrt{15.54} = 3.942\%$$

The accepted error level for the sample size of 618 individuals was 3.942%.

In this research, a non-random sampling method was employed, with sample selection and data collection conducted through the internet. The questionnaire was distributed for completion through social media platforms such as Facebook and Instagram, networks that allowed for the identification of communities consisting of individuals representing the research's target audience. Simultaneously, a snowball sampling approach, also known as the snowball method, was employed. This technique involves requesting individuals to recommend others they know to participate in the research, rather than selecting them randomly. As a result, participants in the study enlist future subjects from their network of friends and acquaintances (Hossan et al. 2023).

Adults who completed the questionnaire further distributed it to others. Among these individuals were content creators who contributed to the questionnaire's dissemination in the online environment.

Data collection took place over a period of five weeks, commencing on 21 August 2023. The Google Forms platform facilitated data collection, as well as the download of the database containing all 618 responses. From the total of 618 completed questionnaires, after the initial filter question, 568 subjects remained eligible to complete the survey. Following question number 3, an additional 48 respondents were redirected to the section containing demographic questions.

The final section of the questionnaire comprises demographic questions, which will be subsequently analyzed. The first question pertains to the identification of respondents' gender. In Figure 1, the percentage of individuals identifying as female is evident, accounting for 64.26% of the 568 sampled participants, specifically 365 women, while males constitute 203 individuals, representing 35.74% of the sample.

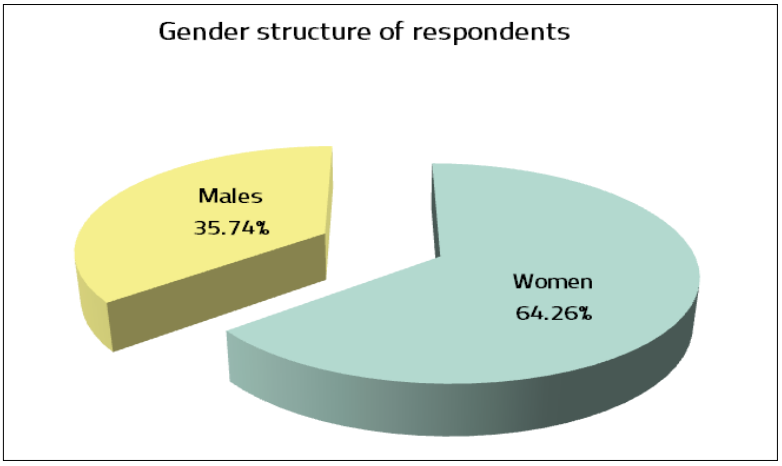

Figure 1. The structure of the sample according to the "Gender" characteristic.

The second question aims to identify the sample's structure based on age categories. Thus, in Figure 2, delineations can be made from the total of 568 respondents: 286 individuals aged between 18 and 29 years (constituting 50.35% of the total sample), 198 persons aged between 30 and 39 years (representing 34.87% of the overall subjects), and 56 individuals aged between 40 and 49 years (amounting to 9.88% of the total respondents). Additionally, 2.80% of the questionnaire's total members fall within the 50–59 age range, numbering 16 individuals, while 2.10% of the sample (12 subjects) are individuals aged over 60 years (including 60).

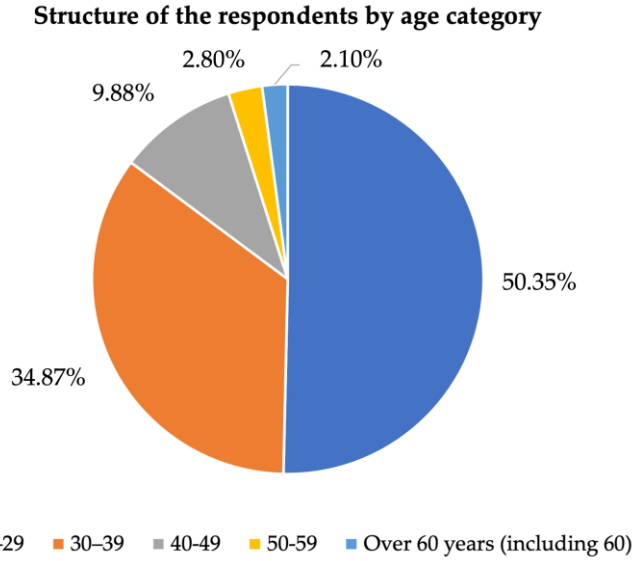

Figure 2. Structure of the sample according to the "Age" characteristic.

Of the total 568 members of the sample, 26.76% originate from rural areas (152 individuals), while the remaining 73.24%, comprising 416 subjects, are drawn from urban environments.

Based on the participants' latest completed level of education, this study categorizes individuals as follows: 18 individuals who have completed primary school (3.17%), 6 subjects with either 10 years of education or vocational school completion (1.06%), 92 respondents who are high school graduates (16.20%), and 10 members of the sample (1.76%) who have completed post-high school education. The highest percentage of respondents holds advanced degrees; specifically, 40.14% of the total respondents (228) have completed master's-level education. A total of 208 respondents, representing 36.62% of all subjects, have completed undergraduate studies. Only 6 individuals (1.06%) possess doctoral degrees among the total of 568 study participants.

The final question within the demographic category pertains to the monthly net income of the sampled individuals. According to Figure 3, 62 individuals (10.92%) out of the total 568 have no income, 20 subjects (3.52%) earn monthly net incomes below RON 1000, and 22 individuals (3.87%) have monthly net incomes between RON 1000.01 and 2000. Within the income range of RON 2000.01–3000, 62 respondents fall, constituting 10.92% of the total sample, followed by 84 individuals (14.79%) falling within the RON 3000.01–4000 income interval. A total of 88 individuals, members of the sample, have a monthly net income ranging between RON 4000.01 and 5000, representing 15.49% of the total respondents, while 40.49% of all study participants (230 individuals) report monthly net incomes exceeding RON 5000.

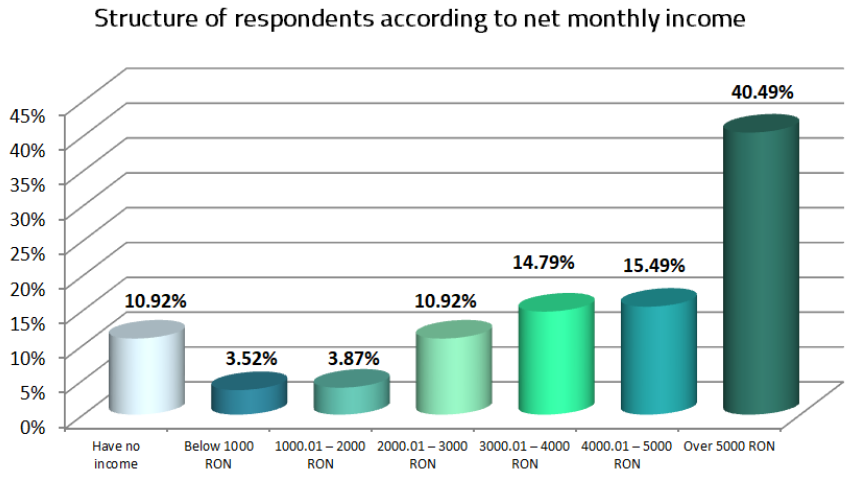

Figure 3. Sample structure according to monthly net income.

4. Results

This section presents a brief overview of the results obtained through the analysis of primary data, as well as the testing of statistical hypotheses. The analysis was conducted using Excel and IBM SPSS Statistics 26.

A portion of content creators' activity focuses on promoting various goods; therefore, this research aimed to identify the extent to which respondents trust product recommendations made by the influencers they follow on social media platforms. Of the 520 respondents, 258, precisely 49.62%, provided a neutral response, opting for the "Neither distrust nor trust" option. Meanwhile, 36.96% of subjects trust the recommendations of content creators, while the "Distrust" response was chosen by 40 individuals (7.69% of valid responses). The least common responses were attributed to the options of "A lot of trust" (5.38%) and "Total distrust" (0.38%) (Figure 4).

The indicators of descriptive statistics corresponding to this question are presented in Table 1. Thus, the respondents' average ratings regarding the level of trust in the recommendations made by the influencers they follow on social media are 3.39 points on a scale from 1 to 5 (1—complete distrust; 5—complete trust). The median and mode each have a value of 3, with the response option "Neither distrust nor trust" being most frequently selected by the sample members. The standard deviation is 0.724 points, indicating a high homogeneity of the population regarding the analyzed variable as it is below 1 point.

In order to better identify the factors contributing to the increased credibility of influencer marketing campaigns, the authors included the following question in the questionnaire: "For you, does the number of followers of a content creator influence the credibility of the marketing campaigns they undertake?"

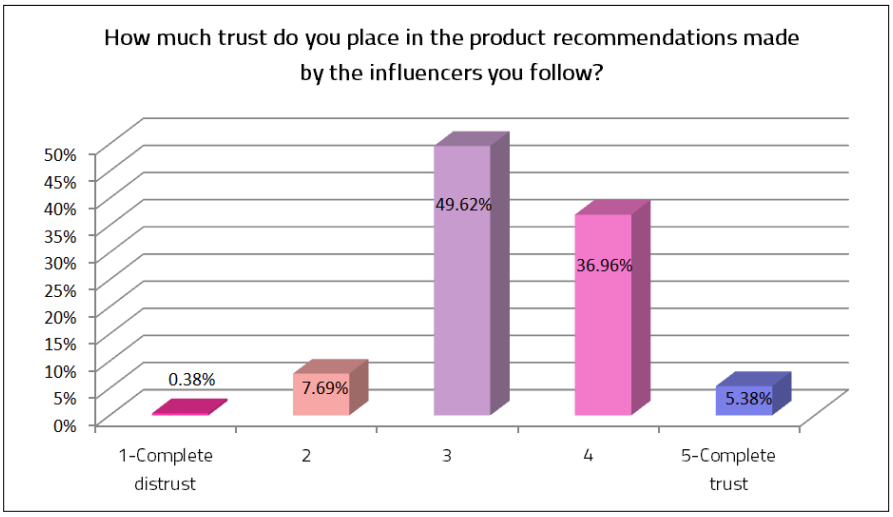

Figure 4. The trust of the respondents in the recommendations of influencers.

Table 1. Indicators of descriptive statistics.

What level of trust do you have in the product recommendations made by the influencers you follow?	N		Mean	Median	Mode	Std. Deviation
	Valid	Missing				
	520	98	3.39	3.00	3	0.724

Source: Created by authors based on the SPSS output.

The responses to this question are presented in Figure 5, where it can be observed that, for 61.90% of the 520 respondents, the number of followers a content creator has does not influence the credibility of the marketing campaigns they are part of. The remaining 38.10% believe that this aspect does influence the credibility of influencer marketing campaigns.

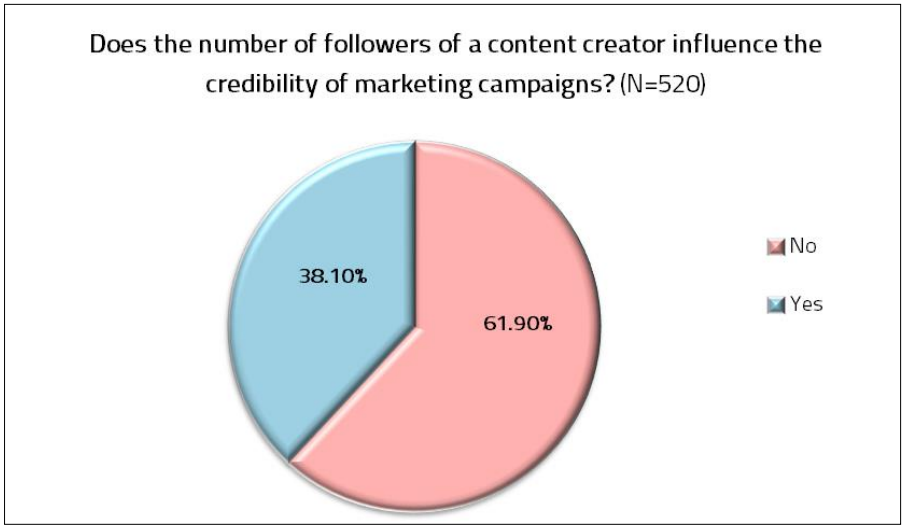

Figure 5. The influence of the number of followers on the credibility of marketing campaigns.

The following figure (Figure 6) presents the types of campaigns that inspire trust among the respondents. Specifically, 358 individuals believe that the most credible campaigns are those created on social media, where the influencer seamlessly integrates the promoted product into their daily activities. The next type of campaigns that instill trust for 54.60% of respondents are those carried out on social networks featuring content creators followed by the subjects online. A total of 162 respondents, representing 31.2% of the subjects, perceive the disclosure of paid partnerships in social media campaigns as credible. The

least credible promotion techniques for the sampled members are television commercials featuring influencers (6.9%) and campaigns conducted on social platforms by influencers, regardless of whether they are among the individuals followed by respondents (5%).

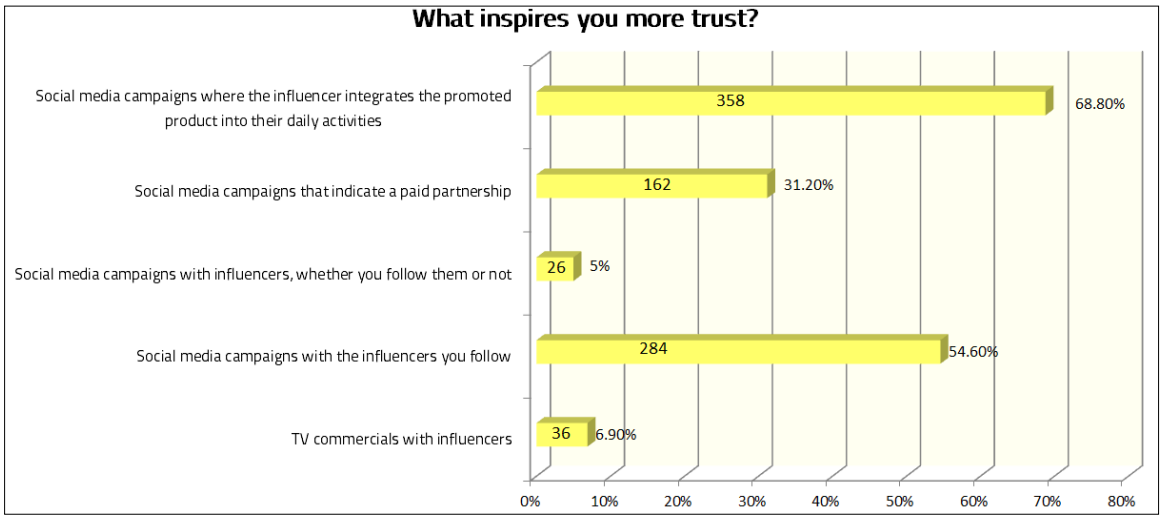

Figure 6. The list of marketing campaigns that inspire trust.

Often, content creators convey information about various products or brands. Sometimes, these types of posts prompt internet users to make purchases. Consequently, the researchers aimed to identify the number of individuals who have bought a product at least once because it was recommended by an influencer on social media. As seen in the graph below (Figure 7), 476 people, or 92% of respondents, have made a purchase at least once based on information provided by a content creator on social media. Only 8% of subjects have never made a purchase considering online opinion leaders.

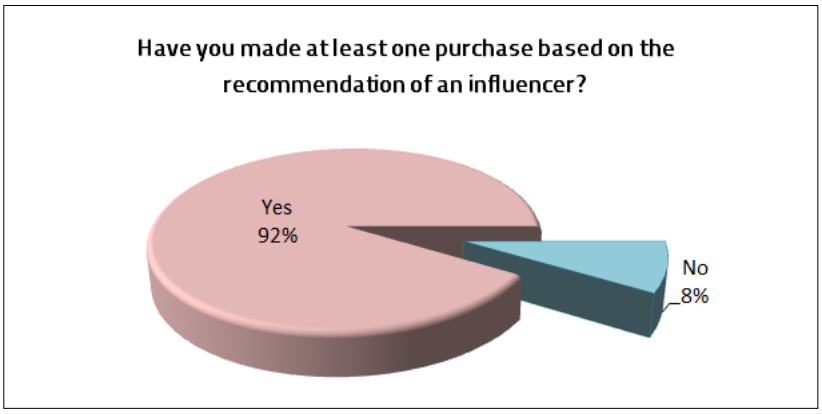

Figure 7. Making purchases based on the recommendations provided by influencers.

The perception of consumers regarding the impact of a content creator campaign also depends on the platform on which it is conducted. Respondents were asked to rank social media platforms in ascending order, assigning rank 1 to the platform with the highest impact campaigns, rank 2 to the second-highest impact, and so on, up to rank 5 for the platform with the least impact. Since an ordinal scale was used—specifically, the ranking scale of response alternatives in relation to a specific criterium—the average score was calculated for each platform. Due to this type of scale, the lowest score represents the first place, indicating that the platform where influencer marketing campaigns have the greatest impact is Instagram, with an average score of 1.61 points (Figure 8). In the second place is TikTok with an average score of 2.52 points, followed by Facebook

(2.98 points), YouTube (3.43 points), and lastly, Snapchat (4.46 points), indicating that influencer marketing activities on this platform have the least impact.

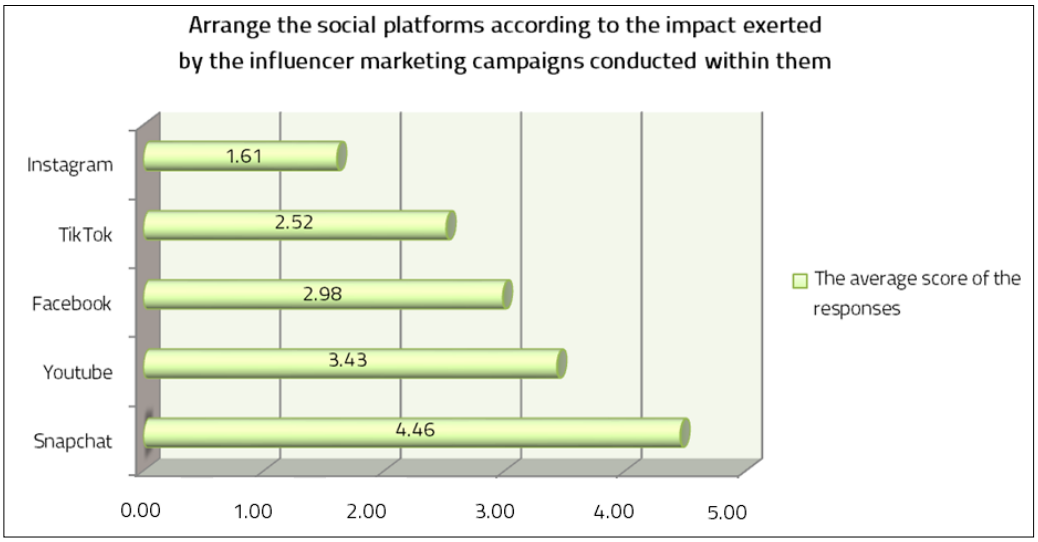

Figure 8. Ranking of social media platforms by the impact of influencer marketing campaigns.

Another relevant aspect for the research is represented by the various reasons that led people to stop following certain influencers online. For this, the questionnaire included a dichotomous nominal scale question: "Have you stopped following a particular influencer because of the campaigns they conducted online?". As can be seen in Figure 9, out of a total of 520 respondents, 66% have stopped following certain influencers on social media because of the campaigns they have carried out. The remaining 34% of subjects answered negatively to this question.

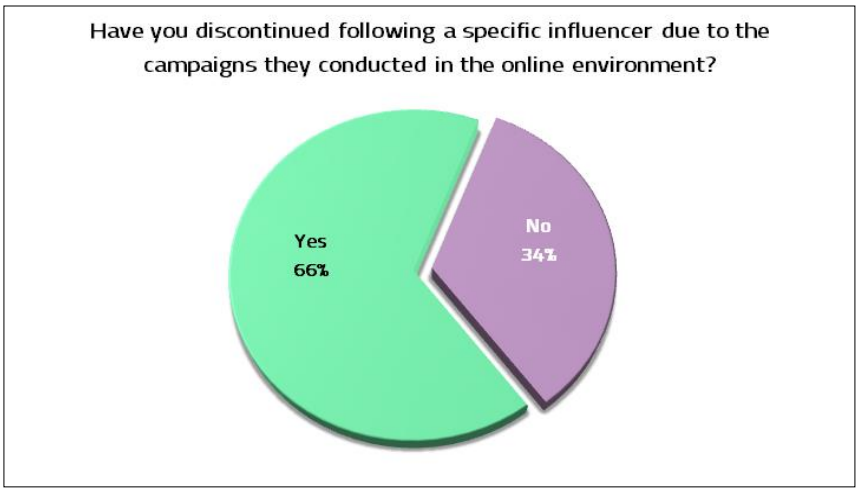

Figure 9. Removing certain influencers from the following list.

The exact reasons why 344 members of the sample removed various influencers from their list are presented in Figure 10. Aggressive campaigns and the lack of consistency between the promoted product and the influencer's activity are the most frequently mentioned causes, both chosen by 154 individuals, representing 44.80% of the 344 respondents. For 38.40% of the subjects, the product promoted by the influencer led to their removal from the following list. Additionally, the brand with which the content creator collaborated for the marketing campaign was a reason to stop following the influencer for 23.30% of those who completed the questionnaire. Sponsored campaigns were mentioned by 11% of study

participants, and 8.70% of the 344 respondents cited other reasons, including the influencer's insincerity, running multiple campaigns with brands in the same sphere, promoting very different products, and focusing more on promotions than on the influencer's life.

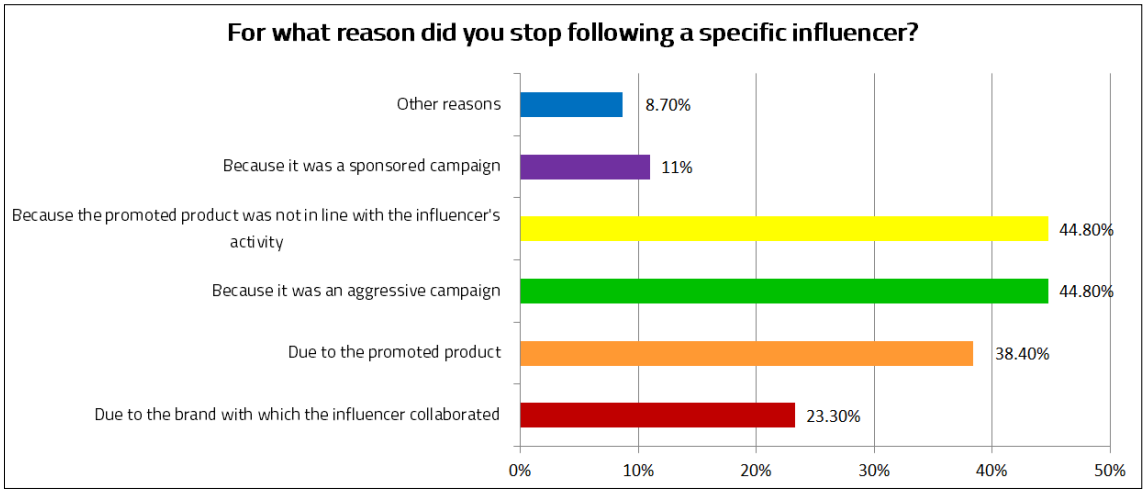

Figure 10. Reasons for removing certain influencers from the following list.

Statistical hypothesis testing is carried out with the aim of extrapolating results from the sample level to the level of the researched population. Therefore, a series of statistical tests will be applied to the hypotheses, aiming to identify statistically significant differences in various parameters, differences that may exist between two or more groups within the population, or even connections and relationships between variables (Tables 2 and 3).

Table 2. Descriptive statistics indicators at the sample level.

One-Sample Statistics				
	N	**Mean**	**Std. Deviation**	**Std. Error Mean**
Acquisition based on the endorsement of an influencer.	520	0.92	0.279	0.012

Source: Created by authors based on the SPSS output.

Table 3. Student's *t*-test for verifying Hypothesis 2.

One-Sample Test						
	Test Value = 0.6					
	t	**df**	**Sig. (2-Tailed)**	**Mean Difference**	**95% Confidence Interval of the Difference**	
					Lower	**Upper**
Acquisition based on the recommendation of an influencer	25.817	519	0.000	0.315	0.29	0.34

Source: Created by authors based on the SPSS output.

Hypothesis 2 (H_2). *The percentage of Romanians who have made at least one purchase based on an influencer's recommendation is different from 60%.*

At the level of the 520 respondents, the mean of the binary characteristic is 0.92, indicating that 92% of the respondents have made at least one acquisition based on the recommendation of an influencer. The standard deviation is 0.28 (28%).

The hypothesis was tested using Student's t-test, and the results are presented in Table 3.

It can be observed that the calculated t-value is 25.817, which is greater than the theoretical t-value of 1.96, thereby accepting H2. Under these conditions, we can ensure with 95% probability that at the population level under investigation, the percentage of individuals who have made at least one purchase based on the recommendation of a content creator is different from 60%.

The second statistical hypothesis to be tested is as follows. By using absolute and relative frequencies, contingency table was generated (Table 4).

Table 4. Contingency table based on absolute and relative frequencies.

I Believe That Influencer Recommendations Assist Me in Making Purchasing Decisions Place of Origin Crosstabulation					
			Place of Origin		Total
			Rural	Urban	
"I am of the opinion that influencer recommendations assist me in making purchasing decisions"	Complete disagreement	Count	8	16	24
		% within place of origin	6.2%	4.1%	4.6%
	Disagreement	Count	12	36	48
		% within place of origin	9.2%	9.2%	9.2%
	Neither agreement nor disagreement	Count	44	128	172
		% within place of origin	33.8%	32.8%	33.1%
	Agreement	Count	44	158	202
		% within place of origin	33.8%	40.5%	38.8%
	Complete agreement	Count	22	52	74
		% within place of origin	16.9%	13.3%	14.2%
Total		Count	130	390	520
		% within place of origin	100.0%	100.0%	100.0%

Source: Created by authors based on the SPSS output.

Hypothesis 3 (H_3). *There is no correlation between the agreement level with the statement "I believe that influencers' suggestions help me make purchasing decisions" and the respondents' background.*

Considering that the percentage of subjects from rural areas (33.8%) who agreed with the statement "I believe that influencer recommendations assist me in making purchasing decisions" differs from the percentage of urban subjects (40.5%) who expressed the same level of agreement on this matter, it can be stated that there is a correlation between the two variables. Another distinction is noticeable regarding those who completely disagree with the aforementioned statement. Individuals from rural areas account for 6.2%, whereas those from urban areas represent 4.1%.

To assess the significance of this relationship at the level of the studied population, the Kolmogorov–Smirnov test was be employed, as the test variable is measured on an ordinal scale, and the grouping variable consists of two groups.

To make a decision regarding this hypothesis, a primary approach involves comparing the values of Dcalc and Dα. The value of Dcalc can be obtained by applying the formula $Dcalc = \max k\,|F1(k) - F2(k)|$ or by identifying it in the table generated by SPSS (Table 5).

Table 5. Contingency table based on absolute and relative frequencies.

Test Statistics [a]		
		I Believe That Influencer Recommendations Assist Me in Making Purchasing Decisions
Most Extreme Differences	Absolute	0.036
	Positive	0.036
	Negative	−0.031
Kolmogorov–Smirnov Z		0.354
Asymp. Sig. (2-tailed)		1.000

[a] Grouping variable: Place of origin. Source: Created by authors based on the SPSS output.

According to Table 5, Dcalc = 0.036 = 3.6%. The same value is obtained by applying the formula Dcalc = max k | F1(k) − F2(k) | (Table 6).

$$D\alpha = 136 \times \sqrt{\frac{(n_1 + n_2)}{(n_1 \times n_2)}}$$

$$D\alpha = 136 \times \sqrt{\frac{(130 + 390)}{(130 \times 390)}} = 13.77\%$$

Table 6. Calculation of differences between cumulative relative frequencies.

	Relative Frequencies		**Cumulative Relative Frequencies**		**Difference**
	Rural	**Urban**	**Rural**	**Urban**	**F1–F2**
Complete disagreement	6.2%	4.1%	6.20%	4.10%	2.10%
Disagreement	9.2%	9.2%	15.40%	13.30%	2.10%
Neither agreement nor disagreement	33.8%	32.8%	49.20%	46.10%	3.10%
Agreement	33.8%	40.5%	83.00%	86.60%	−3.60%
Complete agreement	16.9%	13.3%	100%	100%	0.00%
Total	100%	100%	-	-	-

Source: Created by authors based on the SPSS output.

Considering that Dcalc < Dα (3.6% < 13.77%), Hypothesis H3 is accepted. Therefore, we cannot assert with 95% probability that there is a correlation between the agreement level with the statement "I believe that influencer recommendations assist me in making purchasing decisions" and the respondents' place of origin. The same conclusion is drawn based on the significance level value (Table 5), Asymp. Sig. (2-tailed) = 1, which is greater than the considered theoretical significance level (0.05).

5. Discussion

The results of this study bring an addition to this field, more precisely to studies in the scientific literature. For a better understanding of the overall image of the study performed, the authors illustrated Figure 11.

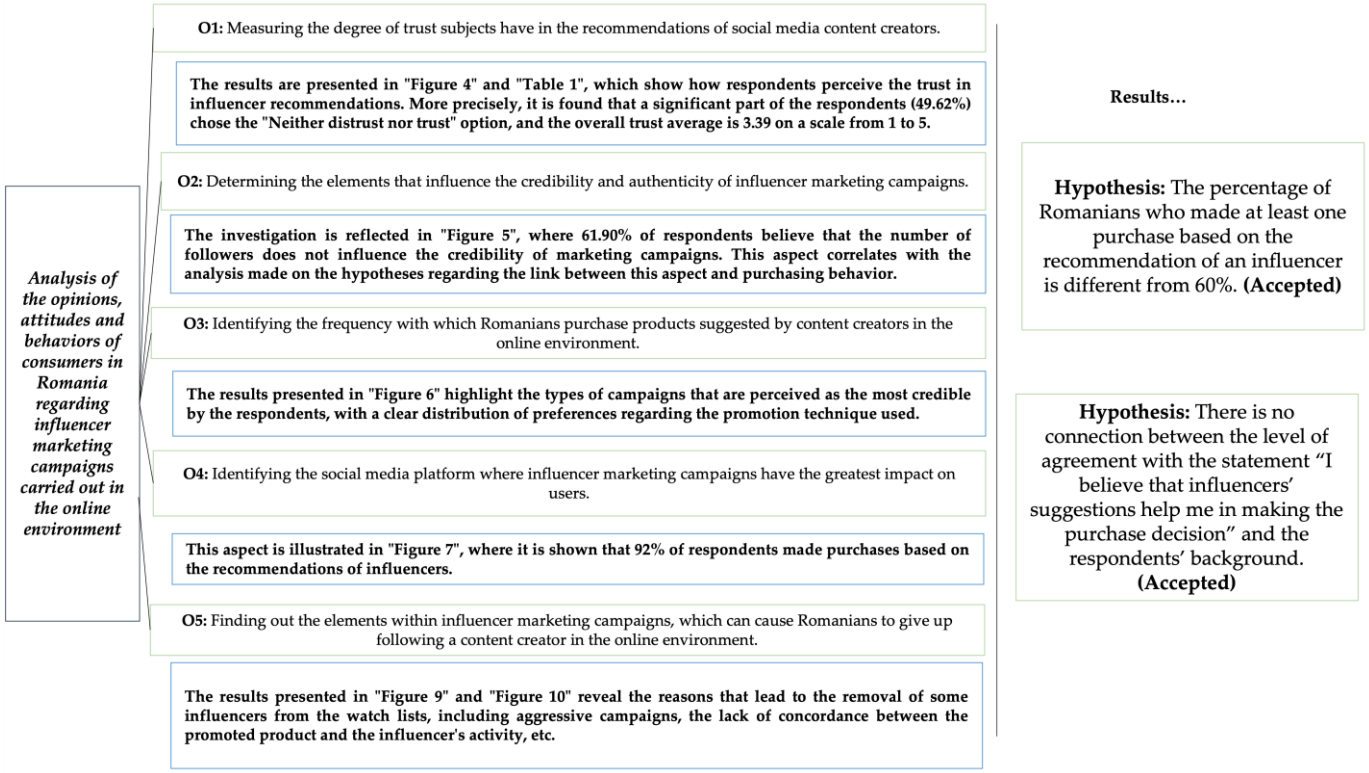

Figure 11. The overall structure of the study according to the objectives.

The conducted marketing research aimed to identify the opinions, attitudes, and behaviors of consumers in Romania regarding influencer marketing campaigns encountered in the digital services market in Romania, as well as the opinions of Romanians regarding various elements of influencer marketing campaigns. Additionally, this study sought to determine the level of familiarity with specific terms in influencer marketing. The questionnaire was drafted and administered using Google Forms, resulting in a sample of 618 adult respondents from Romania, although the sampling method employed was non-random.

The analysis of the quantitative research results has provided valuable information that can be integrated into the development of digital marketing strategies. Firstly, understanding the social media platforms on which adult Romanian users have accounts is essential. Based on the analysis of the primary data, it is observed that Instagram is the most utilized platform (82.80%), holding the top position in user preferences (75.48%). Even though Facebook is the second most used social media platform (71.50%), it ranks fourth in the respondents' preferences (5.77%), with TikTok (10%) and YouTube (7.31%) occupying the second and third positions, respectively.

The researchers aimed to identify the level of impact of online promotional activities carried out by content creators. Therefore, a question was posed regarding the purchases made based on influencer recommendations. Ninety-two percent of respondents acknowledged having made at least one purchase based on the recommendation of a content creator, a result similar to those obtained by other studies (Sarwar-A Alam et al. 2019; Suprapto et al. 2020; Dabbous and Barakat 2020; Saydan and Dülek 2019).

An important aspect emerging from the analysis of primary data is related to the types of campaigns that instill greater trust in the subjects. The top three types of campaigns that inspire confidence in the subjects are social media campaigns where the influencer integrates the promoted product into their daily activities (68.8%), campaigns conducted by influencers they follow on social media platforms (54.60%), and those that indicate the existence of a paid partnership (31.20%). The credibility of marketing campaigns can also be influenced by other factors; for example, the number of followers an influencer has

impacts the credibility of promotional activities according to 38.10% of respondents. The remaining 61.90% do not consider this aspect as crucial.

On the other hand, there are also negative effects of influencer marketing campaigns; in some cases, these can even lead to a decrease in the influencer's community. Sixty-six percent of respondents have stopped following a particular content creator online due to the campaigns they conducted. The most frequently cited reasons include the following: the campaign was too aggressive (44.8%), the promoted product did not align with the influencer's activities (44.8%), dissatisfaction with the promoted product (38.4%), or issues with the collaborating brand (23.30%).

6. Conclusions

In conclusion, regarding the level of trust that subjects place in recommendations from content creators on social media, the response option 'Neither distrust nor trust' was the most frequently selected by members of the sample. Among the most cited factors influencing the credibility and authenticity of influencer marketing campaigns are the following: social media campaigns where the influencer seamlessly integrates the promoted product into their daily activities (68.8%), social media campaigns featuring influencers that participants follow (54.6%), and the disclosure of paid partnerships in social media campaigns (31.2%).

Ninety-two percent of participants from the sample have purchased at least one product recommended by a content creator.

With respect to Objective 4, "Identifying the social media platform where influencer marketing campaigns have the greatest impact on users", an analysis of the obtained results indicates that the top three social media platforms where influencer marketing campaigns exert the most significant impact on users are Instagram, TikTok, and Facebook. Conversely, the social media platform where the impact of these types of campaigns is least pronounced is Snapchat.

The final aspect proposed for analysis pertains to elements within influencer marketing campaigns that may lead Romanians to stop following an online content creator. Based on the analysis of the results, it can be stated that among these elements are aggressive campaigns and a lack of alignment between the promoted product and the influencer's activities, the brand with which the content creator collaborated for the marketing campaign, sponsored campaigns as another reason, as well as factors such as the following: the influencer's insincerity, running multiple campaigns with brands in the same sphere, promoting very different products, and focusing more on promotions than on the influencer's personal life.

7. Limitations and Future Implications

The obtained results are highly valuable for laying the groundwork for future research in this field. The academic environment stands to benefit from these advantages as they can lead to the identification of new research opportunities concerning influencer marketing actions. Simultaneously, the data resulting from this research can be valuable in the economic sphere. Marketing agencies, industry specialists, or companies operating in any market, regardless of their field of activity, can formulate highly effective marketing strategies in the digital environment.

The information obtained from the conducted research is valuable for companies; however, they must extract the most suitable aspects for their specific business needs. Marketing strategies developed in collaboration with influencers will vary based on several factors, including the products marketed or services offered, the target audience characteristics (such as age, gender, and income), and the available budget. Based on these details, a partnership should be established with a content creator recognized as an expert in the relevant field, ensuring that the target audience for the promoted product aligns with the influencer's community. Furthermore, a company's budget may influence the

type of content created, the frequency of posts by the content creator, and the duration of the campaign.

Thus, an influencer marketing strategy consists of several steps: studying the influencer market, selecting a content creator who aligns with the product to be promoted, choosing the platform where the company's target audience is active, and determining the type of content to be created (such as video, images, or text), as well as establishing contractual terms.

Considering the information obtained from the quantitative research, the economic environment may place greater emphasis on the frequency of promotional posts and the manner in which influencers present the promoted product in their posts (the most effective approach being the seamless integration of the product into the influencer's daily activities), which enhances followers' trust in the influencer's recommendations. According to the results, Instagram emerges as the most suitable platform for creating a credible influencer marketing campaign; however, the characteristics of the targeted audience also hold significant importance. Companies should request influencers to provide information about the demographics of their followers to ensure alignment with the target audience's characteristics.

To optimize influencer marketing strategies, brands should focus on collaborating with micro-influencers, who often have higher engagement rates and resonate more deeply with niche audiences, providing a cost-effective way to target specific demographics. It is crucial to provide content to the unique behaviors of users on each platform, such as prioritizing short, creative videos on TikTok for Gen Z while using longer, high-quality content on Instagram and YouTube for millennials. Additionally, the data-driven personalization of messaging and offers, based on audience demographics, can significantly boost engagement and conversion. Authentic storytelling, rather than overt promotion, builds stronger audience relationships, especially among younger demographics that value transparency. Incorporating social proof through user-generated content and reviews can increase credibility and influence purchasing decisions. Interactive campaigns like giveaways or social media challenges, combined with real-time engagement tools like Instagram Live, further enhance brand visibility and connection with audiences. Finally, tracking and optimizing influencer campaigns with real-time analytics ensures continuous improvement and a maximized return on investment by identifying what works best for specific demographic groups.

Given the sample obtained in this research, for the development of an effective influencer marketing strategy, a content creator active on Instagram, whose niche aligns with the promoted product, should be selected. Additionally, it is important that the targeted audience falls within the age range of 18–29 years or even 18–39 years. The frequency of promotional posts should be moderate to avoid an aggressive strategy.

The present research has encountered a series of limitations throughout its course. The primary constraint arises from the non-random sampling method we employed, thereby rendering the results non-extrapolatable to the broader population under investigation. The research results may be influenced by the snowball sampling method, as it tends to create a homogenous sample whose members share similar characteristics. Consequently, the obtained information might not accurately reflect the entire consumer population of Romania. Therefore, this method limits the generalizability of the conclusions drawn. Another aspect to consider is that by distributing the questionnaire through existing social networks, diverse perspectives and experiences may be overlooked. As a result, valuable insights from various demographic groups or consumer segments that are not well represented in the initial sample could be lost.

The snowball method was also employed by distributing the questionnaire online through influencers, which may have an impact on the recorded responses. Content creators often have specific follower demographics, resulting in a sample skewed towards certain age groups, interests, or socio-economic statuses. This could affect the understanding of how different consumer segments respond to influencer marketing strategies.

Nevertheless, the outcomes derived from the analysis of collected data remain relevant to the chosen topic, as the sample size is suitable for formulating specific digital marketing strategies.

A second limitation was determined by the prevalence of closed-ended questions within the questionnaire, which may restrict the expression of respondents, thereby potentially affecting the accuracy of the research. This limitation may lead to a reduction in the variety of perspectives that subjects have regarding the concepts addressed, as they will be unable to express their opinions if these do not fit within the response options predetermined by the researcher. Closed-ended questions have the disadvantage of being unable to identify the reasons behind respondents' opinions; consequently, important contextual information may be lost, and the depth of consumer motivations cannot be determined.

From another perspective, closed-ended questions may be interpreted differently by members of the sample, depending on each individual's personal experiences.

Simultaneously, the theme of influencer marketing is highly topical in Romania, generating a multitude of aspects to be studied. However, the questionnaire does not permit the exploration of all aspects, making it practically impossible to cover all aspects in this study.

Considering this limitation, the diversity of responses is negatively impacted in several perspectives. Firstly, by imposing predefined response options, the predefined response options become uniform, thereby reducing variability and diversity. As a result, the findings may be less representative of the studied population, as some respondents may not fully relate to the available options. Additionally, the order in which the response options are presented can influence choices.

Moreover, closed-ended questions fail to capture the complexity of respondents' opinions, leading to conclusions that may be inaccurate or reflect the subjects' views with limited accuracy. The diversity of information collected through a questionnaire with closed-ended questions is also affected, as respondents with differing opinions or unique experiences may be excluded, due to their lower frequency and the potential oversight by the researcher regarding these variants.

Respondents' motivation to reflect on their answers may decrease due to limited response options, which in turn reduces the depth and quality of the information collected. Therefore, it can be argued that closed-ended questions reduce complex phenomena to binary or simplistic choices, often leaving the respondent's genuine and nuanced opinion unknown.

Given the identified drawbacks of closed-ended questions, future research will aim to formulate clearer and more detailed questions, offer an "Other" option for all such questions to allow respondents to express themselves freely if they do not resonate with the predefined options, and reduce the number of closed-ended questions where the research topic permits.

Another limitation may arise from respondents themselves, specifically certain terms that might be incorrectly interpreted or misunderstood by subjects. Completing the questionnaire without the support of an operator amplifies the difficulties that may arise during its completion.

Conducting the research on the Google Forms platform could represent a fourth limitation, as potential study participants are required to have internet access and a smartphone or a laptop/computer. Additionally, Google Forms may potentially mislead individuals, especially due to filter-type questions that can redirect subjects, among other factors.

A future direction involves continuing the study to ensure representativity at the level of the population under investigation. Additionally, considerations are being made to introduce new questions that better capture consumer behaviors toward influencer marketing campaigns. Furthermore, a new quantitative research study involving marketing agency managers is being contemplated to identify their opinions and attitudes regarding promotion strategies involving collaborations with content creators.

Another future perspective is represented by non-parametric tests such as the Wilcoxon signed-rank test, which might be applied. This method does not rely on the assumption of normality and could serve as a robust alternative to the t-test, particularly given the nature of our data. Secondly, running a Bayesian analysis could provide a more nuanced understanding of the probability distribution of our results, particularly in light of the benchmark used. Therefore, to complement the t-test, effect size metrics could be reported by using Cohen's d, which can offer additional insights into the practical significance of the observed results.

Author Contributions: Conceptualization, A.C.S., G.B., E.C., I.B.C., A.A.M., M.B., and G.I.; methodology, A.C.S.; investigation, A.C.S., E.C., and G.B.; resources, A.C.S. and I.B.C.; writing—original draft preparation, A.C.S. and I.B.C.; writing—review and editing, A.C.S., E.C., I.B.C., G.B., A.A.M., M.B., and G.I.; visualization, E.C.; supervision, G.B.; project administration, G.B.; funding acquisition, G.B. All authors have read and agreed to the published version of the manuscript.

Funding: The APC was funded by Transilvania University of Brașov.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by Faculty Council on 23 February 2023 since this is not a direct study involving human subjects but an online research.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data are available on request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

1. Are you familiar with the term influencer marketing?

- ○ Yes (Proceed to question 2)
- ○ No (End of questionnaire)

2. How familiar are you with the term influencer marketing? (Please indicate a level between the two limits, considering the distance between each level as equal)

Very familiar 5 4 3 2 1 Not familiar at all

3. Do you follow influencers online?

- ○ Yes (Proceed to question 4)
- ○ No (End of questionnaire)

4. Which social media platforms do you use?

- ☐ Instagram
- ☐ Facebook
- ☐ TikTok
- ☐ YouTube
- ☐ Snapchat
- ☐ Others, which?

5. Which is your preferred platform?

- ○ Instagram
- ○ Facebook
- ○ TikTok
- ○ YouTube
- ○ Snapchat
- ○ Others, which?

6. What type of content do you prefer to see from the content creators you follow? (Format: video, photo, text; Category: lifestyle, fashion, beauty, parenting, food and cooking, sports, travel, comedy and entertainment, etc.)

7. How would you evaluate the activity of online content creators?

☐ Focused on delivering useful information
☐ Focused on selling products
☐ Focused on creating experiences
☐ Focused on educational information
☐ Focused on entertainment

8. To what extent can a content creator's post influence your decision to purchase a product?
(Please indicate a level between the two limits, considering the distance between each level as equal)

Very much 5 4 3 2 1 Not at all

9. Have you ever made a purchase based on an influencer's recommendation?

○ Yes (Proceed to question 10)
○ No (Proceed to question 12)

10. How often do you make such purchases?
(Please indicate a level between the two limits, considering the distance between each level as equal. Consider 5—"Very often" = at least 6 times a month, 4—"5 times a month", 3—"4 times a month", 2—"2–3 times a month", and 1—"Very rarely" = once a month or not at all)

Very often 5 4 3 2 1 Very rarely

11. How often do you research or seek additional information about a product promoted by an influencer before making a purchase?
(Please indicate a level between the two limits, considering the distance between each level as equal)

Always 5 4 3 2 1 Never

12. How often do the influencers you follow run marketing campaigns on the following platforms?
(Consider "Very often" = daily, "Often" = weekly, "Neither often nor rare" = a few times a month, "Rare" = once a month, "Not at all" = never)

	Very often	Often	Neither often nor rare	Rare	Not at all
Instagram					
Facebook					
Tik Tok					
Snapchat					
Youtube					

13. Which social media platforms do you believe influencer marketing campaigns have the greatest impact on?
Please rank the following platforms, giving rank 1 to the platform with the greatest impact, rank 2 to the one you place second, and so on, until rank 5 for the one you place last:

	1	2	3	4	5
Instagram					
Facebook					
Tik Tok					
Snapchat					
Youtube					

14. Which of the following inspires more trust in you?

- TV commercials with influencers
- Social media campaigns with influencers you follow
- Social media campaigns with influencers, regardless of whether you follow them or not
- Social media campaigns that indicate a paid partnership
- Social media campaigns where the influencer integrates the promoted product into their daily life
- Others, which?

15. On a scale from 1 to 5, how much trust do you place in the product recommendations made by influencers you follow?
(Please indicate a level between the two limits, considering the distance between each level as equal)

A lot of trust 5 4 3 2 1 No trust at all

16. Does the number of followers a content creator has influence the credibility of the marketing campaigns they conduct?

- Yes
- No

17. Please express your opinion regarding the following statements:

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Influencer marketing campaigns are more credible than traditional advertisements					
Influencer marketing campaigns have a positive impact on my perception of a brand					
I would prefer to see more influencer marketing campaigns in my social media feeds					
I would prefer to see fewer influencer marketing campaigns in my social media feeds					
I appreciate the disclosure of sponsored influencer marketing campaigns					
I believe that brand partnerships with influencers increase a brand's credibility					
I believe that influencer recommendations help me make purchasing decisions					

18. On a scale from 1 to 5, where the distance between consecutive levels is considered equal, do you believe you can skip or ignore sponsored content created by influencers on social media platforms?

Definitely 5 4 3 2 1 Not at all

19. Please rank the following 7 elements based on their importance in convincing you to purchase a product through an influencer marketing campaign:
Give rank 1 to the most important element, rank 2 to the second most important, and so on, until rank 7 for the least important:

	1	2	3	4	5	6	7
Providing detailed information about the product							
Offering a discount through promo codes							
Sharing the influencer's personal experience with the product							
The campaign is conducted by an influencer you follow							
The authenticity of the recommendation							
Clear disclosure of sponsored content							
The influencer's celebrity status							

20. In your opinion, what makes an influencer marketing campaign authentic and credible?

_____

21. What suggestions do you have for brands or content creators to improve the overall quality and impact of influencer marketing campaigns?

_____

22. Have you ever stopped following an influencer because of their online campaigns?

- ○ Yes (Proceed to question 23)
- ○ No (Proceed to question 24)

23. Why?

- ☐ Because of the brand they collaborated with
- ☐ Because of the promoted product
- ☐ Because the campaign was too aggressive
- ☐ Because the promoted product was inconsistent with the influencer's activity
- ☐ Because it was a sponsored campaign
- ☐ Others, which?

24. Your gender is:

- ○ Female
- ○ Male

25. Your age falls within the range of:

- ○ 18–29
- ○ 30–39
- ○ 40–49
- ○ 50–59
- ○ Over 60 (inclusive)

26. Your place of origin is:

- ○ Rural
- ○ Urban

27. Your current occupation is:

- ○ Student
- ○ Employed
- ○ Unemployed
- ○ Retired
- ○ Homemaker
- ○ Others, which?

28. Your highest level of education completed:

- Elementary School
- 10th Grade/Professional School
- High School
- Post-secondary School
- Bachelor's Degree
- Master's Degree
- Doctorate
- Others, which?

29. Your net monthly income falls within the range of:

- No income
- Under 1000 lei
- 1000.01–2000 lei
- 2000.01–3000 lei
- 3000.01–4000 lei
- 4000.01–5000 lei
- Over 5000 lei

References

Adetunji, Raji Ridwan, Sabrina Mohd Rashid, and Sobhi Mohd Ishak. 2018. Social Media Marketing Communication and Consumer-Based Brand Equity: An Account of Automotive Brands in Malaysia. *Jurnal Komunikasi, Malaysian Journal of Communication* 34: 1–19. [CrossRef]

Audrezet, Alice, Gwarlann de Kerviler, and Julie Guidry Moulard. 2020. Authenticity under Threat: When Social Media Influencers Need to Go beyond Self-Presentation. *Journal of Business Research* 117: 557–69. [CrossRef]

Aytan, C., and E. E. Telci. 2014. Brands' Social Media Usage And Its Effects on Consumer Behavior. *Turkish Online Journal of Design, Art & Communication* 4: 1–15.

Bahar, Varqa Shamsi, and Mahmudul Hasan. 2024. #Fakefamous: How Do Influencers Use Disinformation to Establish Long-Term Credibility on Social Media? *Information Technology & People*. *ahead-of-print*. [CrossRef]

Belanche, Daniel, Luis V. Casaló, Marta Flavián, and Sergio Ibáñez-Sánchez. 2021. Understanding Influencer Marketing: The Role of Congruence between Influencers, Products and Consumers. *Journal of Business Research* 132: 186–95. [CrossRef]

Dabbous, Amal, and Karine Aoun Barakat. 2020. Bridging the Online Offline Gap: Assessing the Impact of Brands' Social Network Content Quality on Brand Awareness and Purchase Intention. *Journal of Retailing and Consumer Services* 53: 101966. [CrossRef]

DATAREPORTAL. 2023. DIGITAL 2023: ROMANIA. Available online: https://datareportal.com/reports/digital-2023-romania (accessed on 10 October 2023).

Dhanesh, Ganga S., and Gaelle Duthler. 2019. Relationship Management through Social Media Influencers: Effects of Followers' Awareness of Paid Endorsement. *Public Relations Review* 45: 101765. [CrossRef]

Gerlich, Michael. 2022. Micro-Influencer Marketing during the COVID-19 Pandemic: New Vistas or the End of an Era? *Journal of Digital & Social Media Marketing* 9: 354–70.

Gerlich, Michael. 2023. The Power of Virtual Influencers: Impact on Consumer Behaviour and Attitudes in the Age of AI. *Administrative Sciences* 13: 178. [CrossRef]

Goanta, Catalina, and Sofia Ranchordás, eds. 2020. *The Regulation of Social Media Influencers. Edward Elgar Publishing*. Regency: Edward Elgar Publishing.

Gökerik, Mehmet. 2024. Consumer Cynicism in Influencer Marketing: An Impact Analysis on Purchase Intention and Brand Loyalty. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi* 13: 404–21. [CrossRef]

Hossan, Dalowar, Zuraina Dato'Mansor, and Nor Siah Jaharuddin. 2023. Research Population and Sampling in Quantitative Study. *International Journal of Business and Technopreneurship* 13: 209–22. [CrossRef]

Hu, Lixia, Qingfei Min, Shengnan Han, and Zhiyong Liu. 2020. Understanding Followers' Stickiness to Digital Influencers: The Effect of Psychological Responses. *International Journal of Information Management* 54: 102169. [CrossRef]

INSSE. 2024. Insitutul Național de Statistică Populația Rezidentă La 1 Ianuarie 2023 in Creștere Cu 9,1 Mii Persoane; 2023. Available online: https://insse.ro/cms/sites/default/files/com_presa/com_pdf/poprez_ian2023r.pdf (accessed on 16 January 2024).

Jacobson, Jenna, Anatoliy Gruzd, and Ángel Hernández-García. 2020. Social Media Marketing: Who Is Watching the Watchers? *Journal of Retailing and Consumer Services* 53: 101774. [CrossRef]

Jin, S. Venus, and Ehri Ryu. 2020. 'I'll Buy What She's #wearing': The Roles of Envy toward and Parasocial Interaction with Influencers in Instagram Celebrity-Based Brand Endorsement and Social Commerce. *Journal of Retailing and Consumer Services* 55: 102121. [CrossRef]

Khaleeli, Majdi. 2020. The Effect of Social Media Advertising and Promotion on Online Purchase Intention. *Journal of Critical Reviews* 7: 7031–36.
Khurshid, Sakar, Doaa Ayoub, and Wael Kortam. 2024. The Impact of Influencer Marketing on Consumers' Intentions toward Beauty Brands after the COVID-19 Pandemic. *Arab Journal of Administration* 44: 1–10. [CrossRef]
Lee, Jung Ah, Sabitha Sudarshan, Kristen L. Sussman, Laura F. Bright, and Matthew S. Eastin. 2022. Why Are Consumers Following Social Media Influencers on Instagram? Exploration of Consumers' Motives for Following Influencers and the Role of Materialism. *International Journal of Advertising* 41: 78–100. [CrossRef]
Lefter, Constantin, Gabriel Brătucu, Marius Bălăşescu, Ioana Chiţu, Cristina Răuţă, and Alina Tecău. 2006. *Marketing*. Brașov: Editura Universității Transilvania Braşov.
Murphy, Liam. 2023. The Questionnaire Surveying Research Method: Pros, Cons and Best Practices. *ScienceOpen Preprints*. [CrossRef]
Okazaki, Shintaro, and Charles R. Taylor. 2013. Social Media and International Advertising: Theoretical Challenges and Future Directions. *International Marketing Review* 30: 56–71. [CrossRef]
Pakura, Stefanie, and Christian Rudeloff. 2023. How Entrepreneurs Build Brands and Reputation with Social Media PR: Empirical Insights from Start-Ups in Germany. *Journal of Small Business & Entrepreneurship* 35: 153–80. [CrossRef]
Rosário, Albérico Travassos, and Joana Carmo Dias. 2023. Marketing Strategies on Social Media Platforms. *International Journal of E-Business Research* 19: 1–25. [CrossRef]
Sarwar-A Alam, M. D., Daoping Wang, and Abdul Waheed. 2019. Impact of Digital Marketing on Consumers' Impulsive Online Buying Tendencies With Intervening Effect of Gender and Education. *International Journal of Enterprise Information Systems* 15: 44–59. [CrossRef]
Saydan, Reha, and Bulut Dülek. 2019. The Impact of Social Media Advertisement Awareness on Brand Awareness, Brand Image, Brand Attitude and Brand Loyalty: A Research on University Students. *Nternational Journal of Contemporary Economics and Administrative Sciences* 9: 470–94.
STATISTA. 2023. Number of Facebook Users in Romania from August 2020 to October 2023. Available online: https://www.statista.com/statistics/1178634/romania-number-of-facebook-users/ (accessed on 10 October 2023).
Suprapto, Widjojo, Ken Hartono, and Hakim Bendjeroua. 2020. Social Media Advertising and Consumer Perception on Purchase Intention. *SHS Web of Conferences* 76: 01055. [CrossRef]
Taylor, David G., Jeffrey E. Lewin, and David Strutton. 2011. Friends, Fans, and Followers: Do Ads Work on Social Networks? *Journal of Advertising Research* 51: 258–75. [CrossRef]
UNICEF. 2023. How Many Children Are There in Romania? Available online: https://data.unicef.org/how-many/how-many-children-under-18-are-there-in-romania/ (accessed on 13 August 2023).
Van Dijck, José. 2013. *The Culture of Connectivity: A Critical History of Social Media*. New York: Oxford University Press.
Vandenbosch, Laura, Jasmine Fardouly, and Marika Tiggemann. 2022. Social Media and Body Image: Recent Trends and Future Directions. *Current Opinion in Psychology* 45: 101289. [CrossRef]
Wang, Xuequn, Yichuan Wang, Xiaolin Lin, and Amjad Abdullat. 2021. The Dual Concept of Consumer Value in Social Media Brand Community: A Trust Transfer Perspective. *International Journal of Information Management* 59: 102319. [CrossRef]

Article

Outlook on AGRICULTURE

Outlook on Agriculture
1–9

DOI: 10.1177/0030727018761689
journals.sagepub.com/home/oag
SAGE

Dynamic analysis of European organic agricultural areas in the context of sustainable development

Liliana Duguleană, Marius Bălăşescu, Constantin Duguleană, Simona Bălăşescu, Nicoleta Andreea Neacşu and Lavinia Dovleac

Abstract

The aim of this research was to analyze changes in the size of the European organic agricultural areas between 2000 and 2014 and assess the factors that influenced and differentiated EU member states in this context. The analyses showed the development potential of the EU countries for extension of organic agricultural areas in a comparative manner, based on their future economic development capacities. The article used two multivariate statistical methods, principal components analysis and multiple regression method, to establish and assess the influence of the main factors that contributed to changes in the size of national organic areas. The main factors in 2014 were the European financing for agriculture and rural development, and the migration phenomenon.

Keywords

Principal components analysis, econometric model, sustainability, migration phenomenon

Introduction

The principles of sustainability assume the development of current agriculture to satisfy people's needs without negatively influencing future generations (Seufert, 2012). Since 1980, research has tried to show that organic agriculture is an important alternative agricultural production system, bringing significant benefits to both the economy as well as to social cohesion in rural areas (Annunziata and Vecchio, 2016; Wheeler, 2008). In recent years, researchers have studied the efficacy of organic and nonorganic farming according to the four pillars of sustainability, namely, economy, environment, productivity, and community well-being. Some believe that organic agriculture cannot meet the increasing demand for food and cannot be considered a sustainable form of farming in the future (Reganold, 2016; Seufert, 2012; Trewavas, 2001). The sustainability of organic agriculture is measured by economic profit, the social benefits for communities, and its contribution to environmental conservation (Bengtsson et al., 2005; Halberg et al., 2005; Lotter et al., 2003). Scientists argue that the most visible advantages of organic agriculture include conserving soil and water resources, improving soil and water quality, enhancing species' diversity, sustaining farming yield, producing quality products, and natural control of pests with reduced environmental pollution (Altieri, 2002; Eickhout, Meijl, Tabeau, and Rheenen, 2007). There are studies that show organic agriculture can generate profitable yields for farmers and can protect and improve the environment, while being safer for farm workers (Reganold and Wachter, 2016). There are many factors that influence the profitability of organic agriculture including crop yields (Nink, 2015). The economic sustainability of organic agriculture depends on adequate prices for organic products and accessibility to international organic markets. To enhance the social sustainability of organic agriculture, ecological certification costs should be kept to a minimum, and ideally supported by both consumers and producers. While organic agriculture has the potential to contribute to feeding a growing population, some significant barriers hinder expansion (Reganold, 2016). The development of the organic sector at country level is influenced by a wide range of factors, including not only the economic development level but also the educational level of population regarding the consumption of organic products. Consumers need to be educated in order to understand the benefits of organic food and the sustainability concept for living and maintaining a clean environment. The total organic area in the European Economic Area (EEA), excluding Malta for

Faculty of Economic Sciences and Business Administration, University Transilvania Brasov, Braşov, Romania

Corresponding author:
Liliana Duguleană, Faculty of Economic Sciences and Business Administration, University Transilvania Brasov, Str. Colina Universitatii, no. 1, A Building, 3rd floor, Braşov, Romania.
Email: ldugul@unitbv.ro

which data were missing in the period analyzed, and EFTA countries (Norway, Switzerland, Iceland, and Liechtenstein) has increased from 4,373,731 ha in 2000 to 10,446,850 ha in 2014. The increase in the organic area between 2013 and 2014 was 2.3% (Eurostat, 2016). Based on these considerations, this article aims to analyze the size and evolution of organic agricultural areas in European countries and identify the factors that have most influenced their differential expansion.

Methodology

The purpose of this research was to analyze changes between 2000 and 2014 and identify those factors that influenced the growth in organic agricultural areas in the EU member states. Using principal components analysis (PCA), the development potential of organic agricultural areas and main influencing factors were determined. PCA is a descriptive method that helps examine the relationships between interrelated variables in a data set, which belong to the basic structure of a domain. PCA reduces the number of variables by combining them and representing the structure of the domain in terms of usually at least two new dimensions, called main components. A main component is a linear combination of those variables that are most correlated with this new dimension, either in a negative or a positive way. The component then gathers those variables that are most correlated with it. The higher the correlation coefficient of a variable with the component, the more it is considered linked to that component. The two components are considered to be the new main factors. They are abstract variables that receive names according to the meaning of the variables' combination. The names of the new components are defined by the researcher who also interprets these new dimensions, based on the meaning of the related variables' content. The first component corresponds to the Ox axis and the second corresponds to the Oy axis in a figure termed "the circle of correlations." Even if this figure does not represent a circle, it could be imagined as one with the radius of 1, based on the interval of the correlation coefficient's limits. In this figure, the first component on the Ox axis has the directly correlated variables on the right side, to which there are opposed the inversely correlated variables on the left side. For the second component, the positively correlated variables are close to the Oy axis on the upper side of the figure and on the downside are the inversely correlated variables with the second component. Using the IBM SPSS Statistics 23 software, PCA was implemented with factors identified as having contributed to different size developments in EU organic agricultural areas in 2014. The following variables were considered:

- organic area (ha) in 2014 and proportion in national agriculture land (Eurostat, 2016);
- direct payments for rural development (Euro) in 2014 prices, from a breakdown of overall amounts of the Multiannual Financial Framework of CAP, for the period 2014–2020. The European financing programs for agriculture and rural development also contain direction measures for organic farming (Eurostat, 2016);
- national population (% of total population) on January 1, 2014 and number of immigrants and emigrants in 2013, to explain the influence of the migration phenomenon and contribution to agricultural development (Eurostat, 2016);
- unemployment rates in 2013 and 2014 (Eurostat, 2016);
- gross national income (GNI) per capita in 2014 (2011 Purchasing Power Parity (PPP) $) (Eurostat, 2016);
- Human Development Index (HDI) in 2013 and 2014, an aggregate coefficient representing a measure of wealth, health, and education level of population (Eurostat, 2016);
- Corruption Perceptions Index (CPI) in 2014, to characterize public administration. CPI is calculated on a scale 0–100; a higher value meaning a better perception of the population for low levels of public administration corruption (Countryeconomy.com, 2016);
- distribution of population by degree of urbanization (%) in 2013 and 2014 (Eurostat, 2016);
- material deprivation rate expressed as a percentage of total population in 2014 (Eurostat, 2016);
- activity rates of population from 15 to 64 years (%) in 2013 and 2014 (Eurostat, 2016); and
- Overall Life Satisfaction Index (OLSI) in 2013 and the evaluation of the meaning of life, rated from 1 to 10, based on Eurostat population surveys (Eurostat, 2016).

Some variables were considered for both 2013 and 2014 because of inertia acting in the socioeconomic development, caused not only by aspects related to the behavior of production and consumption, habits, education, and cultural aspects and expectations, but also by wealth and health levels previously attained. The econometric approach is an explanatory method, which is applied here for an analysis of the influence of different factors on the size variation in organic areas in the European Union countries. The explanatory variables in the econometric model were the variables initially considered in PCA. The econometric model for explaining the size variation contained exactly the same variables as the description of the organic development component of PCA. A modern approach is to build an econometric model based on the results of a PCA. In this article, the econometric approach was used to check the PCA results and validate the identified variables as being important factors for the different development of the organic sector in EU countries.

Results and discussion

Evolution of national organic areas in Europe between 2000 and 2014

Over the last decade, the number of organic producers as well as the area under organic production has grown

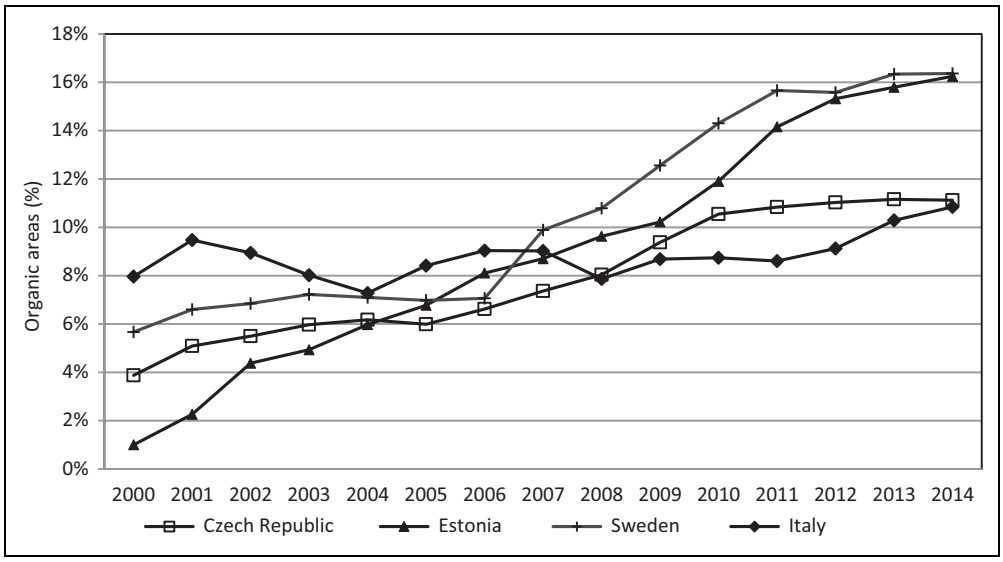

Figure 1. The highest organic area proportions (%) in selected EU countries between 2000 and 2014. EU: European Union.

steadily. Each year, 500,000 hectares of agricultural land have been converted to organic production in the European Union (Europa, 2016). Since 2000, the size of the European organic area and their proportions nationally experienced large change (FAO, 2016). Figure 1 shows countries with the greatest proportion of organic areas in their national agricultural lands in 2014. Estonia had the fastest growth in organic area proportion, from 1% in 2000 up to 16.2% in 2014. Sweden had the greatest weight of organic agricultural area in 2014; rising from 5.7% in 2000 up to 16.4% in 2014. Similarly, the Czech Republic grew from 3.9% in 2000 to 11.1% in 2014. From the developed countries, Italy had an oscillating evolution with cycles of 4 years, with an almost constant rate of between 8% in 2000 and 10.8% in 2014. The other European countries had lower percentages of organic areas in their agricultural lands, typically less than 10%, between 2000 and 2014, but with a gradual increasing tendency. The proportions of organic areas in selected countries from this group include Finland from 6.6% to 9.4%, Norway from 2% to 4.6%, Germany from 3.2% to 6.3%, Slovakia from 2.7% to 9.5%, Spain from 1.5% to 6.9%, France from 1.3% to 4.1%, and Slovenia from 1.1% to 8.9%. Liechtenstein increased its organic area from 19.5% to 30.9%, while the United Kingdom remained stable at 3%. For all countries, the extension of organic areas was not affected by the economic crisis between 2008 and 2009.

Development potential of organic agricultural areas in the European Union (2014)

The total organic area in the EU-28 (i.e. the area fully converted to organic production and under conversion) was 10.3 million ha in 2014. The national organic areas offer a basis for analyzing the development of organic production in Europe (Figure 2). The Oy axis shows the size of the organic area in all European countries in 2014, and on the Ox axis, the average dynamic rates recorded by each country of the change in the organic area between 2000 and 2014. The average level of organic areas of the EU countries in 2014 defines two frames: EU countries having organic areas greater than the European average are positioned above the horizontal line and countries with lower values are below. The average of the dynamic rates of organic area change between 2000 and 2014 on the Ox axis is a vertical line, on which defines two frames: EU countries having dynamic rates lower than the average situated on the left side of this line and countries with values higher than the average on the right-hand side. The intersection of the two average lines defines four frames in which the countries are located. The countries have relative positions; their distances to the intersection of averages show the starting level of the indicator in 2014, and on the Oy axis, and the development potential for the future, on Ox axis, assuming conditions will remain the same. Figure 2 shows the relative positions of each EU country in 2014, regarding the size of organic area compared to average level and the development potential compared to the average of the national dynamic rates between 2000 and 2014, with in four frames termed Leaders, Followers, Trailers, and Catching up (Gottinger and Goosen, 2011).

In the first frame *Leaders*, only Poland is placed above the average level of organic areas of all the countries in 2014, having a high level of annual dynamic growth (27.5%). The second frame *Followers* contains countries with high levels of organic areas, above the European average, but with dynamic rates that are less than the average rate of all European countries. These include Spain, Italy, Germany, and France, which have an area in excess of 1,000,000 ha, forming a subgroup. Another subgroup is identified around 500,000 ha consisting of the United Kingdom, Austria, Czech Republic, and Sweden. The first two frames, *Leaders* and *Followers*, comprise countries with organic areas greater than the European average. The third and fourth frames, *Trailers* and *Catching up,* include countries under the European average size for organic areas. The *Trailers* countries also have lower dynamic rates than the average rate; they can hardly extend their organic agricultural

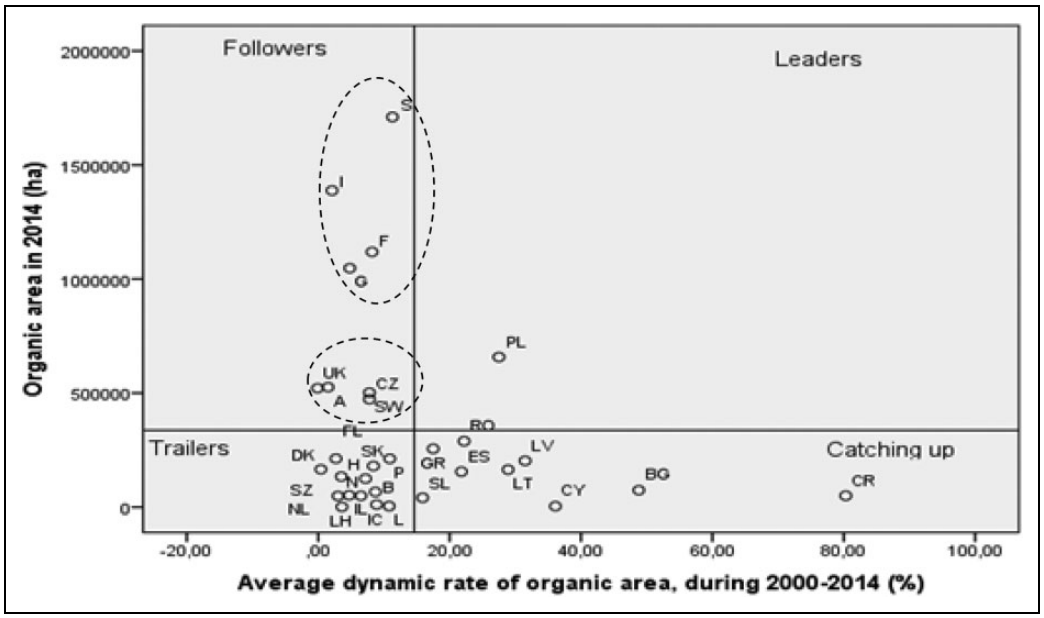

Figure 2. Analyzing the development potential of European organic areas in 2014.

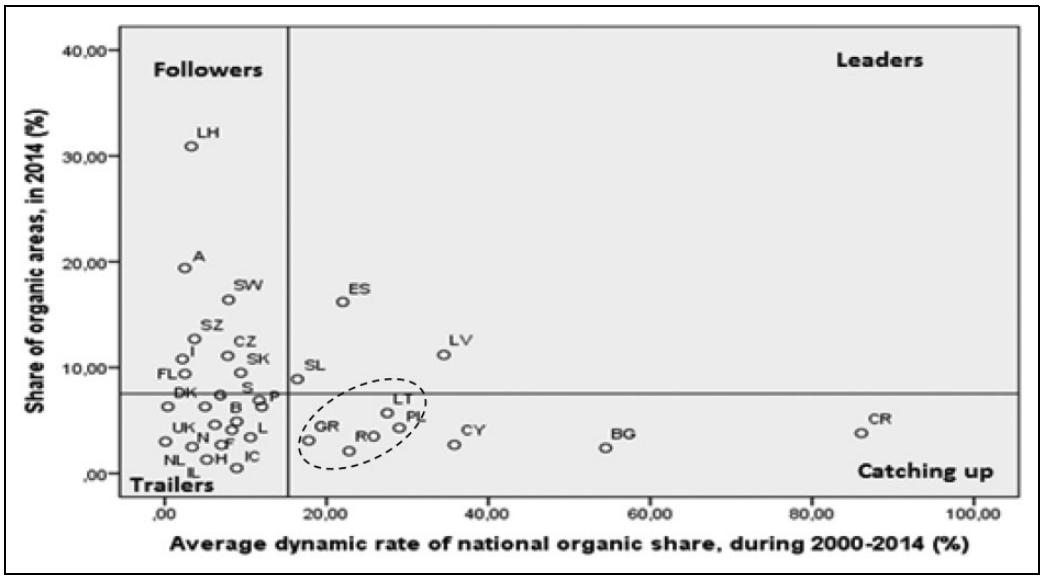

Figure 3. Development potential of organic proportion (%) in national agricultural lands in 2014.

areas. The countries in the fourth frame all have opportunities to catch up with countries in the first frame; they have high dynamic rates in the organic area. Croatia was an outlier in this frame, with the highest change rate. Bulgaria has had an annual increase of more than 40%, followed by Cyprus, Latvia, Lithuania, Romania, and Estonia, with dynamic rates between 20% and 40%. Greece and Slovenia are also part of this frame, with dynamic rates below 20%, but higher than 15%.

A similar analysis regarding the proportion of organic areas in the national agricultural lands and their annual change was completed (Figure 3). Such an analysis shows the countries' correlation with their geographical agricultural land potential and better emphasizes the organic area development. In Figure 3, at EEA level, the *Leaders* and *Followers* frames contain countries with high percentages of organic areas in their national agricultural lands, above the European average in 2014. Estonia and Latvia are the *Leaders*. In the *Followers*, Liechtenstein has the highest proportion of organic land, followed by Austria, Sweden, and other developed countries. In the *Catching up* frame, Croatia is an outlier, followed by Bulgaria and Cyprus. A group of four countries including Poland, Lithuania, Romania, and Greece, all placed under the European average, have high development potential with annual dynamic rates around 20%.

Identifying the main influence factors for the development of EU organic agricultural areas

Using PCA, the initial model with two components explains close to 58% of the entire variance of units, that

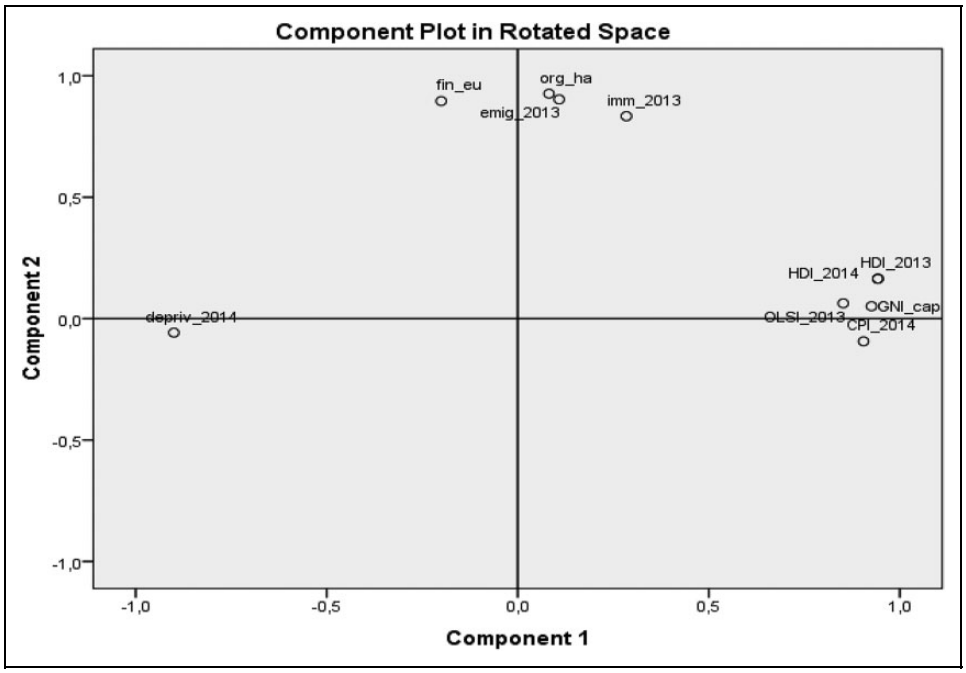

Figure 4. The circle of correlations with the components of the socioeconomic development and the development of organic farming (2014).

is, the EU-28 countries. The model performs better when it has a high determination coefficient, meaning a better explanation of the units' variation depending on the two new defined dimensions, termed the main components. For each component, the SPSS software provides the proportion of variation explained in the total variation of units. The sum of the explained variation by the two components represents the determination coefficient, which reflects model validity. We eliminate from the PCA model the variable having a low correlation with the component it describes. Keeping the strongly correlated variables with the components leads to a better model. In successive PCA iterations, certain variables were gradually eliminated, including activity rates in 2013 and 2014, the proportion of organic areas, the proportions of non-national population, and meaning of life; the resulting model then explained 83.7% of the variation across the EU countries. The circle of correlations (Figure 4) emphasizes two components, namely (i) socioeconomic development level which includes HDI in 2013 and 2014, OLSI in 2013, GNI per capita in 2014, CPI in 2014, all opposed to material deprivation rate in 2014; and (ii) the development of organic farming, with direct payments for rural development, immigrants' number, emigrants' number in 2013, and organic area size. The migration phenomenon was also identified as being important for the second component of EU organic farming. Considering the influence of migration on the development of organic agriculture, the number of emigrants in 2013 is more strongly correlated with the second component, as shown in Figure 4, reflecting emigrants from less developed countries who had gone to work in countries including Spain, Italy, Germany, Poland, and the United Kingdom.

An improved model was found by eliminating further variables including OLSI in 2013, immigrants, emigrants in 2013, and CPI in 2014; the revised model had a determination coefficient of 90.6%: the first component explaining 60.4% and the second of 30.2%. *The component of socioeconomic development* is defined by GNI per capita and HDI for the 2 years on the positive side and by the deprivation rate on the other side. *The component of organic development* consists of two variables: European financing and organic areas. Figure 5 shows the position of countries depending on these two described components. The group of well-developed countries with large projections on the positive side of the first component includes Denmark, the Netherlands, Luxembourg, and Sweden. These are at more than one standard deviation (SD) from the average level of the first component, but within an interval of 1 SD for the second component—organic agriculture development. Germany and France, with Spain and Italy, have a well-developed level of organic areas and are the largest beneficiaries of European funds in this sector. Poland is an outlier; it benefitted from a large amount of EU funding support and is at more than 1 SD from the average of the second component. Romania and Bulgaria are more than 2 SD from the first component; both countries could benefit from additional EU support for socioeconomic development, as both have high rates of material deprivation.

Eliminating the variable European financing from the PCA model resulted in an improved determination coefficient (91.7%). The best descriptive model was obtained with the second component consisting only of the size of the national organic area in the EU member states. The fact that the European financing programs did not significantly contribute to the extension of organic areas can be explained by the different ways of using funds for agricultural and rural development, and not only for land conversion into organic production. Figure 6 shows the relative positions of countries depending on the same two

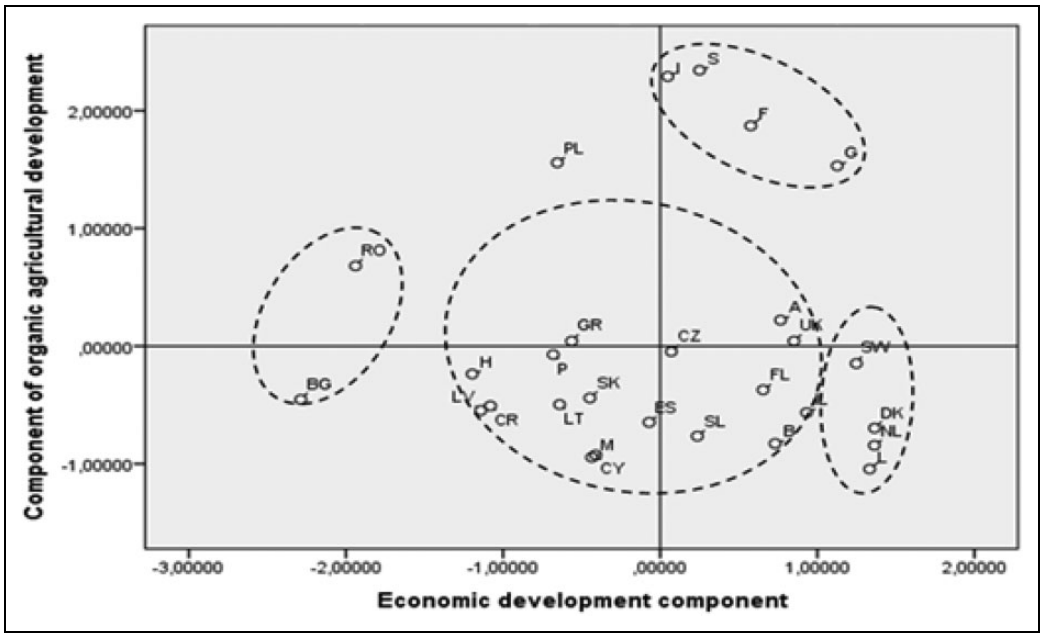

Figure 5. The EU countries' relative positions considering organic area and European funds, within the second component (2014). EU: European Union.

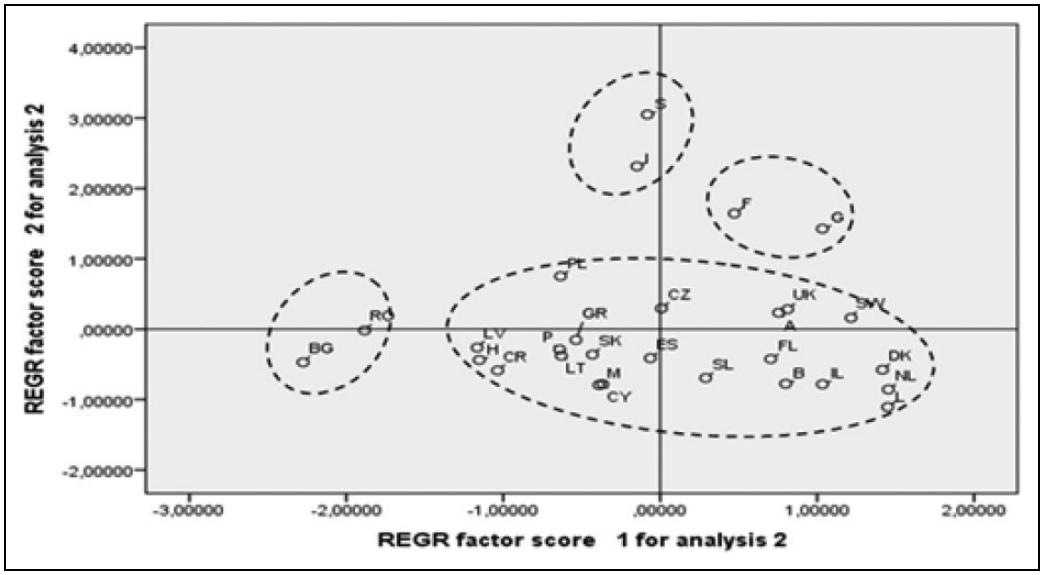

Figure 6. The EU countries' positions considering only organic area in the second component (2014). EU: European Union.

components. Organic agricultural areas are higher in Spain, Italy, France, and Germany. The PCA results for these countries can be explained through the positive influence of EU financing programs from previous years prior to 2014. The improved positions of Poland, Romania, and Bulgaria shown in Figure 5, compared to Figure 6, highlight the positive impact of EU funds on agriculture and rural development. All the PCAs showed very good models with determination coefficients around 90%.

Factors influencing the extension of national organic areas at EU level—an econometric approach

The descriptive results from PCA emphasized two components, namely socioeconomic development and organic agricultural development. The second component has been considered in PCA as different combinations of variables, including organic area size and European funds in 2014, then only organic areas, another with organic areas and emigrants in 2013, and other with organic areas, emigrants in 2013, and European funds in 2014. In the econometric approach, in order to explain the variation in organic area size in EU countries — the dependent variable (y), all the variables presented in the previous PCA were considered as explanatory variables. The econometric model of national organic area development in EU agriculture, based on the initial variables, resulted in the same results as the PCA. The highly correlated explanatory variables with the size of an organic area were exactly those variables that were also identified with the PCA: European financing ($r = 0.804$),

Table 1. Extract from the regression table, without intercept, depending on European financing and emigrants' number.

Included observations: 28
$y = C(1) \times x_1 + C(2) \times x_7$

	Coefficient	Standard error	*t* Statistic	Probability
C(1)	0.000436	0.000113	3.845127	0.0007
C(2)	1.583966	0.481114	3.292292	0.0029

emigrant number ($r = 0.795$), and immigrant number ($r = 0.699$). In building the econometric model, all the explanatory variables describing the first component of socioeconomic development in PCAs were eliminated. Some variables are correlated, as HDI in 2014 and 2013, HDI with GNI per capita, and HDI with OLSI, CPI, and the material deprivation rate. To avoid the multicollinearity phenomenon these variables were eliminated. The difference between the organic area sizes of EU countries depended only on the factors that have defined the second component of the PCA, that is, organic agriculture development. The significant factors were the European funds for Common Agriculture Policy (CAP) for each country in 2014 (x_1) and the number of emigrants in 2013 (x_7). Using the sample of 28 countries in the European Union, the regression equation had the free term (intercept) insignificant; an extract of the regression model is given in Table 1.

$$\hat{y}_i = 0.00044x_{1i} + 1.584x_{7i}, \quad i = 1 \text{ to } 28$$

The determination coefficient (0.8534) shows that the two factors explain 85% of the variation between EU countries regarding the size of the organic area. The regression equation shows that for an increase of 1000 Euro for their allocated European funds in 2014, the national organic area increased on average by 0.44 ha. For each emigrant who left their birth country to go to another EU country, the organic area of the country increased by 1.584 ha. Many EU countries face the challenge of migration which cannot be ignored, with emigrants tending to work in the agriculture sector. Another aspect of the migration phenomenon is that migrants leave and abandon their own farmland to find a better life elsewhere. Usually migrants are poor people from the countryside. In Figure 7, the countries are presented in the descending order of organic area size, together with their theoretical areas estimated using the econometric model. The highest ranked countries are Leaders and Followers (see Figure 2), including Spain, Italy, France, Germany, and Poland. Some countries, including Poland, United Kingdom, Romania, and others, have theoretical values that are higher than their reported areas, meaning they still have development potential to extend their organic areas. Some of these countries are those in the Catching up category (Figure 2).

Implications and methodological limitations

The national profiles of organic area provide a basis for discussion in analyzing the development of organic agricultural production in Europe and the main countries impacting on the organic product market (Figure 1). The country with the biggest organic development potential is Poland (Figure 2). This sector has evolved steadily since Poland's accession into the European Union in 2004. The increase is due in part to the composition of Polish agriculture, where small farms which are easily converted are often "organic by default," and chiefly driven by the objectives of EU Greening policy through subsidization for organic operations (Global Agricultural Information Network, 2013).

The limitations of this analysis include defining the meaning of "development potential" as being the average dynamic rate, calculated for a period during which the level indicator should have had a constant evolution, without great variability and also the assumption that past conditions will be similar in future. We found that the crisis in 2008–2009 had no influence on the organic farming sector, and that the growth in the area was almost constant across all EU countries. The advantage is in combining the static and dynamic aspects of a level indicator, in this case organic area size.

The organic area of each country depends on various social, cultural, geographical, educational, economic, and managerial nature factors. These all act in a specific way within each nation, thus influencing the expansion of organic agriculture. Within the PCA, the first principal component (socioeconomic development) comprises all these influences with a proportion of about 60%. The organic area development was the second main component of the PCA, with a proportion of about 30%. One limitation of the PCA approach is in the descriptive nature of the relative positions of the statistical units, which are valid only for the specific period studied. A qualitative analysis should recognize that the position of the countries depends on the socioeconomic variables, which have hardly changed over time; the conclusion being that these positions have some stability over time. The advantages of PCA are in reducing the number of variables usually for two components, identifying variables that describe a main component, and the proportions of the explained variation by components for the statistically analyzed units.

The spatial econometric model considered the 28 EU member states for 2014. The limitation of the model is the meaning of the coefficient estimates which measured the influence of the significant factors in 2014. In this case, the theoretical values (Figure 7) could also be understood as referring to the potential for future organic farming area development, especially for countries where these values are higher than the reported values for 2014. The model is valid only for the given data. The future analysis should

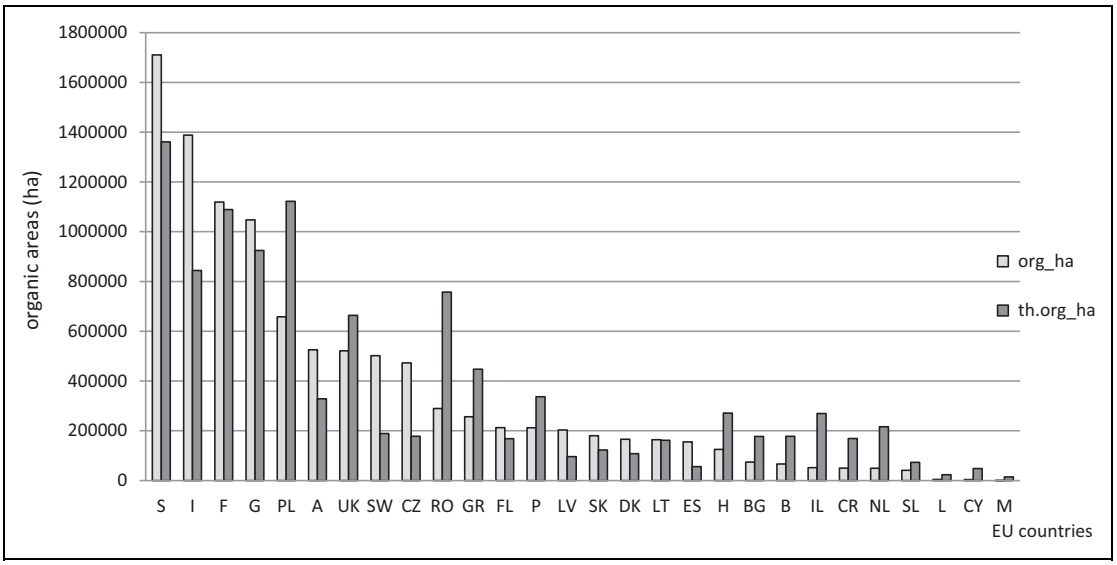

Figure 7. EU countries considering the organic area and their theoretical values (2014). EU: European Union.

consider future years in order to establish the sustainability of the influencing factors. The lack of data regarding organic agricultural production was a reason for considering the organic area. We consider that an area is a very important factor for organic production. The yields of organic farming are typically constant, due to the natural way of production. Future research could analyze aspects concerning organic consumption and international trade transactions in this sector.

Conclusions

The article studied various factors that could be used to differentiate EU countries concerning the extension of their organic production. The results are strongly linked to European financing and migration flows. By 2030, around 3–4% of farmland is expected to be abandoned in the European Union due to a number of institutional and physical factors (FIBL, 2016). The EU budget for organic research has increased from 767,000 Euro in 1993 to more than 6 million Euro in 2013 (IFOAM, 2014). From 2014 onward, the measures of the new CAP for EU member states promote the sustainability under the conditions of climate change for all rural areas and all farmers. Between 2014 and 2020, the European Union will invest over 100 billion Euro in rural areas to help farming meet the challenges of soil and water quality, biodiversity, and climate change (European Commission, 2014). At least 30% of the budget for rural development programs will have to be allocated to agro-environmental measures and to support organic farming or projects associated with environmentally friendly investment or innovation measures (European Commission, 2016). The benefits of this article can be considered from three perspectives: the business opportunities, the implications for European policies, and the scientific approach. The results of the dynamics and the identified influence factors could lead investors to choose countries having agricultural areas with high organic potential. The European decision makers could account for the financing plans of the countries with potential for organic area expansion and coordinate migration policies according to the development of EU organic agriculture. As a scientific approach, the article combines useful methods for describing the evolution of organic areas and for explaining the situation of EU countries in 2014 and their potential for development, based on the average dynamic rates between 2000 and 2014.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

Altieri MA (2002) Agroecology: the science of natural resource management for poor farmers in marginal environments. *Agriculture, Ecosystems & Environment* 93(1–3): 1–24.

Annunziata A and Vecchio R (2016) Organic farming and sustainability in food choices: an analysis of consumer preference in Southern Italy. *Agriculture and Agricultural Science Procedia* 8: 193–200.

Bengtsson J, Ahnström J, and Weibull A (2005) The effects of organic agriculture on biodiversity and abundance: a meta-analysis. *Journal of Applied Ecology* 42(2): 261–269.

Countryeconomy.com Corruption Perceptions Index. Available at: http://countryeconomy.com/government/corruption-perceptions-index (accessed 12 April 2016).

Eickhout B, Meijl H, Tabeau A, et al. (2007) Economic and ecological consequences of four European land use scenarios. *Land Use Policy* 24(3): 562–575.

European Commission (2014) Action plan for the future of organic production in the European Union. Available at: http://ec.

europa.eu/agriculture/organic/documents/eu-policy/european-action-plan/act_en.pdf (accessed 20 April 2016).

European Commission, DG Research and Innovation, Unit for the Analysis and Monitoring of National Research Policies (2016) *Science, research and innovation performance of the EU*. Available at: http://observatori.iec.cat/ORWeb/contents/context/documents/SRI_EU2016.pdf (accessed 12 May 2016).

Europa.eu (2016) EU funding under the new CAP. Available at: http://ec.europa.eu/agriculture/organic/eu-funding/eu-funding-and-the-new-cap/index_en.htm (accessed 17 May 2016).

Eurostat (2016) Migration and migrant population statistics. Available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration_and_migrant_population_statistics#Migration_flows (accessed 12 April 2016).

FIBL (2016) Transforming food & farming. An organic vision for Europe in 2030. Available at: http://www.ifoam-eu.org/sites/default/files/413-ifoam-vision-web.pdf (accessed 12 May 2016).

Food and Agriculture Organization (FAO) (2016) United Nations. Available at: http://www.fao.org/faostat/en/#data/EL (accessed 12 May 2016).

Global Agricultural Information Network (2013) Poland Report. Available at: http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Product%20Brief%20-%20Organic%20Products%20and%20Production_Warsaw_Poland_12-16-2013.pdf (accessed 17 May 2016).

Gottinger H and Goosen MFA (2011) 'Strategies of economic growth and catch-up: industrial policies and management', Nova Science Publishers. Available at: http://www.stratec-con.net/assets/strategies_of_economic_growth_-_index_updated_-_fp.pdf (accessed 16 November 2017).

Halberg N, Verscuur G, and Googlass G (2005) Farm level environmental indicators; are they useful? An overview of green accounting systems for European farms. *Agriculture, Ecosystems & Environment* 105(1–2): 195–212.

IFOAM (2014) Organic in Europe. Prospects and developments. Available at: https://shop.fibl.org/fileadmin/documents/shop/1634-organic-europe.pdf (accessed 15 May 2016).

Lotter DW, Seidel R, and Liebhardt W (2003) The performance of organic and conventional cropping systems in an extreme climate year. *American Journal of Alternative Agriculture* 18(3): 146–154.

Nink E (2015) Study reveals organic farming is financially sustainable around the world. Available at: http://foodtank.com/news/2015/06/study-reveals-organic-farming-is-financially-sustainable-around-the-world (accessed 17 April 2016).

Reganold JP (2016) Organic Agriculture Is Key to Helping Feed the World Sustainably. Available at: http://blog.ucsusa.org/science-blogger/organic-agriculture-is-key-to-helping-feed-the-world-sustainably (accessed 17 May 2016).

Reganold JP and Wachter JM (2016) Organic agriculture in the twenty-first century. *Nature Plants*, No. 2. Available at: http://www.nature.com/articles/nplants2015221 (accessed 17 May 2016).

Seufert V (2012) Organic agriculture as an opportunity for sustainable agricultural development. Available at: https://www.mcgill.ca/isid/files/isid/seufert.pb13.pdf (accessed 10 April 2016).

Trewavas A (2001) Urban myths of organic farming. *Nature* 410(6827): 409–410.

Wheeler SA (2008) What influences agricultural professionals' views towards organic agriculture? *Ecological Economics* 65(1): 145–154.

Social responsibility in the textile industry in Romania

DOI: 10.35530/IT.071.04.1676

NICOLETA ANDREEA NEACŞU
SIMONA BĂLĂŞESCU
MARIUS BĂLĂŞESCU
CARMEN ELENA ANTON

ABSTRACT – REZUMAT

Social responsibility in the textile industry in Romania

In a sustainable society, the integration into the activity of entities of the actions from the sphere of social responsibility becomes more and more evident.
The study analyzes the textile industry in Romania in terms of social responsibility, the involvement of companies in this industry in asserting the values of this level. Thus, a quantitative marketing research is carried out at the level of the population in Romania, a piece of research which is aimed at identifying the opinions and attitudes of the citizens regarding the social responsibility adopted by the Romanian companies, with emphasis on the companies in the textile industry. In this research, particular attention was given to the comprehension of the reality of the aspects in which consumers perceive the requirements of social responsibility and of the way in which they function in practice. The results of this research can be used by the companies in the textile industry as well as by all the companies interested in this aspect in order to improve the quality of the services and of their implications in the social life and in order to respond to the needs of the citizens as well as possible.

***Keywords**: social responsibility, social ethics, consumer behaviour, quantitative research, textile industry*

Responsabilitatea socială în industria textilă din România

Într-o societate sustenabilă, integrarea în activitatea entităţilor a acţiunilor din sfera responsabilităţii sociale se manifestă din ce în ce mai pregnant.
Studiul analizează industria textilă din România prin prisma responsabilității sociale, a implicării companiilor din această industrie în afirmarea valorilor pe acest palier. Astfel, se realizează o cercetare cantitativă de marketing la nivelul populației din România, cercetare care vizează cunoaşterea opiniilor și atitudinilor cetățenilor în legătură cu responsabilitatea socială adoptată de către companiile românești, cu accent pe companiile producătoare din industria textilă. În cadrul acestei cercetări o atenție deosebită s-a acordat cunoaşterii realității aspectelor în care consumatorii percep cerințele responsabilității sociale şi a modului în care acestea se manifestă în practică. Rezultatele acestei cercetări vor putea fi folosite de către companiile din industria textilă, dar și de către toate companiile interesate în acest sens, în vederea îmbunătățirii calității serviciilor oferite şi a implicării în viața socială şi pentru a răspunde cât mai bine nevoilor cetățenilor.

***Cuvinte-cheie:** responsabilitate socială, etică socială, comportamentul consumatorului, cercetare cantitativă, industria textilă*

INTRODUCTION

The domain of textile industry is very well developed in Romania. Romania's overall international trade in 2015 was over 117.56 billion euro, 5.9% more over 2014, according to the data provided by the Ministry of Economy. The export of textiles, leather and footwear exceeds 5 billion euro, which represents 11% of Romania's overall exports and it has over 250,000 employees. There are over 9700 companies operating in these sectors. In Romania this has been a traditional sector for more than 120 years, but it is also very innovative and creative. Highly qualified people work in the field of both design and technology. In the top 100 companies with 100% Romanian capital, there are 41 companies from the domain of textile industry [1].

The affirmation of social responsibility is outlined in the circumstances of the contemporary society as a requirement, as an ever growing necessity. In the day-to-day reality, the manifestation of the requirements of the components that form social responsibility has become an ethical and legal obligation for the commercial societies, imposed by the general interests of the community. When companies comply with and integrate these requirements into their business, they are perceived by the community as socially responsible companies.

Internationally, there are concerns to ensure a balance between moral and the personal interest of companies. The economic growth of a company does not involve only making profit, but also its reinvestment. CSR strategic approach represents a prerequisite for achieving business success [2].

Corporate social responsibility (CSR) is perceived as a new form of cooperation between governments, business and civil society, and the promotion of social objectives by companies has got economic implications (for business, by their increased power within

the community), political (for governments, by increasing the control on companies, although not always directly) and social (for the various stakeholder groups). The ethical behaviour of a commercial company has as coordinates the trust- and respect-based relationships with its trading partners.
The novelty of the information presented in this paper consists of the approach of social responsibility from the point of view of the consumer, his/ her perception of the social responsibility in the context of the sustainable development of the society.
The study carried out by CSRMedia and Valoria Business Solution explores the perceptions of CSR managers and specialists from various companies in Romania in terms of the evolution, dynamics and challenges of this field in 2017 and 2018. The results show that in Romania the companies' involvement in this field has increased from 27 % in 2017, to 35% in 2018 [3]. By comparing it to our research on the views of the Romanian citizens on CSR, it has been found out that this concept is less known among consumers. This aspect requires a more active involvement of companies in CSR actions and better information and promotion of the initiatives.

SOCIAL RESPONSIBILITY IN THE LITERATURE

Corporate Social Responsibility (CSR) stands for the duty of companies to create a positive impact on society by the measures they adopt. Internationally, there are several types of CSR. According to the World Business Council for Sustainable Development, social responsibility is "a continuous commitment in the field of business, towards some ethical behaviour and towards its contribution to the economic development, along with an increase in the quality of life of the staff and their families, as well as for the local community and society as a whole" [4]. The European Commission defines corporate social responsibility as "a concept by which companies integrate social and environmental concerns into their commercial activities and interactions with other stakeholders, on a voluntary basis" [5]. The European Forum on corporate social responsibility in Europe, set up at the initiative of the European Commission, defines CSR as a concept by which companies integrate, voluntarily, social and ecological aspects in their business operations and in their interactions with their stakeholders [6]. Kotler and Lee have identified several types of corporate social responsibility practices that have worked over time and that have produced remarkable results at the organization level [7]. CSR is complementary to specific approaches in order to deliver enhanced social and environmental performance and it should not be understood as a legal substitute or as a task for the companies with public responsibilities, which mainly remain in the hands of governments [8–10].
The basic premise behind the CSR is that the profits, the people and the environment can be harmonized in a strategic corporate approach, so that the company becomes economically sustainable, socially responsible and attentive to environmental issues. It is considered that the integration of the aspects related to social responsibility by businesses in the adopted decisions and strategies brings along more benefits: reducing the costs associated to energy consumption and resources by implementing some ecological actions, by increasing the loyalty of employees and organizational citizenship behaviour by initiating programs for human resources development, by improving relations with governmental institutions [11–12].
Significant differences in CSR approach appear in the literature, where the authors have slightly differently perceived the responsibilities of a company to the society as a whole. Thus, the main debate in this area refers to two distinct concepts: CSR perceived as a moral obligation or duty towards a wider or narrower range of interest groups and the CSR as a voluntarily assumed initiative by companies to achieve social, but also economic objectives.

RESEARCH METHODOLOGY

In order to identify the attitude of the Romanian consumers regarding the social responsibility in the textile industry, a quantitative marketing research based on a sample of 428 respondents residing in Romania was carried out.
The main objective of the paper was to know the opinions and attitudes of the Romanian citizens in relation to the social responsibility adopted by the companies operating in Romania, with emphasis on the companies operating in the textile industry. Bearing in mind the topic of the paper, the research was based on several hypotheses, including:

- H0: At least 50% of Romanians are to a little extend familiar with CSR;
  H1: Less than 50% of Romanians are to a little extend familiar with CSR.
- H0: At most 50% of Romanians are satisfied with CSR actions organized by companies;
  H1: More than 50% of Romanians are satisfied with CSR actions organized by companies.

In this paper, the sampling method being non-aleatory, volunteer sampling of the respondents was carried out on the basis of a survey. For the collection the data, the survey method was used in the electronic format. The questionnaire (containing 20 questions) was designed on the Google Forms platform and it was distributed to Facebook groups with over 1500 members. Similarly, it has been distributed by means of the Instant Messaging application, Whatsapp. Being distributed online, the questionnaire collected 428 respondents, the researcher having no control over who answers it.
After having collected the information with the help of the questionnaire, the statistical data processing was done with the SSSP (Social Sciences Statistics Package) system. The first step was to define the relevant variables of the research. Afterwards, the response options were encoded in order to facilitate data computerization. The encoding was done

according to each question and to the scale used for this question. The SSSP database was completed after all questionnaires were introduced and, in the end, the data were centralized as tables and graphs of frequency [13].

RESEARCH RESULTS

Although the practices of responsibility rendering in the Romanian corporate area have emerged as an import of values and principles taken from the European context, the indigenous companies have begun to assimilate and adapt them to the specificity of the organizational culture in Romania. Over the last three years we there has been a growing visibility of the CSR programs and there has been a large number of NGOs that promote on behalf of companies and with their financial aid various social causes [14]. In this context, it has become imperiously necessary to carry out research to provide an overview of the opinions of the Romanian citizens on the actions of companies in the sphere of social responsibility. The research has revealed a lot of information, the most relevant for the issues under consideration being presented below.

To the question referring to the understanding of the concept of "corporate social responsibility" (CSR), it is noticeable that 40.2% of the respondents know little about this concept, but a very close percentage of 30.7% know and understand to a great extent what CSR presupposes. Similarly, it is noted that 10.3% of the respondents know to some extent what CSR presupposes. The percentage of the people who do not know this concept at all is significant (19.6%) (table 1 and figure 1).

Table 1

BEING FAMILIAR TO CSR

Answers	Frequency	Percent	Valid percent	Cumulative percent
Not at all	84	19.6	19.6	19.6
To a lesser extent	172	40.2	40.2	59.8
To some extent	44	10.3	10.3	70.1
To a large extent	112	26.2	26.2	96.3
To a great extent	16	30.7	3.7	100.0
Total	428	100.0	100.0	-

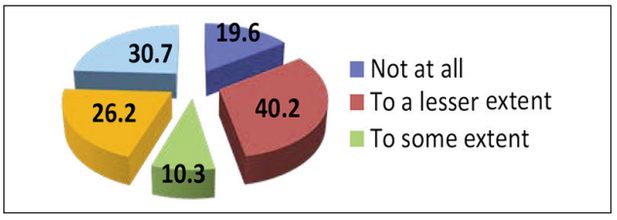

Fig. 1. Being familiar to CSR

Table 2

THE INVOLVEMENT OF ROMANIAN COMPANIES IN CSR

Answers	Frequency	Percent	Valid percent	Cumulative percent
Very poor	32	7.5	7.5	7.5
Poor	72	16.8	16.8	24.3
None	172	40.2	40.2	64.5
Strong	92	21.5	21.5	86.0
Very strong	60	14.0	14.0	100.0
Total	428	100.0	100.0	

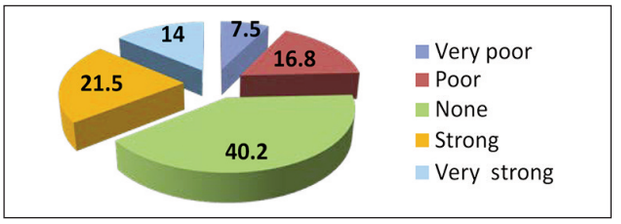

Fig. 2. The involvement of companies in CSR

The respondents' opinions on the involvement of Romanian companies in CSR actions are highlighted in table 2 and figure 2.

It can be noted that most of the respondents, 40.2% chose the option "None", which means that they have a neutral opinion regarding the involvement of Romanian companies in solving the problems the Romanian society faces. On the second place, by 21.5% are those who have a "strong" opinion, meaning they are interested in this topic. Summed up, the opinions of those who chose the "Strong" and "Very strong" variants make up 35.5%, surpassing the opinions of those who chose the "Poor" and "Very poor" versions of 24.3%. Therefore, this area is one that is not currently in the area of interest of the population.

To the question "What sources did you hear about corporate social responsibility from?", the respondents offered various answers that are highlighted in table 3 and figure 3. The majority of respondents, 41.1% found out about this concept from "the Internet", to be more precise, 176 out of 428 persons. It is important to highlight that 38 people have heard about this concept from the questionnaire they filled in. A percentage of 9.3% respondents heard about this concept from the faculty, and 7.5% of the respondents have never heard about the CSR concept, at all.

The statement "Romanian companies are actively involved in helping the citizens", the highest share is the category "Disagree" with 120 respondents, very close to the "Agree" category, which has got 188 answers. This balance may be the result of the lack of sufficient knowledge of the meaning of the concept CSR by the Romanian population.

Referring to the situation when "Romanian companies are interested in profit and not in citizen welfare", a significant number of respondents, namely 168

Table 3

SOURCES OF INFORMATION ON CSR				
Answers	**Frequency**	**Percent**	**Valid percent**	**Cumulative percent**
Television	84	19.6	19.6	19.6
Internet	176	41.1	41.1	60.7
Hoardings	24	5.6	5.6	66.4
Radio	20	4.7	4.7	71.0
Faculty	40	9.3	9.3	80.4
This questionnaire	36	8.4	8.4	88.8
Others	16	3.7	3.7	92.5
Never heard of	32	7.5	7.5	100.0
Total	428	100.0	100.0	-

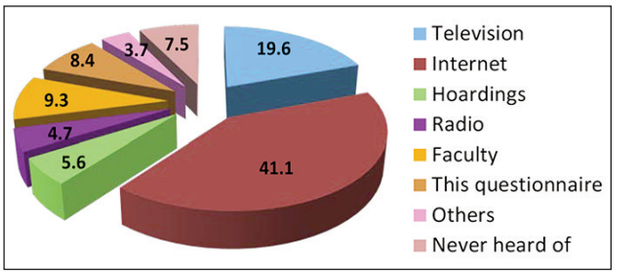

Fig. 3. Sources of information on CSR

to involve in actions of social responsibility and of support for these actions is easily noticeable (table 4). The following responses were given to the question on mentioning the name of a company in the textile industry involved in social responsibility activities, according to the following table (table 5). Thus, the

Table 4

THE DEGREE OF AGREEMENT OR DISAGREEMENT ON CSR ACTIONS					
The degree of agreement or disagreement with concern to the following statements	**Totally disagree**	**Disagree**	**Neither agree nor disagree**	**Agree**	**Totally agree**
Romanian companies are actively involved in helping citizens	44	120	44	188	32
Romanian companies are interested in profit and not in citizen welfare	12	72	48	168	128
I think there are more and more companies involved in social responsibility activities	20	144	32	192	40
Corporate social responsibility is a beneficial aspect for the society	4	12	44	132	236
I am willing to pay more for a product purchased from a company that is involved in social responsibility activities	20	96	40	140	132

respondents, stated that they agreed with this statement, only 12 people totally disagree with the given assertion.

For the opinion “I consider that there are more and more companies involved in social responsibility activities”, 192 persons “Agree”, in total contrast being the statement of total disagreement from 20 respondents.

The following statement “Corporate social responsibility is a positive thing for society” gathered the majority of respondents, 236 people for the “Totally agree” answer, which means that the population is aware of the increasing importance of CSR.

For the statement “I am willing to pay more for a product purchased from a company involved in social responsibility activities”, the opinions of the interviewees are divided between “Agree” answers from 140 respondents and “Totally agree” with a total of 132 respondents. Thus, people’s desire

Table 5

DISTRIBUTION OF COMPANIES IN THE TEXTILE INDUSTRY INVOLVED IN CSR ACTIVITIES IN THE OPINION OF THE CITIZENS				
Answers	**Frequency**	**Percent**	**Valid percent**	**Cumulative percent**
SC Rifil SA	64	15.0	15.0	15.0
SC Rosko Textil SRL	52	12.1	12.1	27.1
SC Moden SRL	40	9.3	9.3	36.4
SC Benrom SRL	20	4.7	4.7	41.1
SC Formens SRL	16	3.7	3.7	44.9
SC Biancospino SRL	4	0.9	0.9	45.8
SC Pandora Prod SRL	8	1.9	1.9	47.7
SC Paola Confectii SRL	12	2.8	2.8	50.5
SC ITS Production SRL	12	2.8	2.8	53.3
SC Coats Odorhei SRL	4	0.9	0.9	54.2
SC Coindu Romania SRL	84	1.,6	19.6	73.8
DC Cottontex SRL	4	0.9	0.9	74.8
Others	12	2.8	2.8	77.6
I don’t know	96	22.4	22.4	100.0
Total	418	100.0	100.0	-

most well-known company, from the point of view of the citizens, is SC Coindu Romania SRL with 19.6%, followed by SC Rifil SA with 15%, followed by SC Rosko Textil SRL with 12.1%. They are known by citizens as companies that get involved in CSR activities. It can be noticed that 22.4% of the respondents said that they do not know companies in this industry that are involved in CSR actions.

Similarly, for the statement "Do you think that CSR is well served in the textile industry in our country?", it is to be noticed that 42.1% of the respondents answered "Neither agree nor disagree", which may mean that they do not have all the information about these actions or that they are not convinced of the seriousness of these actions. At the same time, 24.3% of the respondents agree with the statement and 14% are in total agreement with this statement (table 6).

Table 6

AGREEMENT ON THE VALUATION OF CSR IN THE ROMANIAN TEXTILE INDUSTRY

Answers		Frequency	Percent	Valid percent	Cumulative percent
Valid	Totally disagree	4	0.9	0.9	0.9
	Disagree	80	18.7	18.7	19.6
	Neither agree nor disagree	180	42.1	42.1	61.7
	Agree	104	24.3	24.3	86.0
	Totally agree	60	14.0	14.0	100.0
	Total	428	100.0	100.0	-

When asked about the respondents' decision to buy products mainly from some companies in the textile industry that are environmental-friendly and to pay a higher price for them, the questioned respondents answered affirmatively in a very high percentage, more exactly 91.6%, while only 8.4% say they do not take this aspect into consideration when purchasing textiles (figure 4).

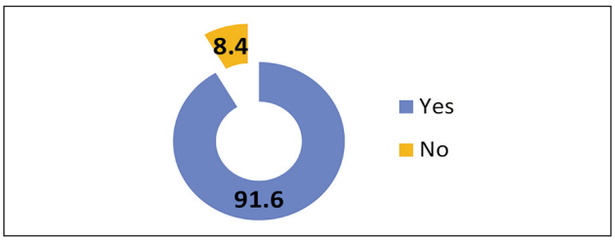

Fig. 4. Consumers' desire to pay a higher price for the environmentally friendly products

Two very important hypotheses have been confirmed, namely, that at most 50% of Romanians are satisfied with CSR actions organized by the companies in the textile industry in our country, and the hypothesis which claims that at most 50% of the Romanians are familiar to a little extent to the term CSR. That is why it is possible that this high degree of satisfaction of the population results from the thorough ignorance of the concept and its role in society. At the declarative level, the population agrees to be socially responsible, but to have a minimal to nonexistent involvement, so that the population places responsibility on companies [15].

CONCLUSIONS

Any economic entity, including those in the textile industry, prior to integrating into its activity social responsibility actions, gets down to a profitability analysis based on financial reporting. Their impact becomes evident in the level of registered expenditures, such as: social expenses, education expenses, expenses for the development of sports, cultural actions, etc. The fundamental orientation is coordinated by the tax mechanisms provided by the tax legislation [16–17]. Thus, the entities are interested in tax facilities they can benefit from in carrying out social responsibility activities, and tax deductions are the tax instrument most commonly used by the national regulator. Yet, the very complex and unstable tax legislation triggers a less-present behaviour of entities on this level. The combination of the patrimonial interests with the charitable actions aimed, in fact, at improving the public image of the entity and, implicitly, at reducing human resource costs [18]. The companies in the textile industry, by tackling with innovative solutions and interest paid to environmental actions, contribute to the sustainable development, a dimension of social responsibility.

If a company does not appeal to consumers, partners, community in the development process, then its profitability and competitiveness will suffer in the long run. CSR aims to ensuring a better connection between the society/community responsibility and the long-term financial objectives of the companies [19].

There are specialists who claim that CSR generates far too high costs in social investments without visible effects, but this concept has to be understood and promoted in terms of long-term benefits without minimizing its strategic role. Communication is an important element of CSR which guarantees transparency for the interested groups. The promoted social programs, however, should not be viewed solely from the perspective of PR and marketing benefits they bring. In setting up the CSR strategy, the companies should start from the community's real needs and afterwards it should define its measurable and honest objectives.

The results of the research are meant to outline the directions of action that companies should introduce

into their overall business strategy so that the end consumer perceives them as an ally in the sustainable social development. Consumer attitudes and opinions on CSR lead to the need for active visibility for consumer assimilation and understanding.

As a result of the study, it was found only in the reports of the large companies that CSR actions were carried out. In case the small and medium-sized companies have been involved in CSR activities, they are not visible and cannot be known to the general public.

The authors recommend to the managers of the companies a gradual manifestation of the actions regarding the essential values promoted for the improvement of the quality of life and for the optimization of the environmental performance. Similarly, large entities also must be consistent with the observance of the principles of integrated reporting, according to which the transmitted information can be perceived and respond to the needs of consumers.

The limits of the study consist in the inexistence of some reports containing CSR actions undertaken by small and medium-sized companies in Romania. Keeping in mind these limitations, we recommend including CSR actions carried out by small and medium-sized companies in administrators' annual reports.

A future research direction could consist in conducting qualitative research among the managers of companies in Romania in order to study the correlations between the consumers' and managers' opinions on the CSR concept.

The analysis emphasizes the necessity of integrating social responsibility components by the economic entities as an ethical and legal obligation imposed by the general interests of the community for some sustainable development. The attitude of complying with the CSR requirements convinces the community to perceive them as socially responsible societies.

REFERENCES

[1] The European Way, *Corporate social responsibility in the European Union and the fight against poverty: the example of the textile industry in Romania*, Available at: https://www.caleaeuropeana.ro/live-video-6-mai-ora-11-00-responsabilitatea-sociala-a-intreprinderilor-in-uniunea-europeana-si-combaterea-saraciei-exemplul-industriei-textile-din-romania-in-cadrul-eurosfat-2016/ [Accessed November 7th 2018]

[2] Mohamed, W.S., Arafa, I.M., *Investigating corporate social responsibility disclosure by banks from institutional theory perspective*, In: Journal of Administrative and Business Studies, 2016, 2, 6, 280–293

[3] CSR Media, *Studiu CSR: 35% dintre companii spun că Responsabilitatea Socială face parte din filosofia firmei,* Available at: https://www.csrmedia.ro/studiu-csr-35-dintre-companii-spun-ca-responsabilitatea-sociala-face-parte-din-filozofia-firmei/ [Accessed November 9th 2018]

[4] *Social Responsibility (Corporate) in Romania*, Available at: http://www.csrmedia.ro/wp-content/uploads/2013/01/Analiza-Situatiei-RSC-in-Romania-RO1.pdf [Accessed November 9th 2018]

[5] European Commission – Directorate General for Small and Medium Enterprises, *Internal Market, Industry, Entrepreneurship and SMEs*, Available at: https://ec.europa.eu/info/departments/internal-market-industry-entrepreneurship-and-smes_ro [Accessed November 7th 2018]

[6] CSR EMS Forum, *Final Report*, 2004, Available at: http://www.indianet.nl/EU-MSF_CSR.pdf [Accessed October 22th 2018]

[7] Kotler, P., Lee, N., *Coroprate Social Responsibility. Doing the Most Good for your Company and your Cause*, In: New Jersey Published by John Wiley & Sons, 2005, 198–234

[8] Iamandi, I.E., Jolde, C.S.R., *Corporate social responsibility during the economic crisis.The case of Romanian companies*, In: Annals of Faculty of Economics, 2010, 1, 2, 963–969

[9] Filip, R., Iamandi, I., *Etică și responsabilitate sociala corporativă în afacerile internaționale*, In: Bucharest, ASE Publishing, 2008, 134-136

[10] Dewi, N.I.K., Mataram, I.G.A.B., Siwantara, I.W., *Validating a framework of the integration of corporate social responsibility and culture: The case of hotel industry,* In: International Journal of Business and Economic Affairs, 2017, 2, 1, 31–44

[11] Olaru, M., Stoleriu, G., Sandru, I.M.D., *Social Responsibility Concerns of SMEs in Romania, from the Perspective of the Requirements of the EFQM European Excellence Model*, In: Amfiteatru Economic, 2011, 13, 29, 57–72

[12] Hassan, R., *Exploring the association of corporate social responsibility and employees' organisational citizenship behaviour: A study in Pakistan*, In: Journal of Administrative and Business Studies, 2018, 4, 1, 27–40

[13] Anton, C., *Consideration related to the attitudes, behaviours and opinions of the managers of the micro, small and mesium entreprises of Brasov, related to the tender of the financial-accounting services companies*, In: Proccedings of the International Conference on Business Excellence, 2010, 14–18

[14] Obrad, C., Petcu, D., Gherghes, V., Suciu, S., *Corporate Social Responsibility in Romanian Companies – between Perceptions and Reality*, In: Amfiteatru Economic, 2011, 13, 29, 54

[15] Madar, A., Neacşu, N.A., *Protection of tabacco consumers and no consumers*, In: Proccedings of the International Conference on Business Excellence, 2009, 259–262

[16] Culiuc, E., *Mecanisme fiscale de stimulare a filantropiei*, In: Chișinău, 2011, Available at: https://www.expert-grup.org/ro/biblioteca/item/332-mecanisme-fiscale-de-stimulare-a-filantropiei [Accessed October 27th 2018]

[17] Bălăşescu, M., Bălăşescu, S., *The assertion of consumption goods distribution marketing in retail companies*, In: Proccedings of the International Conference on Business Excellence, 2010, 46–48

[18] Pahayahay, A.B., Asejo, N.R., Pangan, S.M., Dasig Jr., D.D., Panganiban Jr., A.S., *A concurrent exploratory study on sectoral engagement model of an altruistic corporate social responsibility in bureau of jail management and penology*, In: International Journal of Business and Economic Affairs, 2017, 2, 2, 98–105
[19] Alshannag, F., Basah, M.Y.A., Khairi, K.F., *The relationship between corporate social responsibility and corporate financial performance A survey of literature*, In: *International Journal of Business and Administrative Studies,* 2017, 3, 1, 9–15

Authors:

NICOLETA ANDREEA NEACȘU, SIMONA BĂLĂȘESCU, MARIUS BĂLĂȘESC, CARMEN ELENA ANTON

Transilvania University of Brașov, Faculty of Economics Sciences and Business Administration,
Colina Universității no.1, 500084, Brașov, Romania
e-mail: f-seaa@unitbv.ro

Corresponding author:

NICOLETA ANDREEA NEACȘU
e-mail: deea_neacsu@yahoo.com

sustainability

MDPI

Article

Research of the Smart City Concept in Romanian Cities

Simona Bălășescu [1], Nicoleta Andreea Neacșu [1], Anca Madar [1], Alexandra Zamfirache [2,*] and Marius Bălășescu [1]

[1] Department of Marketing, Tourism Services and International Business, Transilvania University of Brasov, 500084 Brasov, Romania
[2] Department of Management and Economic Informatics, Transilvania University of Brasov, 500084 Brasov, Romania
* Correspondence: alexandra.zamfirache@unitbv.ro

Abstract: The Smart City concept has emerged in the last decade as a fusion of ideas about how information and communication technologies could improve the functioning of cities. A new concept, that of a sustainable Smart City, is already under discussion. This article aims at analyzing the Smart City concept in Romania. The resulting advantages, but also the difficulties and obstacles that need to be confronted, are considered when becoming a Smart City. When a city wants to become smart, it must consider both the advantages and the difficulties it will face in this endeavor. This paper has been able to take into account and group the four key features of a sustainable Smart City. The authors conducted research in two parts. The first consisted of conducting a comparative analysis of the most important results of Smart City projects implemented in the four reference cities in Romania compared to London. The second, a quantitative analysis, aimed to analyze the opinions and attitudes of Romanians regarding the Smart City concept in relation to sustainability. An important finding of the study shows that over half of the respondents are familiar with the Smart City concept and 41.9% consider health as a priority for investment in technology. The authors of the article propose clearer highlighting and division of cities from the point of view of creating a Smart City.

Keywords: Smart City; sustainable development; smart transportation; smart governance; smart waste management; quantitative research; consumer attitudes

Citation: Bălășescu, S.; Neacșu, N.A.; Madar, A.; Zamfirache, A.; Bălășescu, M. Research of the Smart City Concept in Romanian Cities. *Sustainability* **2022**, *14*, 10004. https://doi.org/10.3390/su141610004

Academic Editors: Aleksandra Kowalska, Arkadiusz Kijek, Anna Matras-Bolibok and Tomasz Kijek

Received: 15 July 2022
Accepted: 8 August 2022
Published: 12 August 2022

1. Introduction

In the 2018 UN Report on the prospects of urbanization of the world [1] it is estimated that 68% of the world's population will live in urban areas by 2050 and that, in many areas, the share of the population living in the city and the number and size of cities will increase [2]. The rapid pace of urbanization and the unplanned expansion of cities bring about important changes to economies at all levels. If the consumption of water, fuels and electricity are taken into discussion, growing pollution with a strong impact on the lives of citizens and the environment can already be imagined. Although only 2% of the planet's surface is covered by cities, they consume 80% of the total energy produced worldwide and produce 75% of the total carbon dioxide emissions [3].

The high and rapid level of urbanization requires new and innovative ways of managing the complexity of urban living (problems caused by overcrowding, energy consumption, resource management and environmental protection) [4]. According to the United Nations (2018) [5], urbanization is closely connected to the three dimensions of sustainable development: economic, societal and environmental. Well-managed urbanization can help maximize the benefits of congestion while reducing environmental degradation and other potentially negative effects of an increasing number of urban dwellers.

Cities are very dynamic entities that rely on the continuous flow of people, ideas, resources and, in general, the connections they have with other entities in the areas they coordinate. In order to prosper, cities must respond to the economic and social needs of

their inhabitants. They need to effectively manage their impact on the environment in order to ensure sustainable and durable growth to the benefit of all.

There are a number of reasons that force cities to take action in order to become "smart": demographic and environmental factors, vulnerability to natural disasters, inability of infrastructure to cope with rapid social and economic changes, as well as economic and financial pressures (the need "to do more with less") as a result of increased competition between cities.

The implementation of projects related to the transformation of cities into Smart Cities is seen as a tool for the development of a sustainable society. They must integrate all sustainability perspectives, including social, environmental and institutional aspects, and cultural pillars [6].

This article aims to: (1) analyze the implementation stage of a Smart City in Romania, (2) identify the advantages of such a city and (3) identify the risks and obstacles that confront the city when becoming a Smart City. In this context, the analysis considers the sustainable development and functioning of a Smart City. The Organisation for Economic Cooperation and Development (OECD) defines sustainability as "the extent to which the net benefits of the intervention continue, or are likely to continue" [7]. Sustainable development is a model of economic growth in which the use of resources aims to meet human needs, while preserving the environment, so that these needs can be met not only now but for future generations [8]. In order to achieve sustainable global development, in 2015 the leaders and Governments of the United Nations member states agreed on Agenda 2030, which includes 17 Sustainable Development Goals (SDGs) together with 169 associated targets, with the aim of being fully implemented by 2030 [9].

The reference sources were accessed from the following databases: ScienceDirect, Springerlink Journals, Proquest Central and Clarivate Analytics Web of Science, which were accessed through Transilvania University in Brașov. The information about the smart projects of the cities analyzed in the paper was obtained by accessing the websites of their town halls. The search keywords were: smart city, sustainability, renewable energy, waste management, smart governance and smart transportation. Through this search, the authors found a total of 426 works from which they selected those presented in the References section according to the relevance and novelty of the information contained and the year of publication.

To achieve the purpose of the paper, the authors conducted research in two parts. The first consisted of conducting a comparative analysis of the most important results of Smart City projects implemented in the four reference cities in Romania compared to London (this being representative of a Smart City). The authors have analyzed the Smart City projects implemented in four emblematic cities in Romania: Brașov, Bucharest, Cluj and Sibiu, which are in the top 10 in terms of the number of Smart Projects implemented. In addition to this research, the authors made another, quantitative in nature, to identify the opinions, attitudes and perceptions of citizens (from the four cities analyzed above) regarding the Smart City concept. In the specialized literature, different authors have identified several key features of smart cities. After analyzing the literature, the authors took into account four key features of a sustainable Smart City: smart transportation, smart governance, renewable energy and smart waste management. One of these features is smart waste management. From that, at the end of the quantitative research, the authors used the chi-square test to check whether there was a link between the gender of respondents and their habit of selecting household waste. The authors chose to test this feature because, in this type of project, citizens are directly involved and the connection between the variables could be highlighted more.

The value of this paper lies in the analysis of the concept from both parties: what the authorities did to become a Smart City and the point of view of consumers. Additionally, the contribution brought by this paper, shows where Romania is, at present, from this point of view. The paper shows that the barriers to Smart City development primarily consist of a lack of information and lacking education of the population. Thus, we propose the

public authorities carry out, as soon as possible, programs of information, education and awareness for the Romanian population regarding the broad Smart City concept.

This work is structured in five sections: Introduction, Literature Review, Research Methodology, Results and Discussion and Conclusions.

The Introduction presents the background of the theme (the trend of population evolution and its migration to the urban environment and the negative implications of the agglomeration of cities and the need for a smart planning of their activity). In this section, the purpose of the work, and the methodology used to achieve it, are also presented.

In the Literature Review section, the authors synthesized the information presented in the studied articles and grouped them according to the four key characteristics.

The Research Methodology section presents the two types of research that were carried out in the work (a comparative analysis and a quantitative one) and establishes the main objectives of the research based on the four key features of a Smart City.

In the Results and Discussions section, the results of the two types of research are presented. These were analyzed in comparison to the results of other studies, which can be found in the articles presented in the References section.

The Conclusions section summarizes the most important ideas and results of the paper and includes the authors' proposal to calculate an economic and sustainability index to measure how smart a city is.

The results of the research can be used to define public policies by regional and local authorities, as well as to define the adoption of a system of indicators (as proposed in this work) that measures how intelligent a city is.

2. Literature Review

2.1. Developing the Concept of Sustainability in Smart Cities

The guiding principle of sustainable development is meeting human needs while protecting the current and future availability of resources [10]. Mensah defines sustainability as an entity's ability to maintain itself over time. Other approaches in the scientific literature have defined the concept as a dynamic of equilibrium between the satisfaction of human needs and environmental protection; this is in line with the contributions of the Brundtland Report [11].

Across the globe, every city dreams of becoming a Smart City. Integration of information and communication technologies to optimize the lifestyle of people is the process involved in developing a Smart City. Each government thinks about and takes various measures to fulfill the necessities of becoming a Smart City [12].

The world's urban population is expected to exceed six billion by 2045. Much of the projected urban growth will take place in countries in developing regions, especially in Africa. Consequently, these countries will face many challenges in meeting the needs of their growing urban population, including housing, infrastructure, transport, energy and employment, as well as basic services such as education and health care [1].

Franchina et al., (2021) [13] point out that there is still a weak connection between smart and sustainable urban practices, despite the potential of ICT to improve green living. They define a sustainable city that can be described as an urban agglomeration whose main objective is to contribute to improvements in quality and environmental protection, to social equity and well-being and to economic performance in the long term. The same idea is found in Ahvenniemi et al., (2017) [14], which mentions that many of the smart solutions for Smart Cities are not aligned with sustainability objectives, thus generating the concept of sustainable Smart Cities. As stated by Prince Antwi-Afari et al., (2021) [15], creating smart and sustainable cities from the beginning can help solve urbanization problems and can lead to sustainable development.

A Smart City must pay attention to the needs of its people, rational resource management, sustainable development and economic sustainability [16]. A city with more efficient services and more sustainable and environmentally smarter energy use is required [17]. The same authors have developed a method, called Smartainability, to help decision makers

understand and quantify the potential benefits of implementing innovative technologies that enable smart services for cities. Additionally, conducting a ranking of cities is an important tool that can help cities understand their performance in different dimensions of urban sustainability, compared to other cities in the same region, and identify areas for improvement [18].

2.2. Analysis of the Smart City Concept

The Smart City concept emerged during the last decade as a fusion of ideas about how information and communications technologies might improve the functioning of cities, enhancing their efficiency, improving their competitiveness and providing new ways in which problems of poverty, social deprivation and poor environment might be addressed [19].

A Smart City will have to be one that provides efficient services, has good mobility, ensures safety and security, has a good image, is sustainable and bases these factors on economic development [20]. Smart cities bring together technology, government and society to enable a smart economy and smart mobility, environment, people, living and governance [21].

The Smart City type of urban market was valued at USD 739.78 billion in 2020 and is estimated to reach USD 2036.10 billion in 2026, with an annual growth rate of 18.22% between 2021 and 2026 [22]. This market is influenced by the increasing share of urban populations in the total population of the world. Although there has been more and more talk in recent years about the development of Smart Cities, it is difficult to find a unanimously accepted definition. Caragliu et al., (2009) [23] argue that "a city is smart when the investments in the human and social capital, in the traditional transport and modern communications (ICT) infrastructure contribute to the sustainable economic development and to a superior quality of life, with a wise management of natural resources, by participatory governance" [24]. Another definition [25] states that a Smart City is a place where the traditional services and networks are made more efficient by using telecommunications and digital technologies to the benefit of its citizens and economy.

Grossi and Trunova [26] emphasize that a Smart City must be technological, interconnected, sustainable, comfortable and safe.

The British Standards Institute (BSI) defines a "Smart City" as an "efficient integration of physical, digital and human systems in order to build the necessary background for the sustainable, prosperous and inclusive development of the future of its citizens" [3].

The smart development of a city aims to increase the quality of life of the citizens living in that city by reducing poverty, unemployment and, similarly, by efficient management of energy resources. The "Smart City" concept emerged at the end of the last century as a necessity for effective management of the rapid development of cities which highlighted the importance of ICT (Information and Communication Technology) in their development. By this concept, a connection between citizens and public management is made, as they are no longer perceived as simple users or public services consumers, but as partners in the development of the city. A Smart City assumes the existence of an integrated informatics system that includes a multitude of cloud computing subsystems, Internet of Things (IoT) devices, Open Data, Big Data and mobile applications connected to the Internet through secure networks. These allow the local administration to interact directly with citizens and the infrastructure of the city [27].

This paper, based on study of the literature, identified several elements of a Smart City.

The authors consulted 426 specialized articles from different databases (ScienceDirect, Springerlink Journals, Proquest Central, Clarivate Analytics Web of Science), from which 96 were selected according to the relevance and novelty of the information contained and the year of publication.

From the specialized analysis, several key features of a Smart City emerged, of which four stood out. They are shown in Figure 1. Based on these four key characteristics, the authors built objectives for the quantitative research.

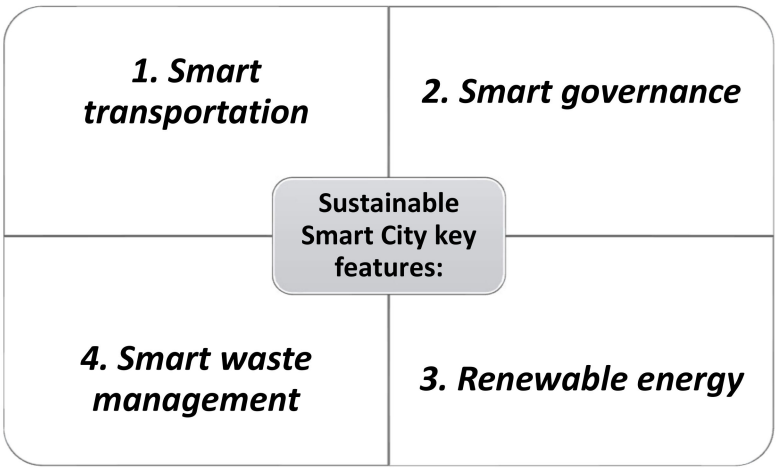

Figure 1. The key features of a sustainable Smart City.

2.2.1. Smart Transportation

The rapid increase in the amount of traffic in cities has led to both an increase in traffic jams and accidents and to increases in pollution and time spent in traffic. Hence the need for "intelligent mobility" in cities, through the use of public transport, in combination with the personal car or instead of it [28]. In a Smart City, the goal is the mobility of citizens—the ability to connect them in an efficient and elegant way with their points of interest—and not just their transportation from one point to another on the city map [3,29].

According to Matei et al., (2018) [30], for a city to become smart, a first step is to have smooth and decent traffic and, for that, the authorities must get involved. A European Commission study by DG Communications Networks, Content and Technology [31] states that a sustainable urban mobility plan is needed to implement the latest ITS/ICT solutions. The same study stated the three pillars of sustainable mobility: more fluid, safer and more accessible. Sustainable forms of transport are a key issue for cities across the globe, including smart cities [32,33].

Kanthavel et al., (2021) [34] define the intelligent transport system as a set of information and communications technologies used in transport systems to improve the safety, efficiency and stability of the transport network, as well as to reduce traffic congestion and improve the experience of drivers.

Intelligent transport, as claimed by Benevolo et al., (2016) [35], must take into account the following elements: public transport management to optimize public transport line networks, passenger information so that they can decide on the appropriate mode of transport, safety in vehicles with camera systems for greater protection for passengers, electronic payment systems to allow passengers to purchase tickets via the Internet, and comfort [36].

Cepeliauskaite et al., (2021) [37] states that, in the transport sector, actions are aimed at demotorizing and decarbonizing transport, including the expansion of electric vehicles.

The literature describes several solutions by which a city can transform its transportation system into a smart one. These include: the expansion of electric vehicles; greater use of energy-efficient appliances and autonomous and shared/public mobility systems [37]; dynamic trip-planning and ticketing services, on-demand minibuses and first- and last-mile ridesharing [38]; and walking and cycling [36], among others.

2.2.2. Smart Governance

The Smart Economy aims to digitize the economy, from payments, payments by phone and electronic wallets to the use of NFC or QR technologies. The goal of a Smart Economy is to finally digitize the entire experience of the consumer, and possibly to employ the exclusive use of electronic currency (cryptocurrency) [39]. Better use of the citizens'

expertise will also require better trained managers and leaders. This new category of professionals will need to know how to work, speak and decide with the citizens [40].

Smart governance, or e-governance, aims to inform and involve citizens in the life of the city, to reduce bureaucracy and to increase the transparency of governance. Gil-Garcia et al., (2016) [41] state that citizen-centered means the administration of a Smart City is oriented towards public value. Exercising power in a Smart City implies the need to give "visibility" to specific government issues [42]. Bolivar-Meijer [43] highlights six attributes of a smart governance system, which must be based on ICT, external collaboration and participation, internal coordination, the decision-making process, e-government and results. Accessing information about public institutions via the Internet, filling in online forms, e-commerce [44,45], paying taxes online [46], submitting documents to the National Agency for Fiscal Administration (NAFA) via the Internet and using e-mail or electronically signed documents in relation to public institutions become increasingly normal ways of interacting with public administration [47,48]. In order to effectively coordinate the many departments and to have access to real-time data, public administrations need intelligent systems and tools. Smart solutions, such as web portals, online forums, mobile applications and their integrated services, ensure two-way communication between authorities and citizens and help the latter voice their questions, suggestions and dissatisfactions. A United Nations [49] document states that the design of electronic platforms through electronic participation must take into account three levels, namely electronic decision making, electronic consultation and electronic information. According to Lim-Yigitcanlar [50], e-participation, which is part of e-governance, includes three main elements: e-information, e-consultation and e-decision-making. In Italy, thanks to the implementation of the Digital Citizenship Card, the Publi Digital Identity System, the Electronic Identity Card, the National Service Card and the National Register of Resident Population, citizens and businesses can access public services online using a single pair of credentials [48].

2.2.3. Renewable Energy

Smart solutions for the environment are the optimization of energy, water and electricity consumption, air quality monitoring and waste management. It has become imperative to make cities smarter in order to handle large-scale urbanization and to find new ways to manage energy and improve living standards without harming the environment in cities [51]. Lewandowska et al., (2020) [52] state that energy infrastructure stands out as one of the key elements of a Smart City, especially since its state and structure determine whether the principles of sustainable development will be implemented.

According to Gesteira-Uche (2022) [53], in 2016 the European Commission developed guidelines for the promotion of near-zero energy buildings, as the construction sector is responsible for almost 40% of global energy consumption and over 30% of greenhouse gas emissions [54]. Haas et al., (2021) [55] say that it is important to study and improve energy efficiency in order to promote global and coordinated development of the economy, society and the environment. He also points out that there are three major areas in the energy system to invest in: renewable energy (RE) technologies, electricity grid infrastructure and reducing energy demand while increasing energy efficiency in buildings. Liu et al., (2022) [56] say that energy efficiency not only emphasizes the relationship between a country's economic growth and energy consumption, but can effectively reflect a country's level of green development.

Building automation systems can reduce GHG (greenhouse gas) emissions, better air quality can be achieved as a secondary benefit of many energy saving and mobility applications, and the detection and control of water losses can support the conservation of water resources [57]. Small and micro renewable energy installations are used in multi and single family residential buildings that contain various devices, and also this type of facilities can power street lamps, road signs, vehicles and parking meters [52]. Additionally, lighting systems represented by smart light-emitting diodes (LEDs) [58], smart urban

mobility, smart grids and smart metering [59] are all viable solutions for securing the energy of a Smart City.

Other alternative sources for renewable energy that can be used in a Smart City in order to reduce pollution are: solar energy, wind energy, hydropower and oceanic energy, biomass energy and geothermal energy [60]. However, as Kanase-Patil et al., (2020) [51] and Alizadeh et al., (2016) [61] explain, due to their intermediate nature their use is still restricted. The integration of renewable energy sources in the electricity system of cities would determine the solution to problems such as pollution, climate change and dependence on fossil fuels [62].

2.2.4. Smart Waste Management

As DelufaTuzJerin et al., (2022) [63] point out, in fast-growing cities in developing countries, managing waste in an environmentally acceptable way is a major challenge. Various waste management issues have become more difficult to solve in recent decades. Waste management includes collection, transport, processing and disposal [64]. Related to this area, there are problems with collection services, landfill location and reverse logistics applications [65]. The European Union has introduced the three Rs waste management program—reduce waste, reuse, recycle—so that there is no more waste buried [66]. In order to meet the challenges of the environmental impact of waste, it is necessary to move from a linear economy to a circular economy [67]. The selection of waste for domestic and industrial consumers, the construction of ecological landfills for waste and the capture and reuse of thermal energy resulting from their decomposition are some modern methods of management [68,69]. Other measures implemented in smart waste management are: development of a smart waste management system which helps local authorities to monitor the waste collection contractor by bringing information about garbage container status and automatically reporting when it is full [70,71]; a landfill monitoring process using wireless sensor networks (WSN) [72] which use NodeMCU (web-based IoT solution) and an ultrasonic sensor to create a wireless prototype device for real-time monitoring of trash levels [73]; and designing optimal waste transport routes to reduce the negative impact of these activities on the environment [74].

Table 1 summarizes key features of a Smart City that were identified by the authors based on analysis of the literature.

Table 1. Key features of a Smart City.

Topic	Selected Sources
Smart transportation	Xin Li et al., (2017);
	Vrabie-Dumitrașcu (2019); Han Zhang et al., (2022); Matei et al., (2018); DG Communications Networks, Content and Technology (2012); Behrendt (2019); Garau et al., (2016); Kanthavel et al., (2021); Benevolo et al., (2016); Ribeiro et al., (2021); Cepeliauskaite et al., (2021); Canales et al., (2017).

Table 1. *Cont.*

Topic	Selected Sources
Smart governance	Romanian Association for Smart City (2021a);
	Noveck (2015); Gil-Garcia et al., (2016); Argento et al., (2019); Bolivar-Meijer (2016); Alghazzawi-Badri (2022); Ribeiro-Duthie et al., (2021); Tyutyuryukov-Guseva (2021); Ministry of Communications and Information Society (2016); Battilani et al., (2022); United Nations (2020); Lim- Yigitcanlar (2022).
Renewable energy	Kanase-Patil et al., (2020);
	Lewandowska et al., (2020); Gesteira și Uche (2022); European Commission (2016); Haas et al., (2021); Liu et al., (2022); Romanian Association for Smart City (2021b); Strielkowski et al., (2020); Komninos (2022); Bibri (2020); Alizadeh et al., (2016); Al-Nory (2019).
Smart waste management	Delufa Tuz Jerin et al., (2022);
	Batur et al., (2020); Medeiros Assef et al., (2022); Popov-Kuzmina (2021); Viswanathan-Telukdarie (2022); Xu-Yang (2022); Peura et al., (2022); Omar et al., (2016); Misra et al., (2018); Longhi et al., (2012); Muniandy et al., (2018); Hariyani1-Meidiana (2018).

3. Research Methodology

To achieve the purpose of the paper, the authors conducted two types of research. The first consisted of conducting a comparative analysis of the most important results of Smart City projects implemented in the four reference cities in Romania compared to London (this being representative of a Smart City). The authors have analyzed the Smart City projects implemented in four emblematic cities in Romania. In addition to this research, the authors conducted another analysis, quantitative in nature, to identify the opinions, attitudes and perceptions of citizens (from the four cities analyzed above) regarding the Smart City concept.

The quantitative research is an applied descriptive one which aims to analyze the opinions and attitudes of Romanians regarding the Smart City concept in relation to sustainability point. Considering the above aspects, the authors considered it important to know the opinions of citizens from four very important cities in Romania regarding the Smart City concept. This research can help public authorities make certain decisions in order to improve the citizens' quality of life.

The general hypotheses of the quantitative research were the following:

I1. Most of the respondents know the Smart City concept;
I2. A large part of the respondents do not use renewable energy sources;
I3. Most subjects collect waste selectively.

The main objectives of the research are based on the four key features of a Smart City that have been identified by the authors:

O1. Determining ***smart transportation*** practices, including public and private transportation;
O2. Identifying ***smart governance*** practices, including online administrative services provided by public institutions and companies;
O3. Finding out the most important actions related to ***renewable energy***;
O4. Identifying ***smart waste management actions***.

The quantitative research was conducted using a survey and a questionnaire was used as a data collection tool. The questionnaire used in the research was distributed in an electronic format by means of a web-based platform. This data collection technique is called Computer Assisted Web Interviewing (CAWI) [75] and is a method where the questions in the questionnaire are displayed on a web page and the respondent only needs to fill in the answers directly in the browser page. The data collection period was between February and April 2022.

The researched population consisted of the inhabitants of four representative cities in Romania, namely Brașov, Bucharest, Cluj and Sibiu. These cities were selected by the authors because their local authorities are concerned with the implementation of projects that will lead to their transformation into a Smart City. In Romania, these four cities are in the top 10 in terms of the number of Smart Projects implemented.

The sampling method used in this research is called "snowball". It is a non-probability sampling technique that does not allow extrapolation of results. The purpose of this sampling method is to get as many people as possible recruited into the sample. In this sense, the link leading to the web page of the questionnaire was distributed on social networks (Facebook, WhatsApp, Instagram) and the users of these networks were asked to access the questionnaire and answer its questions. Two eligibility criteria were taken into account: being over 18 years old and living in one of the four analyzed cities (Brașov, Bucharest, Cluj and Sibiu).

4. Results and Discussion

4.1. Comparative Analysis of Implementing the Smart City Concept in Emblematic Cities in Romania

In Romania, the Smart City concept is relatively new. Although Bucharest has been a pioneer since 2007, when it implemented a traffic management system, many Smart City projects have been carried out in the country.

Romania has 265 towns, but the groups of professionals working in the Smart City field are few and located only around larger cities, representing attempts to become a Smart City [76].

According to Vegacomp Consulting [77], the major challenge for today's Romanian cities is the speed of project implementation while overcoming bureaucracy and changing mentalities in all media, both public and private. The same source notes that, currently, 594 Smart City projects are being implemented and this market is valued at over EUR 120 million, which demonstrates and confirms substantial growth of the Smart City market in Romania.

When analyzing all Smart City projects in Romania, it is noticed that the leader is smart mobility, with 188 projects, followed by smart governance, with 130 projects. The rostrum is completed by smart living with 121 projects, smart economy with 84 projects, smart environment with 42 projects and smart people with 29 initiatives [77].

The authors have analyzed the Smart City projects implemented in Brașov, Bucharest, Cluj and Sibiu (Table 2).

Table 2. Smart City projects in Cluj, Brașov, Bucharest and Sibiu.

No	City	Overall Projects	Smart Economy	Smart Mobility	Smart Environment	Smart People	Smart Living	Smart Governance
1	Cluj-Napoca	54	4	20	7	3	12	8
2	Brașov	18	1	6	1	1	3	6
3	Bucharest District 4	18	2	7	0	0	5	4
4	Sibiu	16	5	5	0	0	2	4

Source: Vegacomp Consulting [77].

The authors analyzed the available information about the four cities in Romania regarding the Smart City projects implemented and compared them with those about London (UK)—which is considered as a Smart City reference. The results of the comparative analysis, presented below, are structured on the four objectives of the quantitative research:

- All four cities in Romania analyzed, compared to London, have implemented many projects in the field of ***public and private transport***, designed to ensure both traffic flow and pollution reduction in cities. These projects have materialized in: computerized traffic management (Brașov, Bucharest, Cluj from Romania and London, UK), integrated infrastructure for bicycle and pedestrian traffic (Cluj, Brașov, Sibiu, London), vending machines and public transport season tickets (Brașov, Bucharest, London), public transport prioritization systems (Brașov, Cluj, London), online platforms through which citizens obtain information about the traffic situation in the city (reporting traffic problems) (Bucharest), online or SMS parking payment systems (Brașov, Bucharest, Cluj, London), charging stations for electric cars (Brașov, Bucharest, Cluj, Sibiu, London), intelligent traffic light systems for crowded intersections (Brașov, London), purchase of electric public transport (Brașov, Bucharest, Cluj, Sibiu, London) and bicycle/scooter rental systems to encourage people to use less green transport (Brașov, Bucharest, Cluj, Sibiu, London);
- Regarding the ***administrative services*** offered by public institutions and other companies in the analyzed cities, projects such as electronic administration services (Brașov, Bucharest, Cluj, Sibiu, London) and electronic geospatial services, which serve as a public information portal (Brașov, Bucharest, Cluj, Sibiu, London), were implemented;
- For the use of ***green energy***, solar panels were installed to illuminate pedestrian crossings during the night (Brașov, London);
- In the field of ***selective waste collection***, projects have been implemented that have integrated waste management systems (Brașov, London) and developed selective waste collection programs (Brașov, London).

What has also been done in London, and could be done in Romanian cities, includes: a map of solar panel installation opportunities to help companies and other organizations identify opportunities to install solar panels on their property; a project for the exchange of solutions, practices, experiences and results with other cities in Europe and the improvement of the way cities manage and share data, which aims to create better and more energy-efficient living conditions for citizens and communities in London; GovTech—a platform to help innovative SMEs better understand the opportunities that exist in London and provide them with tools to help secure these contracts; and the Civic Innovation Challenge which aims to bring together London's public sector and private organizations with innovative technology companies trying to solve some of the most pressing problems in London.

As can be seen, the cities analyzed have taken important steps on their way to Smart City status. Objectives that lead to this status more quickly and completely must continue to be pursued.

Any newly implemented activity presents benefits and risks. For the Romanian cities analyzed in this paper, the benefits of the transition to Smart City status identified by the authors are: reduction of CO_2 emissions and improvement of air quality; streamlined traffic and a reduction in the amount of noise produced; lower usage of personal cars for moving

around the city; increased transparency and ethics in the provision of services by local public authorities through efficient management; a reduction in the amount of time it takes to solve citizens' problems while avoiding trips to the headquarters of local authorities by digitizing their activities; increased quality of services provided by local authorities; decreased energy losses from buildings by insulating them and using alternative energies for heating which decreases their heating/cooling expenses; early detection of water losses on the network which avoids increased expenses; a reduction in the amount of waste that must be stored (lack of space) and an increased degree of waste recycling which will lead to a reduction in the amount of raw materials used; and better management of waste collection.

The identified risks and obstacles of the transition to being a Smart City include the following: not all citizens (especially the elderly) will be able to adapt to the new measures (digitalization of services, waste selection); the implemented measures will cause price increases for some services, which could displease some citizens; the failure of implemented software would cause blockages to current activity (technology dependence); most of these projects were realized with funds from the European Union and the procedures for granting these funds are very cumbersome, which leads to delays in the implementation of the projects; and delays in receiving installments of money which also causes delays in the realization of projects. Some of these risks are also found in the work of Razmjoo et al., (2021) [78].

Although there are considerable risks in this activity, the authors believe that the advantages of a Smart City are indisputable, and the risks can be assessed and monitored.

The comparative analysis above aims to show the current situation regarding the implementation of the Smart City concept in our country. Starting from the results of the comparative analysis, the authors wanted to find out what the opinions of Romanian citizens are regarding the Smart City concept. For this purpose, quantitative research was conducted.

4.2. Opinions, Attitudes and Perceptions of Romanian Citizens Regarding the Smart City Concept

The research started with the questioning the respondents about the Smart City concept, and the data collected showed that 46% of respondents knew of this concept while 54% did not. This leads to the conclusion that more than half of the respondents have not heard about the Smart City concept and, consequently, they do not know what it means.

The previous analysis showed that there are four main sectors that need to be developed for a city to become smart:

- Types of personal transport, a public transport system and intelligent and green transport infrastructure;
- Online administrative services provided by public institutions and companies;
- Renewable energy;
- Selective waste collection.

The quantitative research conducted aimed to identify the opinions, attitudes and perceptions of Romanian citizens regarding these sectors. The research results are structured around the four main objectives.

The sample structure is given in Table 3.

Table 3. The sample structure.

		Sample Structure					
Criteria	**Sample (1116 Respondents)**	**49% Men**			**51% Women**		
	Residents of	Brașov	Cluj-Napoca		Sibiu	Bucharest	
		31%	31%		20%	18%	
	Sample structure according to **age**	Under 20	20–29 years	30–39 years	40–49 years	50–59 years	60–69 years
		2%	29%	40%	18%	9%	2%

*O1. Determining **smart transportation** practices, including public and private transportation*

The answers received regarding the means of transportation that the respondents use most frequently show that 61.6% of the respondents use their personal car, 30.8% use a public means of transportation, while 3.2% use a bicycle. A total of 3.2% use another means of transportation and 1.1% use a motorcycle. It can be concluded that most of the respondents, more than half (62%), use the most their personal car as a means of transportation.

A good example for the increased degree of attractiveness of public transportation for citizens is put into effect by the European Union, which has implemented the CIVITAS Initiative (an action that supports cities in implementing a sustainable, clean and efficient integrated transport policy from the point of view of energy). CIVITAS II is an initiative by which 14 cities have implemented measures aimed at increasing the quality of urban public transport [79].

More than half of the respondents (58%) occasionally use public transportation. A total of 23% of the respondents use public transportation several times a week, while only 16% of them use it daily (Table 4).

Table 4. The frequency with which respondents use public transport.

	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	184	16.5	16.5	16.5
A few times a week	256	22.9	22.9	39.4
Occasionally	648	58.1	58.1	97.5
Others	28	2.5	2.5	100
Total	1116	100	100	

This research aimed to establish the degree of satisfaction respondents had for public transportation in the city. The intermediate response variant (neither satisfied nor dissatisfied) accounted for 47% of responses. Almost a quarter of the subjects (30.1%) are fully satisfied with public transport, while 23% of them are dissatisfied. The frequency distribution indicates a relatively balanced concentration of responses on the positive and negative side of the scale (B2B score = 23% and T2B score = 30.1% positive).

From the respondents' point of view, the main problems that public transportation companies should solve are:

- Poor cleaning of buses;
- Operating hours;
- Reduced number of buses at peak hours;
- Absence of electric buses;
- Absence of a lane dedicated to public transport.

According to a survey conducted by PwC among Europeans, 74% of consumers will opt for the most convenient way to travel, including the use of several types of transportation, and 28% of European vehicle owners believe they can earn money from sharing their cars in a peer-to-peer platform. However, the global 2020 Digital Auto Report shows that those data have changed, and the global COVID-19 Pandemic has changed consumer choices in this area as well, with most choosing to use their own car instead of public transportation or the mobility platform [80].

Among the subjects, 80% personally own a car and 20% do not have a car. If we compare the data obtained in this research with data from Europe, according to the PwC Digital Auto Report, Europe's car fleet will increase by 1.4% by 2025 [81], reaching approximately 273 million of cars. It is estimated that the number will then decrease by 5.4% by 2030 due to the development of mobility platforms (such as Uber, Clever, Bolt, etc.) and alternative ownership methods [81]. Globally, alternative mobility models will account for between 17% and 28% of global vehicle transport by 2030.

The research continued with identification of the type of engine in the car that the respondents own. Only the subjects who answered *Yes* to the previous question were invited to answer this question, namely, those who own a personal car. For this reason, only 896 responses were given out of a total of 1116 respondents.

Half of the respondents (49%) own a car that runs on petrol, and close to 46% of the respondents drive a car that runs on diesel. A small percentage have a hybrid car (3%), 1% have an electric car. 1% own a car which does not belong to any of these categories.

From the preferences of consumers on the international market, it is noted that petrol engines continue to be the most sought after in Germany and the USA, while in China 68% of consumers under the age of 40 prefer electric engines, which compares to only 46% in Germany and 37% in the USA. The forecasts show that battery electric vehicles (BEVs) will account for 17% of new vehicle sales in the European Union and 19% in China by 2025. In the USA, they will have a share of only 5% by 2025, due to reduced government support [81].

The identification of conditions in which the respondents are willing to ride a bike is highlighted the following results:

- 65.8% would ride a bicycle if there were more bicycle renting points;
- 56.1% would ride a bicycle if drivers were more civilized;
- 27.7% would ride a bicycle if there were more bike lanes;
- 12.2% had other responses.

O2. Identifying ***smart governance*** *practices, including online administrative services provided by public institutions and companies*

The research results showed that 84% of the respondents use online services pro-vided by public utilities institutions and companies, while 16% of them do not use them. The increased percentage shows the desire of the population to use online services as much as possible (including for receiving and paying bills, paying taxes, online schedules, etc.). Of course, the global COVID-19 pandemic has left its mark on these results, as the recommendations referring to responsible social conduct [82] advocate avoiding direct contact.

The respondents were further asked to express their degree of satisfaction degree regarding online services provided by public utilities institutions and companies. The obtained results are shown in Figure 2.

The most frequent answers are offered at levels three and four of the scale. A total of 39.1% of the respondents awarded level three, while 32.3% of the respondents indicated rank four. The fewest answers, representing 4.9%, are indicated by those who are totally dissatisfied with the online services offered by public institutions and public utility companies. At the other end of the spectrum, only 12% of the respondents indicated that they are very satisfied with these services.

The answer variants for scales four and five are combined, representing the Top Two Box (T2B) score which received 44.3% of the provided answers. At the other end of the spectrum, the score called Bottom Two Box (B2B) totals 16.6%. Comparing the answers received in the research, it is noted that 44.3% of the respondents are satisfied with the online services offered by the public institutions and the public utility companies.

A proposal called E-Romania has already been launched. This is a public policy in the field of e-governance within the Administrative Capacity Operational Program (POCA) [83]. Through the implementation of this program, the capacity of Romanian institutions and public authorities to develop and implement e-government solutions (representing a series of important services in the life of citizens and private legal entities) has increased. Thus, it is expected that, in the coming period, investments by public institutions in various online applications will increase, and with this increase it becomes imperiously necessary to deepen research in this field.

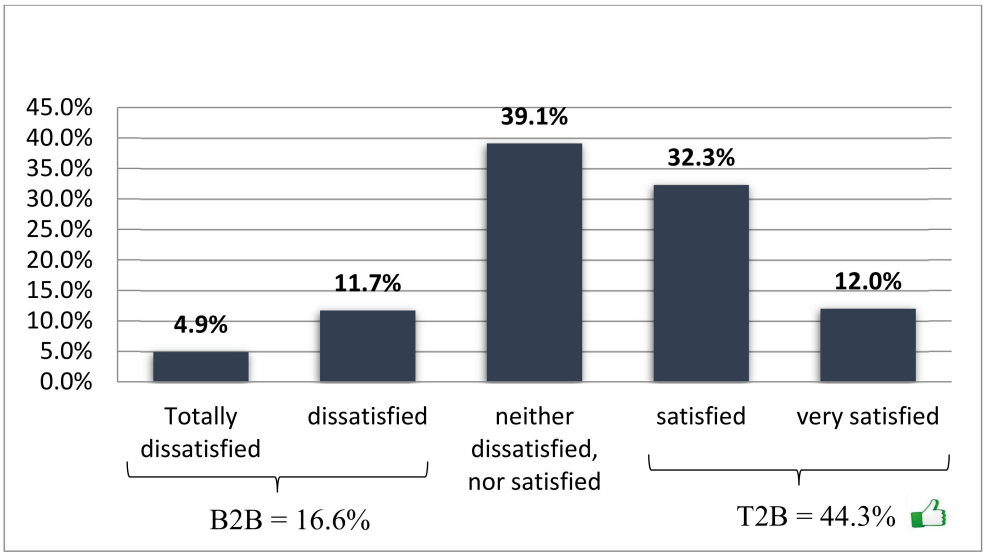

Figure 2. Frequency of responses regarding respondents' degree of satisfaction with online services offered by public utility institutions and companies.

This research aimed to establish the areas in which respondents felt that public authorities in their city should invest more in technology.

Most of the answers emphasized the field of health as being the one that requires the most investments regarding technology, which was mentioned by almost half of the respondents (42%). A total of 29% of the respondents mentioned protection of the environment, followed by 23% who opted for the field of education. The lowest percentage, 5%, was given for transportation, while 1% selected the "another field" answer.

During the pandemic, health system shortcomings emerged, especially at the national level, which included technology. Similarly, education suffered a lot during the COVID-19 period, and it was decided that by "order of the Minister of Education and Research, based on the decision of the National Committee for Emergency Situations and the analysis of the epidemiological situation at national level, the suspension of the activities that require physical presence can be decided [. . .] in the educational units and the continuation of the didactic activities in the online system" [84]. This decision revealed the shortcomings in the educational system. Unfortunately, the repercussions of these decisions will be seen in the coming years.

One thing is certain, and it has been highlighted once again by this research, namely that the population wants major investments in technology in the fields of health, environmental protection and education.

As a result of citizens' desire and the administrations' need for technology, the Authority for the Digitization of Romania was established in 2020, which aims to digitize all government and administrative activities on a large scale [85].

The connection between the use of online services offered by the public utilities institutions and companies and the income of respondents was analyzed, with the following table showing the results obtained.

The authors notice from the data analysis (Table 5) that the distribution of respondents using the online services provided by the public utilities institutions and companies is significantly higher for higher-income earners. It is noticed that the highest percentage (96%) was recorded for people who earn more than RON 5000. The share remains at a high level (82%) for those earning between RON 3001 and 5000.

Table 5. The contingency table regarding the use of online services provided by public utilities institutions and companies in relation to the income of respondents.

			Net Monthly Income Is in the Range of:				
			Less than RON 1.400	**RON 1.401–3.000**	**RON 3.001–5.000**	**More than RON 5.000**	**Total**
Use the online services	**No**	Count	20	80	72	4	176
		%	16.1%	16.7%	17.6%	3.8%	15.8%
	Yes	Count	104	400	336	100	940
		%	83.9%	83.3%	82.4%	96.2%	84.2%
	Total	Count	124	480	408	104	1116
		%	100%	100%	100%	100%	100%

At the other end of the spectrum, less high-income respondents (over RON 5000) responded that they had not used such online services so far, amounting to 3.8%.

In conclusion, it is noted that, from among the researched population, those with a higher income use the online services offered by the public utility companies to a higher degree.

O3. Finding out the most important actions in ***renewable energy***

From the respondents, 41% have currently had a smart meter installed in the building where they live, while 39% have not had anything installed and a relatively high percentage of 20% of the respondents answered that they did not know.

Most respondents, namely 89%, do not use renewable energy sources, while only 11% use them. The percentage of those who use such energy sources will most likely increase in the coming period, a statement based on the European Union's commitment to meet the goal that at least 27% of total energy consumption should be energy from renewable sources by 2030 [86]. In this research, the respondents who mentioned that they used renewable energy were asked to mention the type they used. The research results showed that 93% of the respondents who used renewable energy used geothermal energy, while 7% used solar energy.

A study carried out in Poland showed that the most used alternative source of energy in the country was solar (64%), followed by biogas (18%), hydropower (8%), biomass (7%) and wind (3%) [52]. We can say that, depending on natural resources and geographical positioning, each country/city tries to reap the benefits of using the most efficient renewable energy sources.

O4. Identifying ***smart waste management*** *actions*

Taking into consideration that the norms of the European Union oblige Romania to reach a degree of waste recycling of at least 50% by 2020 [87], the results of the research highlight a major problem, namely the fact that there are very low percentages of people who recycle waste. According to the results, the majority of the respondents (61.3%) do not select the waste to be disposed of, while only 38.7% of the respondents select them.

The respondents who do not select waste when dis-posing of it were asked to mention the reasons why they do not select waste. For this question, the respondents had the opportunity to tick several answers.

The absence of containers for waste selection is mentioned as being the most representative reason for why respondents do not select waste before disposing of it, with a majority of respondents (91.8%) selecting this answer. A relatively low percentage (15.2%) of the respondents mentioned convenience, while 2.3% had other reasons. The lowest percentage (0.6%) represents the "I am not interested" answer.

The authors used the chi-square test to check whether there was a link between the gender of respondents and their habit of selecting household waste. The expected values were calculated (Table 6).

Table 6. The observed and expected frequencies.

			Gender		
			Female	**Male**	**Total**
The habit of selecting waste	**No**	Count	368	316	684
		Expected Count	34,813	33,587	684
	Yes	Count	200	232	432
		Expected Count	21,987	21,213	432
	Total	Count	568	548	1116
		Expected Count	568	548	1116

The expected frequencies are on the expected count line. From the summary analysis of the differences between the absolute frequencies (Count) and the expected ones (Expected Count), there are differences at the level of all subgroups.

For women, the expected values for waste selection are higher than the absolute values. For men, the expected values are lower than the absolute ones. For those who do not select waste before disposing of it, women have a higher value for absolute values than expected values, whereas for men the expected values are higher than the absolute ones. In order to test the significance of the differences, chi-square tests were used (Table 7).

Table 7. Critical report for the chi-square analysis.

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-Sided)**
Pearson Chi-Square	5.967080238	1	0.014575395
Likelihood Ratio	5.971133884	1	0.014541927
Linear-by-Linear Association	5.961733392	1	0.014619661
N of Valid Cases	1116		0.014575395

a Computed only for a 2 × 2 table; b 0 cells (0%) have an expected count less than 5. The minimum expected count is 21,213.

Applying the chi-square test and comparing the calculated level of significance (0.014) with the theoretical one (0.05), it is noticed that the first level of significance is lower. Thus, we conclude that there is a connection between the gender of the researched population and the habit of selecting waste before disposing of it.

In conclusion, the quantitative research carried out has achieved its purpose and objectives, and the obtained results are really useful. Objectives 1 (determining smart transportation practices, including public and private transportation), 2 (identifying smart governance practices, including online administrative services provided by public institutions and companies) and 4 (identifying the smart waste management actions) were almost completely achieved. Objective 3 (finding out the most important actions in renewable energy) was achieved to a high extent. Regarding the research hypotheses, the situation is as follows: Hypothesis 1 (the majority of respondents know the Smart City concept) was disproved as the research showed that only 47% of the subjects knew of this concept; Hypothesis 2 (a large part of respondents do not use renewable energy sources) was proven to be true as 89% of respondents did not use renewable energy sources; and Hypothesis 3 (most subjects selectively collect waste) was disproved as the responses revealed that only 38.7% of the respondents selectively collected waste.

A summary of the most relevant research conclusions obtained from the quantitative research on the four main objectives is given in Figure 3.

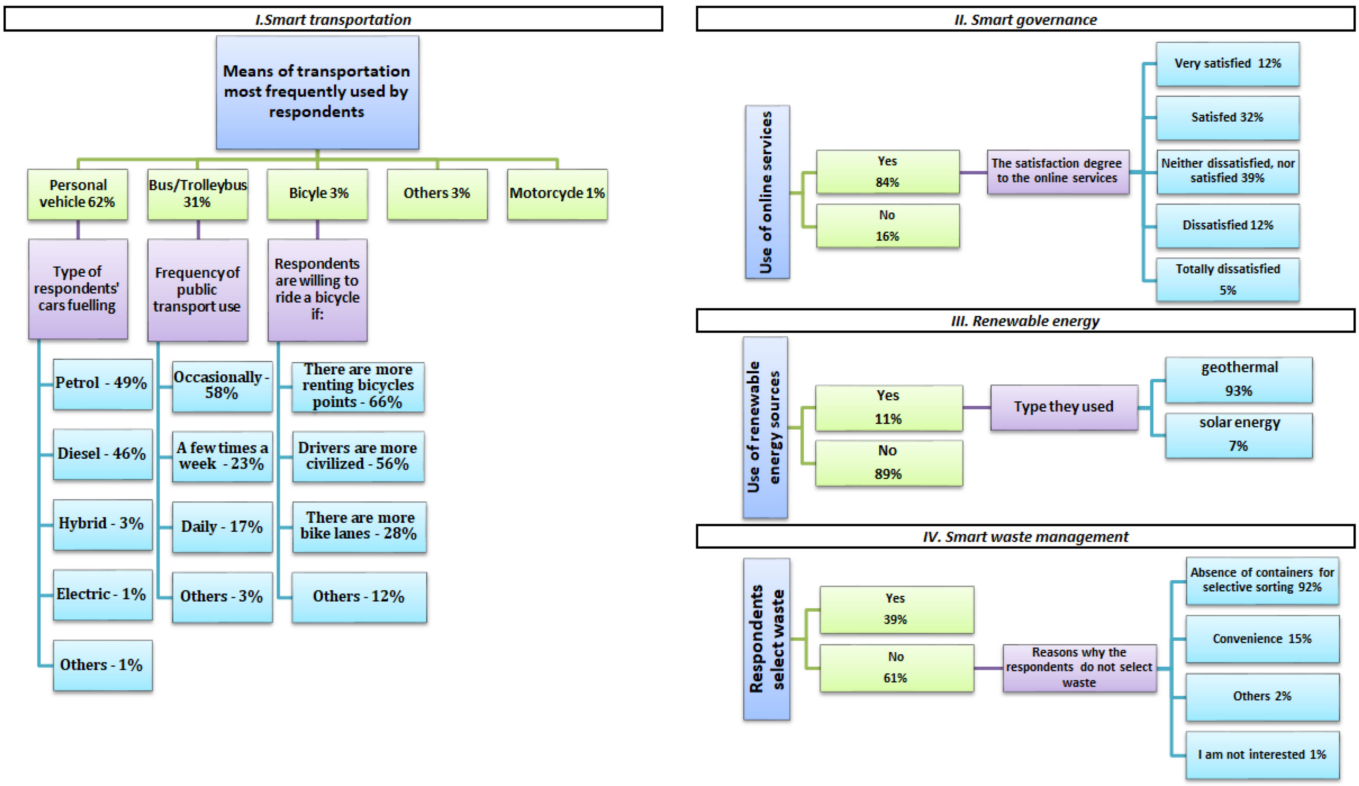

Figure 3. Framework of the most relevant research conclusions.

5. Conclusions

This paper highlighted the fact that the concept of Smart City has experienced a wide development in recent years, including in Romania where important efforts have been made to develop the sustainability of cities by implementing smart measures in transportation, renewable energy, e-governance and waste management. This study enriches the literature and research that has been conducted in the Smart City field. The Smart City concept has emerged in the last decade, but a new concept, that of a sustainable Smart City, is already under discussion. First of all, this paper has been able to identify and group the four key features of a sustainable Smart City: smart transportation, smart governance, smart waste management and renewable energy.

The article is original through the two types of research performed. The first is a comparative analysis, and the second is quantitative research. The quantitative research conducted in four cities in the country (Brașov, Cluj-Napoca, Sibiu, Bucharest) showed that over half of the respondents are familiar with the Smart City concept and 41.9% consider health as a priority for technological investment.

Considering all the aspects mentioned and analyzed in this article, the authors of propose clearer highlighting and division of cities from the Smart City point of view. The authors' proposal is to ***calculate an economic and sustainable index/indicator*** for each city, which measures how smart a city is. For this, an analysis of the four characteristics of a Smart City (identified as the key features of a sustainable Smart City) must be performed and, depending on the value of the ***index/indicator***, the city must be included in one of the four levels of achievement proposed by the authors:

- Indexed city "Sustainable Smart City" in ***a majority*** global percentage;
- Indexed city "Sustainable Smart City" in ***an average/medium*** percentage;
- Indexed city "Sustainable Smart City" in ***a small*** percentage;
- ***NON*** "Sustainable Smart City".

The proposal of the authors to represent the Smart City fulfillment stage is represented in Figure 4.

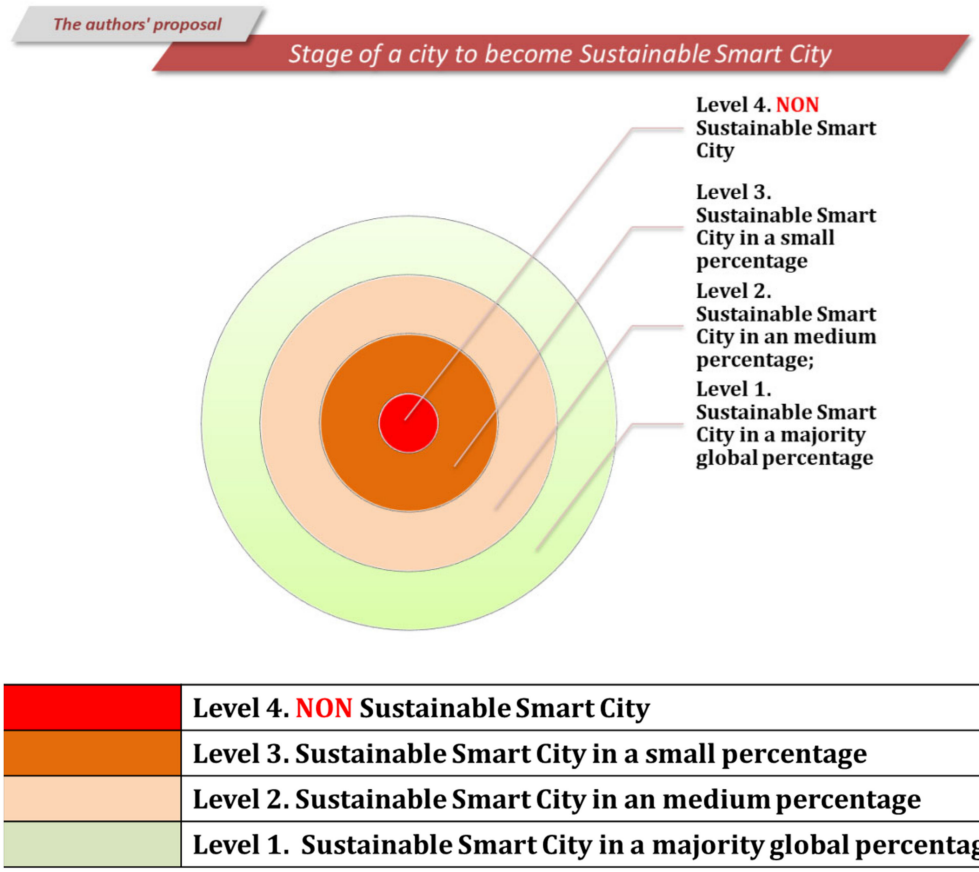

Figure 4. The proposal of the authors to represent Smart City stages.

This method of calculation and representation can be applied by any city. In the next period, it becomes important to perform this analysis in order to see how the cities are at the specified time. This could be a zero moment. Of course, this model may represent the analysis of a future article.

The "Smart City Solutions for a Riskier World" study shows that while the COVID-19pandemic has created very big problems and obstacles throughout the world, it has also created a wave of innovation. This study includes research conducted between August and September 2020 based on a survey of senior officials from 167 cities in 82 countries around the world. Cities were assessed and ranked, based on progress, into two categories: progress in applying smart solutions, with cities ranked as "starter", "intermediate" or "leader"; and progress regarding the United Nations Sustainable Development Goals (SDGs), with cities classified as "implementer", "developer" or "sprinter". ESI ThoughtLab research, sponsored by Oracle, Deloitte and Intel, highlights the vital role technology, data, cyber security and public–private partnerships play in ensuring a healthy, safe and prosperous future for citizens after this pandemic. The study shows that the COVID-19 pandemic is accelerating innovation in the public sector; 88% of surveyed city leaders are calling for investment in cloud platforms. In the study, Bucharest is classified as "evolving" according to the United Nations in terms of the Sustainable Development Goals and, based on the use of digital solutions and technologies to achieve social, environmental and economic goals, it is classified as "intermediate" [88].

The limitation of the quantitative research carried out in this paper is the fact that it was not possible to carry out a non-random sampling, though this aspect does not mean that the research is less valuable. Another limitation of the research is that only four cities

in Romania were analyzed. In the future, the authors are considering conducting more extensive research, which will include more cities from Europe.

The current global energy crisis, generated by the war in Ukraine, as well as increases in the price of energy resources (oil, refined products, gasoline, diesel, gas, liquefied gas, electricity, etc.) can be considered from this point of view as an opportunity, the key to a faster transition to a green economy and society, especially in the EU space. There is a favourable context determined by the adoption, at the EU level, of the National Recovery and Resilience Plan [89], which has in its structure several components aimed at the support given to member countries to move to a green economy and society. Taking into account these aspects, we can state that there are two major directions of action in the public authority–citizen relationship, namely stimulation and coercion, in the sense of adopting the measures proposed by this plan. Thus, we highlighted the measures that mainly involve the stimulation of citizens to participate in the implementation of green environmental policies, challenges and recommendations regarding the four objectives of the research.

Regarding *smart public transport*, in the context of the increase in air pollution in big cities, pollution mainly due to vehicles, we recommend replacing the car fleet with electric cars. The countries of the world must create financial aid schemes for citizens and companies which will lead to the replacement of thermal engines with non-polluting electric cars. In this sense, good practice models in this field should be taken into account. Romania managed to have a more than four-fold increase in the number of electric cars. This increase is mainly due to the Rabla+ Program, which envisages receiving Ecobonuses of over EUR 10,000 when buying an electric car [90].

For a city to become a Smart City, the *digital transformation* component represents a new vision in the public sector.

The advantages of digital transformation are efficiency, transparency and simplicity, and these lead to much higher productivity of processes. The awareness of the need for the introduction of new technologies by the leaders of public institutions, the continuous adaptation to the demands of citizens and the provision of quality, safe and fast online public services are just some of the vision elements that contribute to the development of the Smart City concept.

In the context of increases in pollution of all types and climate change, the recommendations take into account *public management* at the central and local level. Here, we refer to all the programs offered by the Romanian Ministry of Environment, Water and Forests. These programs are applied regionally and locally [91].

In the component related to *waste management*, in the context of increasing waste pollution, we refer to the way some public policies have been adopted by regional or municipal authorities. An example in this case can be represented by the mode of action of a regional authority in Romania (Brasov County Council). This is an example of good practice for adopting the European Union's waste management policy [92].

Other recommended measures could aim at better communication and educating citizens about household waste collection. An example of this can be found in the city of Brasov, Romania, where PETrica collection machines were introduced. These machines allow the efficient collection of plastic, glass and aluminum waste. Citizens who collect are rewarded with free tickets for local public transport [93].

The research carried out and presented in this article is topical and, for our country, the presented information is of real use. The results of the quantitative research add value to the targeted cities, managing to create a base from which to start the whole Smart City mechanism.

The concept, and especially the philosophy, of a Smart City presupposes the transition from a passive consumer of resources (transport, infrastructure, health, education, etc.) to a prosumer, a person who creates resources (by producing more than they consume). A future research direction could study the relationship between the Smart City concept and that of a circular economy. For each urban community that aspires to Smart City status,

designing public decentralized policies and local autonomy that will lead to the creation of a competitive attitude is necessary.

The authors expect that, after completing this work, they will enrich the specialized literature through a better knowledge of developments in Romania on the topic of this work. In addition, this work can be the basis for the definition of public policies by regional and local authorities on the four key Smart City components. Furthermore, the information and research from this work can help the assimilation, by local authorities in Romanian cities, of some models of good practice in the fields of communication, information and education for all parties involved in Smart City processes. The Green Cities Forum is an example, being the largest event in Romania dedicated to environmental sustainability [94]. The adoption of a system of indicators (as proposed in this paper) that measures how intelligent a city is, would first allow all cities to understand their position in the implementation/development of the city as a Smart City. Secondly, it would help entrepreneurs decide where to invest. Last but not least, this system would give citizens the opportunity to decide on their own quality of life.

Another research direction could include the evaluation of current public policies for urban development and their correlation with the concept and components of a Smart City. Additionally, there are already studies and articles that focus on energy supply, which is considered as an active research topic among the new aspects of urban management, especially in developing countries [95].

Author Contributions: Conceptualization, S.B., N.A.N., A.M., A.Z. and M.B.; methodology, N.A.N., S.B. and A.Z.; literature review, A.M. and S.B.; analysis and writing the results, A.Z. and N.A.N.; results and discussion, S.B., N.A.N., A.M. and A.Z.; conclusions, S.B., N.A.N., A.M. and A.Z; writing—original draft preparation, S.B., N.A.N., A.M., A.Z. and M.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by TRANSILVANIA UNIVERSITY OF BRAȘOV.

Institutional Review Board Statement: Ethical review and approval were waived for this study due to we conducted a non-interventional study (questionnaires type) and all participants were fully informed that the anonymity is assured. All the participants agreed to answer the questions, taking into account that the data obtained were used strictly for statistics.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. United Nations. World's Population Increasingly Urban with More than Half Living in Urban Areas. Available online: https://www.un.org/en/development/desa/news/population/world-urbanization-prospects-2014.html (accessed on 27 April 2022).
2. Becchio, C.; Corgnati, S.P.; Delmastro, C.; Fabi, V.; Lombardi, P. The role of nearly-Zero Energy Buildings in the definition of Post-Carbon Cities. *Energy Procedia* **2015**, *78*, 687–692. [CrossRef]
3. Vrabie, C.; Dumitrașcu, E. *Smart Cities—De la Idee la Implementare*; Universitara: Bucharest, Romania, 2019; pp. 67–80.
4. Visvizi, A.; Lytras, M.D. Rescaling and refocusing smart cities research: From mega cities to smart villages. *J. Sci. Technol. Policy Manag.* **2018**, *9*, 134–145. [CrossRef]
5. United Nations (Departament of Economic and Social Affairs). World Urbanization Prospect. Available online: https://population.un.org/wup/publications/Files/WUP2018-Report.pdf (accessed on 29 March 2022).
6. Benites, A.J.; Simoes, A.F. Assessing the urban sustainable development strategy: An application of a smart city services sustainability taxonomy. *Ecol. Indic.* **2021**, *127*, 107734. [CrossRef]
7. Organisation for Economic Co-operation and Development. Network on Development Evaluation. Available online: https://www.oecd.org/ (accessed on 17 May 2022).
8. Bizoza, A.R. United Nations Conference on Sustainable Development, (RIO+20), National Preparatory Process for Rwanda. Available online: https://sustainable%20development.un.org/content/documents/1030rwanda.pdf (accessed on 19 March 2022).
9. Johnsson, F.; Karlsson, I.; Rootzén, J.; Ahlbäck, A.; Gustavsson, M. The framing of a sustainable development goals assessment in decarbonizing the construction industry—Avoiding "Greenwashing". *Renew. Sustain. Energy Rev.* **2020**, *13*, 110029. [CrossRef]

10. Valencia-Arias, A.; LucellyUrrego-Marín, M.; Bran-Piedrahita, L.A. Methodological Model to Evaluate Smart City Sustainability. *Sustainability* **2021**, *13*, 1214. [CrossRef]
11. Mensah, J. Sustainable Development: Meaning, History, Principles, Pillars, and Implications for Human Action: Literature Review. *Cogent Soc. Sci.* **2019**, *5*, 1653531. [CrossRef]
12. Kanagachidambaresan, G.R. *Role of Edge Analytics in Sustainable Smart City Development*; Scrivener: Beverly, MA, USA, 2020; pp. 1–3.
13. Franchina, L.; Calabrese, A.; Inzerilli, G.; Scatto, E.; Brutti, G.; de los Angeles Bonanni, M.V. Thinking green: The role of smart technologies in transforming cities' waste and supply Chain's flow. *Clean. Eng. Technol.* **2021**, *2*, 100077. [CrossRef]
14. Ahvenniemi, H.; Huovila, A.; Pinto-Seppä, I.; Airaksinen, M. What are the differences between sustainable and smart cities? *Cities* **2017**, *60*, 234–245. [CrossRef]
15. Antwi-Afari, P.; Owusu-Manu, D.-G.; Simons, B.; Debrah, C.; Ghansah, F.A. Sustainability guidelines to attaining smart sustainable cities in developing countries: A Ghanaian context. *Sustain. Futures* **2021**, *3*, 100044. [CrossRef]
16. Bubelíny, O.; Kubina, M. Impact of the concept Smart City on public transport. *Transp. Res. Procedia* **2021**, *55*, 1361–1367. [CrossRef]
17. Girardi, P.; Temporelli, A. Smartainability: A methodology for assessing the sustainability of the smart city. *Energy Procedia* **2017**, *111*, 810–816. [CrossRef]
18. Akandea, A.; Cabrala, P.; Gomesa, P.; Casteleyn, S. The Lisbon ranking for smart sustainable cities in Europe. *Sustain. Cities Soc.* **2019**, *44*, 475–487. [CrossRef]
19. Batty, M.; Axhausen, K.W.; Giannotti, F.; Pozdnoukhov, A.; Bazzani, A.; Wachowicz, M.; Ouzounis, G.; Portugali, I. Smart cities of the future. *Eur. Phys. J.* **2012**, *214*, 481–518. [CrossRef]
20. Marcuta, L.; Marcuta, A.; Iagaru, P.; Iagaru, R.; Dimen, L. The relationship between demography development of smart city. Case study—Bucharest. *Manag. Econ. Eng. Agric. Rural. Dev.* **2020**, *20*, 333–340.
21. Orejon-Sanchez, R.D.; Crespo-Garcia, D.; Andres-Diaz, J.R.; Gago-Calderon, A. Smart cities' development in Spain: A comparison of technical and social indicators with reference to European cities. *Sustain. Cities Soc.* **2022**, *81*, 16–18. [CrossRef]
22. Mordor Intelligence. Smart Cities Market—Growth, Trends, COVD-19 Impact and Forecasts (2021–2026). Available online: https://www.mordorintelligence.com/industry-reports/smart-cities-market (accessed on 11 May 2022).
23. Caragliu, A.; Del Bo, C.; Nijkamp, P. Smart cities in Europe. In Proceedings of the 3rd Central European Conference in Regional Science—CERS, Kosice, Slovakia, 7–9 October 2009.
24. Camero, A.; Alba, E. Smart City and information technology: A review. *Cities* **2019**, *93*, 84–94. [CrossRef]
25. European Comission. Shaping Europe's Digital Future. Smart Cities and Communities. Available online: https://ec.europa.eu/digital-single-market/en/smart-cities-smart-living (accessed on 18 April 2022).
26. Grossi, G.T.; Trunova, O. Are UN SDGs useful for capturing multiple values of smart city? *Cities* **2021**, *114*, 103193. [CrossRef]
27. Orange Business Services. The Smart City Concept Proposed by Orange. Available online: https://www.orange.ro/business/industrii/smart-city/conceptul-de-oras-inteligent/ (accessed on 10 April 2022).
28. Li, X.; Yu, J.; Shaw, J.; Wang, Y. Route level transit operational-efficiency assessment with a bootstrap super-data envelopement analysis model. *J. Urban Plan. Dev.* **2017**, *143*, 04017007. [CrossRef]
29. Zhang, H.; Lv, Y.; Guo, J. New Development Direction of Underground Logistics from the Perspective of Public Transport: A Systematic Review Based on Scientometrics. *Sustainability* **2022**, *14*, 3179. [CrossRef]
30. Matei, L.; Dumitru, I.; Racila, L. Smart Signalization and Public Transport Priority, a First Step to Smart Mobility in a Smart City. *Appl. Mech. Mater.* **2018**, *880*, 383–388. [CrossRef]
31. European Commission, Directorate-General for the Information Society and Media. ICT Concepts for Optimization of Mobility in Smart Cities. Available online: https://op.europa.eu/ro/publication-detail/-/publication/9f74b9ee-9280-4cb6-b204-5cd15c29b5f9 (accessed on 10 April 2022).
32. Behrendt, F. Cycling the Smart and Sustainable City: Analyzing EC Policy Documents on Internet of Things, Mobility and Transport, and Smart Cities. *Sustainability* **2019**, *11*, 763. [CrossRef]
33. Garau, C.; Masala, F.; Pinna, F. Cagliari and smart urban mobility: Analysis and comparison. *Cities* **2016**, *56*, 35–46. [CrossRef]
34. Kanthavel, R.; Sangeetha, S.K.B.; Keerthana, K.P. Design of smart public transport assist system for metropolitan city Chennai. *Int. J. Intell. Netw.* **2021**, *2*, 57–63. [CrossRef]
35. Benevolo, C.; Dameri, R.; Dàuria, B. Smart Mobility in Smart City. In *Empowering Organizations*; Torre, T., Braccini, A., Spinelli, R., Eds.; Springer: Berlin/Heidelberg, Germany, 2016; Volume 11, pp. 13–28. [CrossRef]
36. Ribeiro, P.; Dias, G.; Pereira, P. Transport Systems and Mobility for Smart Cities. *Appl. Syst. Innov.* **2021**, *4*, 61. [CrossRef]
37. Cepeliauskaite, G.; Keppner, B.; Simkute, Z.; Stasiskiene, Z.; Leuser, L.; Kalnina, I.; Kotovica, N.; Andin, J.; Muiste, M. Smart-Mobility Services for Climate Mitigation in Urban Areas: Case Studies of Baltic Countries and Germany. *Sustainability* **2021**, *13*, 4127. [CrossRef]
38. Canales, D.; Bouton, S.; Trimble, E.; Thayne, J.; Da Silva, L.; Shastry, S.; Knupfer, S.; Powell, M. *Connected Urban Growth: Public-Private Collaborations for Transforming Urban Mobility*; The McKinsey Center for Business and Environment: Washington, DC, USA, 2017; pp. 39–45.
39. Romanian Association for Smart City. Smart Economy. Available online: https://romaniansmartcity.ro/smart-economy/ (accessed on 5 April 2022).

40. Noveck, B.S. *Smart Citizens, Smarter State: The Technologies of Expertise and the Future of Governing*; Harvard University Press: Cambridge, MA, USA, 2015; pp. 16–17.
41. Gil-Garcia, J.R.; Zhang, J.; Puron-Cid, G. Conceptualizing smartness in government: An integrative and multi-dimensional view. *Gov. Inf. Q.* **2016**, *33*, 524–534. [CrossRef]
42. Argento, D.; Grossi, G.; Jääskeläinen, A.; Servalli, S.; Suomala, P. Governmentality and performance for the smart city. *Account. Audit. Account. J.* **2020**, *33*, 204–232. [CrossRef]
43. Bolivar, M.P.R.; Meijer, A.J. Smart governance: Using a literature review and empirical analysis to build a research model. *Soc. Sci. Comput. Rev.* **2016**, *34*, 673–692. [CrossRef]
44. Alghazzawi, D.M.; Badri, S. Using the B/S Model to Design and Implement Online Shopping System for Gulf Brands. *Sustainability* **2022**, *14*, 3176. [CrossRef]
45. Ribeiro-Duthie, A.C.; Gale, F.; Murphy-Gregory, H. Fair trade governance: Revisiting a framework to analyse challenges and opportunities for sustainable development towards a green economy. *Discov. Sustain.* **2021**, *2*, 58. [CrossRef]
46. Tyutyuryukov, V.; Guseva, N. From remote work to digital nomads: Tax issues and tax opportunities of digital lifestyle. In Proceedings of the 20th IFAC Conference on Technology, Culture, and International Stability TECIS, Moscow, Russian, 14–17 September 2021.
47. Ministry of Communications and Information Society. Smart City for Smart Communities. Available online: https://www.comunicatii.gov.ro/wp-content/uploads/2016/12/Ghid-Smart-City.pdf (accessed on 15 May 2022).
48. Battilani, C.; Galli, G.; Arecco, S.; Casarino, B.; Granero, A.; Lavagna, K.; Varna, R.; Ventura, M.; Revetria, R.; Damiani, L. Business Process Re-engineering in Public Administration: The case study of Western Ligurian Sea Port Authority. *Sustain. Futures* **2022**, *4*, 100065. [CrossRef]
49. United Nations (Department of Economic and Social Affairs). UN E-Government Survey 2020. Available online: https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020 (accessed on 19 April 2022).
50. Lim, S.B.; Yigitcanlar, T. Participatory Governance of Smart Insights from e-Participation of Putrajaya and Petaling Jaya, Malaysia. *Smart Cities* **2022**, *5*, 5. [CrossRef]
51. Kanase-Patil, A.B.; Kaldate, A.P.; Lokhande, S.D.; Panchal, H.; Suresh, M.; Priya, V. A review of artificial intelligence-based optimization techniques for the sizing of integrated renewable energy systems in smart cities. *Environ. Technol. Rev.* **2020**, *9*, 111–136. [CrossRef]
52. Lewandowska, A.; Chodkowska-Miszczuk, J.; Rogatka, K.; Starczewski, T. Smart Energy in a Smart City: Utopia or Reality? Evidence from Poland. *Energies* **2020**, *13*, 5795. [CrossRef]
53. Gesteira, L.G.; Uche, J. A Novel Polygeneration System Based on a Solar-Assisted Desiccant Cooling System for Residential Buildings: An Energy and Environmental Analysis. *Sustainability* **2022**, *14*, 3449. [CrossRef]
54. Greenhouse Gas Emissions in the European Union (EU-28) in 2016. Available online: https://www.statista.com/statistics/781044/greenhouse-gas-emissions-european-union-eu/ (accessed on 21 May 2022).
55. Haas, R.; Ajanovic, A.; Ramsebner, J.; Perger, T.; Knápek, J.; Bleyl, J.W. Financing the future infrastructure of sustainable energy systems. *Green Financ.* **2021**, *3*, 90–118. [CrossRef]
56. Liu, Y.; Failler, P.; Liu, Z. Impact of Environmental Regulations on Energy Efficiency: A Case Study of China's Air Pollution Prevention and Control Action Plan. *Sustainability* **2022**, *14*, 3168. [CrossRef]
57. Romanian Association for Smart City. Smart Environment. Available online: https://romaniansmartcity.ro/smart-environment/ (accessed on 15 March 2022).
58. Strielkowski, W.; Veinbender, T.; Tvaronavičien, M.; Lace, N. Economic efficiency and energy security of smart cities. *Econ. Res.* **2020**, *33*, 788–803. [CrossRef]
59. Komninos, N. Net Zero Energy Districts: Connected Intelligence for Carbon-Neutral Cities. *Land* **2022**, *11*, 210. [CrossRef]
60. Bibri, S.E. The eco-city and its core environmental dimension of sustainability: Green energy technologies and their integration with data-driven smart solutions. *Energy Inform.* **2020**, *3*, 4. [CrossRef]
61. Alizadeh, M.I.; Moghaddam, M.P.; Amjady, N.; Siano, P.; Sheikh-El-Eslami, M.K. Flexibility in future power systems with high renewable penetration: A review. *Renew. Sustain. Energy Rev.* **2016**, *57*, 1186–1193. [CrossRef]
62. Al-Nory, M.T. Optimal Decision Guidance for the Electricity Supply Chain Integration with Renewable Energy: Aligning Smart Cities Research with Sustainable Development Goals. *IEEE Access* **2019**, *7*, 74996–75006. [CrossRef]
63. Jerina, D.T.; Saraa, H.H.; Radia, M.A.; Hema, P.S.; Hasan, S.; Urme, S.A.; Audia, C.; Hasan, M.T.; Quayyum, Z. An overview of progress towards implementation of solid waste management policies in Dhaka, Bangladesh. *Heliyon* **2022**, *8*, e08918. [CrossRef]
64. Batur, M.E.; Cihan, A.; Korucu, M.K.; Bektaş, N.; Keskinler, B. A mixed integer linear programming model for long-term planning of municipal solid waste management systems: Against restricted mass balances. *Waste Manag.* **2020**, *105*, 211–222. [CrossRef]
65. Medeiros Assef, F.; Arns Steiner, M.T.; Pinheiro de Lima, E. A review of clustering techniques for waste management. *Heliyon* **2022**, *8*, e08784. [CrossRef]
66. Popov, A.A.; Kuzmina, A.O. Algorithm of the Software Modules Interaction for Managing the Collection and Transportation of Municipal Solid Waste. In Proceedings of the International Science and Technology Conference "Earth Science", Vladivostok, Russian, 8–10 December 2020.
67. Viswanathan, R.; Telukdarie, A. The role of 4IR technologies in waste management practices-a bibliographic analysis. *Procedia Comput. Sci.* **2022**, *200*, 247–256. [CrossRef]

68. Xu, X.; Yang, Y. Municipal hazardous waste management with reverse logistics exploration. *Energy Rep.* **2022**, *8*, 4649–4660. [CrossRef]
69. Peura, P.; Voutilainen, O.; Kantola, J. From garbage to product and service systems: A longitudinal Finnish case study of waste management evolution. *Waste Manag.* **2022**, *140*, 143–153. [CrossRef]
70. Omar, M.F.; Termizi, A.A.A.; Zainal, D.; Wahap, N.A.; Ismail, N.M.; Ahmad, N. Implementation of spatial smart waste management system in Malaysia. In Proceedings of the 8th IGRSM International Conference and Exhibition on Remote Sensing & GIS, Kuala Lumpur, Malaysia, 13–14 April 2016. [CrossRef]
71. Misra, D.; Das, G.; Chakrabortty, T.; Das, D. An IoT-based waste management system monitored by cloud. *J. Mater. Cycles Waste Manag.* **2018**, *20*, 1574–1582. [CrossRef]
72. Longhi, S.; Marzioni, D.; Alidori, E.; Di Buò, G.; Prist, M.; Grisostomi, M.; Pirro, M. Solid Waste Management Architecture Using Wireless Sensor Network Technology. In Proceedings of the 5th International Conference on New Technologies, Mobility and Security (NTMS), Istanbul, Turkey, 7–10 May 2012.
73. Muniandy, K.A.; Nasir, A.F.A.; Razak, N.H.; Adam, A.; Zakaria, M.A. Smart Waste Management System (SWMS) based on Internet of Things (IoT). In Proceedings of the Symposium on Electrical, Mechatronics and Applied Science 2018, Melaka, Malaysia, 8 November 2018.
74. Hariyani, S.; Meidiana, C. Optimization of waste transportation route at waste transfers point in Lowokwaru District, Malang City. In Proceedings of the International Conference on Environmental Resources Management in Global Region, Bali, Indonesia, 25 November 2017.
75. Sowa, P.; Pedzonski, B.; Krzyaak, M.; Maslach, D.; Wojcik, S.; Szpack, A. The Computer-Assisted Web Interview Methodas Used in the National Study of ICT Use in PrimaryHealthcare in Poland—Reflections on a Case Study. *Stud. Log. Gramm. Rhetor.* **2015**, *43*, 137–146. [CrossRef]
76. Dincă, D.; Vrabie, C.; Dumitrică, C. *The Smart City*; Pro Universitaria: Bucharest, Romania, 2016; pp. 87–112.
77. Vegacomp Consulting. Smart City Radiography in Romania, 4th ed. Available online: https://steinbeis-romania.com/wp-content/uploads/2020/06/raport-radiografie-smart-city-romania-iunie-2020_final-1.pdf (accessed on 15 April 2022).
78. Razmjoo, A.; Nezhad, M.M.; Kaigutha, L.G.; Marzband, M.; Mirjalili, S.; Pazhoohesh, M.; Memon, S.; Ehyaei, M.A.; Piras, G. Investigating Smart City Development Based on Green Buildings, Electrical Vehicles and Feasible Indicators. *Sustainability* **2021**, *13*, 7808. [CrossRef]
79. Civitas. Policy Advice Notes Enhancing the Quality of Public Transport Services. 2020. Available online: https://civitas.eu/sites/default/files/civitas_ii_policy_advice_notes_11_public_transport_quality.pdf (accessed on 20 April 2022).
80. PWC. COVID-19 Pandemic Has Changed Mobility Preferences, The Car Personally Becomes the Main Option Again. 2020. Available online: https://www.pwc.ro/ro/media/press-release-2020/raport-digital-auto-2020--pandemia-covid-19-a-schimbat-preferint.html (accessed on 20 April 2022).
81. Strategy and PWC. The 2020 Digital Auto Report. Navigating through a Post-Pandemic World. 2020. Available online: https://www.strategyand.pwc.com/de/de/studie/2020/digital-auto-report-2020.html (accessed on 25 March 2022).
82. Ministry of Health. Recommendations for Socially Responsible Behavior in Preventing the Spread of Coronavirus (COVID-19). 2020. Available online: http://www.ms.ro/recomandari-privind-conduita-sociala-responsabila-in-prevenirea-raspandirii-coronavirus-covid-19/ (accessed on 20 April 2022).
83. Romanian Digitization Authority. E-România. A Public Policy in the Field of e-Government. 2020. Available online: https://www.adr.gov.ro/wp-content/uploads/2020/08/Livrabil-A12_Propunere-de-politica-publica-in-domeniul-e-guvernarii.pdf (accessed on 5 May 2022).
84. The Official Monitor of Romania. Order on the Approval of Measures for the Organization of Activity within Educational units/Institutions in Conditions of Epidemiological Safety for the Prevention of SARS-CoV-2 Virus Diseases. 2021. Available online: https://www.edu.ro/sites/default/files/ordin%20comun%20nr.%203.235_93_4.02.2021.pdf (accessed on 18 April 2022).
85. Chichernea, V.; Garais, E.G. From E-Learning and On-Line Education to the Digitalization of the main activities in current society. *J. Inf. Syst. Oper. Manag.* **2021**, *15*, 58–65.
86. European Council. Promoting the Use of Energy from Renewable Sources. 2017. Available online: https://www.consilium.europa.eu/ro/press/press-releases/2017/12/18/promoting-renewable-energy-use-council-adopts-its-position/ (accessed on 9 April 2022).
87. Profit. Romania Risks Fines from the EU of 1 Million Euros Per Day for Waste. The Solution at Hand to Avoid the Sanction. 2019. Available online: https://www.profit.ro/stiri/social/foto-romania-risca-amenzi-ue-de-1-milion-euro-pe-zi-pentru-deseuri-solutia-la-indemana-pentru-a-evita-sanctiunea-19035012 (accessed on 10 April 2022).
88. Esi Thoughtlab. Smart City Solutions for a Riskier World. How Innovation can Drive Resilience, Sustainability, and Citizen Well-Being. Version 2. 2021. Available online: https://econsultsolutions.com/wp-content/uploads/2021/03/ESITL-Smart-City-Solutions-eBook-Final.pdf (accessed on 2 August 2022).
89. Ministry of Investments and European Projects. 2022. Available online: https://mfe.gov.ro/ (accessed on 2 August 2022).
90. Environment Fund Administration. 2022. Available online: https://www.afm.ro/ (accessed on 2 August 2022).
91. Ministry of Environment, Waters and Forests. 2022. Available online: http://www.mmediu.ro/categorie/finantate-din-fondul-de-mediu/97 (accessed on 2 August 2022).

92. Brasov County Council. 2022. Available online: https://site.judbrasov.ro/upload/files/1606407111_Planul%20Jude%C5%A3ean%20de%20Gestion-are%20a%20De%C5%9Feurilor%20%C3%AEn%20Jude%C5%A3ul%20Bra%C5%9Fov%202020-2025%20-%20noiembrie%202020.pdf (accessed on 1 August 2022).
93. The Information and Communication Portal of the Municipality of Brașov. 2022. Available online: https://www.brasovcity.ro/ (accessed on 1 August 2022).
94. The Forum of Green Cities. 2022. Available online: https://fovbv.ro/ (accessed on 1 August 2022).
95. Ghadami, N.; Gheibi, M.; Kian, Z.; Faramarz, M.; Naghedi, R.; Eftekhari, M.; Fatholhi-Fard, A.; Dulebenets, M.; Tian, G. Implementation of solar energy in smart cities using an integration of artificial neural network, photovoltaic system and classical Delphi methods. *Sustain. Cities Soc.* **2021**, *74*, 103149. [CrossRef]

Bulletin of the *Transilvania* University of Braşov
Series V: Economic Sciences • Vol. 14(63) No. 2–2021
https://doi.org/10.31926/but.es.2021.14.63.2.15

INNOVATION IN RETAIL

Marius BĂLĂȘESCU[1]

Abstract: *This paper proposes an investigation of the trend concerning both to innovation in the field of retail trade and involvement of technology in streamlining the purchasing process, starting from the example given by Amazon- that is, implementing artificial intelligence and sensor-based systems in cashless stores, Amazon Go. The purpose of this scientific approach is to understand the influence of technological developments within the retail field and to analyze the current state of innovation in this industry for a possible shaping of the future buying experience.*

Key words: *retail, innovation, technology, change.*

1. Introduction

Technological advances in recent years have led to many improvements in various industries, reshaping them under the influence of strong innovation. The world of retail is no exception, where the impact of technological evolution plays a very important role in moderating the constant changes which occur in the field.

Historically, this evolution has shaped the concept of retail over time through the implementation of internet-based technologies, which have given companies the opportunity to reach customers through new ways (eg Google AdWords), revolutionize supplies, manage orders and deliveries and apply radical business models (e.g., Netflix, Amazon). These changes have directly affected consumers, who are in a position to interact with each other through blogs and forums, social networks, with the possibility of adding reviews of products and services (Varadarajan et al., 2010).

Given the frequent changes in this area, companies' efforts to maintain profitability, maintain market relevance and gain competitive advantage are based on the adoption of new technologies and innovations, especially those in the area of customer contact interface.

Traditional business models of retailers are confronting with disturbances, for new participants entering the maket are offering more value to their clients in an efficient manner. To stay competitive and to be able to survive in this diverse environment, marked by continuous changes, retailers must innovate by adopting new technologies with a positive impact on the retail industry (Oasthuizen, 2020).

[1] *Transilvania* University of Braşov, mariusbalasescu@unitbv.ro, ORCID ID: 0000-0002-0781-9145

2. Retail Innovation through the Use of New Technologies

2.1. Artificial intelligence

Applications based on artificial intelligence include customization and referral systems, efficient sales / customer relationship management, customer service management, supply chain optimization and inventory management.

In January 2018, Amazon opened the first cashless grocery store, Amazon Go, implemented through artificial intelligence in Seattle, Washington. Amazon Go's innovation has been the sum of several technologies used throughout the company's time, such as artificial intelligence, machine learning, facial recognition, integrated payments, Qr Code identifiers and technologies based on a multitude of sensors.

Customers can enter such a "Just Walk Out" store through a mobile app associated with a credit card, select the desired products from the shelves and refrigerators, and then leave the store without waiting for the scan. The payment is made automatically, the total purchased products being withdrawn from the account associated with the exit application. This is possible thanks to the camcorders on the ceiling and shelves that follow the customer's movements through each frame. The software decides which items were selected using the depth sensors of the camcorder and the weight sensors on the shelves. Product records are reflected in a virtual shopping cart. If after the transaction, the customer is not satisfied with the purchase, he has the possibility of virtual return of the product through the mobile application for full recovery of physical return is not necessary (Ives, 2019).

Due to the current advances in Information and Communication Technologies, the sector of retailing is forced to pursuit innovation from the most recent technical solutions. Especially the use of virtual reality techniques offers tools for supporting the design of innovative systems capable of enhancing users' experience (Korves and Loftus, 2000).

2.2. Biometric technology

Retail managers continuously make decisions related to the adoption of new technologies available in the field. In recent years, biometrics has become a key word in technology circles, with more and more businesses, including many retailers and government agencies testing various forms of biometrics, from simple fingerprint readers to elaborate iris scans.

Biometrics is a process used to identify or authenticate the identity of an individual using one of its physical or behavioral characteristics. These features are not limited to fingerprints, palm geometry or iris scanning, and other options are available such as facial mapping, signature and writing style and, more recently, DNA maps (Clodfelter, 2010).

One of the simplest examples of biometric technology is the replacement of traditional authentication data (username and password) with a fingerprint for registration on a computer or network. Disney World uses fingerprint scanning at the

entrance of the theme park for season ticket holders while some casinos use face recognition technology to detect cheating players.

Biometric payment systems that use fingerprint scanning technology or the geometry of a palm represent another novelty implemented by some retailers.

An innovation in the field of retail involving biometric technology also comes from the company Amazon. Since 2020, Amazon Go cashierless stores have received an upgrade to the "Just Walk Out" system which involves replacing mobile phone scanning to facilitate on-premises access with a contactless method based on palm scanning as a unique signature which identifies the customer and enables the system based on artificial intelligence to assist him in making purchases. This technology, called Amazon One, has already been implemented in two of the Amazon Go stores in Seattle, with the initial registration of the customer lasting less than a minute. According to user reviews on the company's website, the improvement of the two concepts was a real success, appreciating the efficiency of the systems given the short time spent in the store and the safety it offers customers during the pandemic of COVID- 19, keeping physical interaction with staff to a minimum.

The strategy behind the Amazon Go store is to create a shopping experience without interacting with employees or making payments manually, making purchases as easy as possible.

Adopting this strategy is the exact opposite of the classic ways of retailing. Instead of interrupting the customer making them interact with the technology or asking them to get in touch with the brand online, Amazon wants to keep the technological aspects hidden, to run in the background without disturbing the consumer, thus shaping the shopping experience in a activity that gives the client the impression of an intimate, personal atmosphere.

3. The Role of Marketing in Amazon Go Innovation

The market segmentation strategy involves dividing it into small accessible groups, with the aim of concentrating resources efficiently in those groups with the greatest possibility of buying the product or using the service. In the case of Amazon Go, the target market is that of smart shoppers, a marketing segment which represents a group of people who prefer the ease of the purchase process despite the price. They seek to buy as much as possible, investing as little time and effort as possible.

The justification for focusing on this segment is given by the fact that the store uses a lot of technology to facilitate the customer experience, thus perfectly molding the pattern of the smart buyer whose only desire is to make purchases as efficiently as possible in a short time.

Amazon's most valuable asset is branding, which is one of the causes that led to the company's success. The main strength of Amazon is given by customer loyalty, the company being famous for its innovative and reliable products. Other factors that can be taken as strengths are sustainability and efficiency in terms of environmental protection. The brand ranking really matters for business growth, and Amazon is one of the most innovative names in the world, their aim to offer state-of-the-art technology and unique

features along with innovative products.

As Amazon Go introduces the concept of automated stores, a new and easier shopping experience can emerge, where the main goal is to become a pioneer in the market. Positioning the brand will not be so difficult due to the existing name of Amazon, the existing branding strategy proving useful in the case of Amazon Go.

The strategy behind the Amazon Go store is to create a shopping experience without interacting with employees or making payments manually, making purchases as easy as possible.

Amazon Go stores will be able to keep track of every customer movement, the brand having a greater amount of marketing data available than ever before.

Consumers are accustomed to personalizing the experience based on registration data from previous uses, which is reflected in a better service. An example of this is given by the recommendations made by the Netflix platform or by the playlists made by Spotify.

In the case of Amazon Go, consumers will waive the right to privacy when entering the store while making personal purchases, being monitored at every step whit every product taken from the shelf and every route taken inside the store. All this information will be available to the company. Many retail companies have tried over the years to track customers in order to extract data, leading to problems, such as the case of the American retailer NordStorm which was forced to give up tracking people in the store via Wifi due to consumer riots.

For Amazon Go, the goal is to use the retrieved data in a smart and relevant manner, and to perform monitoring in a way that does not endanger consumer privacy.

4. Conclusions

The adoption of new technologies in retail outlines the shopping experience of the future characterized by short lead times, reduced physical interaction and increased efficiency.

The importance of technology has reached critical levels during the COVID-19 pandemic, becoming the helping hand that humanity needs. Following restrictions and warnings designed to slow the spread of coronavirus, many retailers have been forced to close their physical stores, to rethonk strategies of providing security to customers. The imposition of new regulations has led to a much greater need to adopt technology-based solutions such as click and collect, online orders and robot-assisted operations.

Strategic returns management lets retailers get ahead of returns in a way that's cost-effective and appealing to consumers.

Buyers want to interact with retail brands that offer convenient experiences. Business ecosystems, a network of companies connected by data, products and services, have evolved in response to this demand, focusing on minimizing the number of steps a person must take to obtain the products they need.

A lot of data held leads retailers to create their own media platforms, in direct partnership with suppliers or other brands to provide highly personalized data and commitments on owned channels. These relationships are closely linked, with partners and retailers exchanging direct information about the target audience (eventually

consolidating their primary data over time), and retailers benefiting from new revenue by monetizing the data.

The process of accelerating the digitalisation of the industry will have as an effect the emergence of many new technologies in a wide range of fields, with retail being one of them. If until now the involvement of technology in the physical shopping experience was meant to improve the brand image, bring a competitive advantage or increase profits and reduce costs, in the near future this trend will become a standard whith pioneers in the field, such as Amazon enjoying leading places in the top of retailers.

For almost two years, retailers have faced restrictions on COVID-19, with e-commerce changing consumer expectations and the role of physical stores and online channels. Consumers' desire to return to physical retail can be seen in store profits after lifting restrictions.

Increasing the diversity of technologies within the field of retail, such as augmented reality, virtual reality and artificial intelligence-based information systems, raises a number of relevant questions regarding the protection of customers' personal information. Addressing potential privacy threats in the online and offline context is a complicated issue, as offline consumers are easily influenced by the shopping environment, being a tangible environment, customers feel closer to it and have more trust. Offline retail media could incline consumers to disclose more personal information than they would in an online context, including not only registration data but also the biometric characteristics of the individual, such as face, ethnicity- and behavioral reactions (Pizzi, 2020).

In the case of “Just Walk Out” type stores, the biggest impediment that must be solved by the companies that implement this concept, is represented by the customers' confidentiality, the system being based on most of their personal data. The success of the cashierless store model lies in the correct balance between the numerous advantages offered after the implementation require an accompaniment with a strict privacy policy which respects the privacy of the consumer.

References

Clodfelter, R., 2010. Biometric technology in retailing: Will consumers accept fingerprint authentication*?, Journal of Retailing and Consumer Services*, 17(3) pp. 181-182.

Econsultancy, 2017. *Nikki Gilliland*: *What can marketers learn from Amazon Go’s customer experience?* Available at: <https://econsultancy.com/what-can-marketers-learn-from-amazon-go-s-customer-experience/>

eMarketer, 2020. *Rima Kats: For Many Consumers, the In-Store Shopping Experience Still Has Flaws.* Available at: <https://www.emarketer.com/content/for-many-consumers-the-in-store-shopping-experience-still-has-flaws>

eMarketer, 2020. *Rima Kats: Self-Checkout Is Changing the Retail Landscape*. Available at:<https://www.emarketer.com/content/self-checkout-is-changing-the-retail-landscape>

Ives, B., Cossick, K., Adams, D., 2019. Amazon Go: Disrupting retail?. *Journal of Information Technology Teaching Cases*, March 26, pp. 1-2.

Korves, B., Loftus, M., 2000. Designing an immersive virtual reality interface for layout planning. *Journal of Materials Processing Technology*, 107, pp. 425-430.

Neacsu, N.A., 2020. The Customer-oriented Strategy - A Tool for Increasing Customer Satisfaction. *Bulletin of the Transilvania University of Braşov, Series V,* vol. 13 (62), No. 1, pp. 49-56.

Oosthuizen, K., Botha, E., Robertson, J., Montecchi, M., 2020. Artificial intelligence in retail: The AI-enabled value chain*. Australasian Marketing Journal*, pp. 1-7.

Pizzi, G., Scarpi, D., 2020. Privacy threats with retail technologies: A consumer perspective*. Journal of Retailing and Consumer Services*, Elsevier, vol. 56(C), pp. 1-2.

Varadarajan, R., Srinivasan, R., Vadakkepatt, G.G., Yadav, M.S., Pavlou, P.A., Krishnamurthy, S., Krause, T., 2010. Interactive Technologies and Retailing Strategy: A Review, Conceptual Framework and Future Research Directions. *Journal of Interactive Marketing* 24, pp. 96-97.