

SYSTEMATIC REVIEW: OPPORTUNITIES AND BARRIERS TO ONLINE MARKETING CAUSED BY THE DEVELOPMENT OF THE INTERNET OF THINGS

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Abstract. The current research aims to systematically review the impact of the Internet of Things (IoT) on online marketing, focusing on its opportunities and challenges. Using the PSALSAR methodology, this research delves deep into the literature to understand the nature of IoT influences. The analysis reveals that while IoT offers transformative potential for online marketing, it brings with it significant challenges. Among these challenges are concerns about security, consumer perceptions, and sustainability. Furthermore, there is a noticeable gap concerning the quantifiable impact of IoT on B2B online marketing effectiveness and the long-term customer perceptions of IoT-integrated products. The estimation of effects and opportunities as well as a detailed description of challenges is an important step in every technological development.

Keywords: online marketing, data-driven approach, online marketing opportunities, online marketing barriers, systematic review, Internet of Things.

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1. Introduction

Nowadays we are facing an increasing number of publications that are pointing out the rapid development of communications technologies and stating that the world is on the edge of the new industrial revolution (Li et al., 2017). Chen and Lien (2014) mentioned that the ability to create machine-to-machine communications, termed the Internet of Things (IoT), is the core driver of the changes. Edquist et al. (2021) proved that IoT technologies have an influence on economic development and impact both consumers and industries.

The principal aim of this article is to explore the impact of IoT – a formidable technological advancement – on online marketing. This examination encompasses the exploration of potential opportunities and challenges, as well as broader implications for the business landscape.

While the influence of IoT is recognized across diverse sectors, there remains a conspicuous paucity in the literature specifically dedicated to its role in the evolution of online marketing. The central inquiry thus emerges: How does the infusion of IoT technologies transform the shape and position of online marketing,

and what direct and indirect outcomes can stakeholders anticipate?

This study predominantly centers on the role of IoT in online marketing, particularly its proficiency in collecting amounts of data and the subsequent consequences for marketing paradigms.

The preliminary task includes undertaking a systematic literature review to explore existing knowledge about IoT's impact on online marketing, identifying the opportunities and challenges brought about by IoT integration in online marketing, and highlighting research gaps including suggesting areas for future exploration.

Through the PSALSAR methodology, we employ systematic literature review tools and techniques, ensuring a rigorous and comprehensive analysis of the research topic.

Every new technology could be implemented in different areas of the economy, and each company is always trying to implement it in a way to maximize profit (Jensen, 2002). IoT technologies enable companies to collect a huge amount of data. Thus, the rapid development of the data-driven approach in online marketing is just a matter of time (Shah & Murthi, 2021).

2. Literature review

2.1. Internet of Things (IoT) development

Online marketing has become a fast-developing area because of the increased demand from the business world which considers it as a powerful and inalienable part of the commercial environment (Warokka et al., 2020). Nevertheless, the rapid development of online marketing is not possible without the underlining changes in technological progress (Basyazicioglu & Karamustafa, 2018). Manyika et al. (2015) stated that the background technological challenge can act as a barrier to the most fundamental changes. Chow et al. (2021) confirmed the statement that the prerequisites for the upcoming development of the IoT infrastructure are connected to the technical progress that should enable the overall implementation of the new techniques. Lei et al. (2021) connected the development of fifth-generation technology with the revolution within IoT solutions that enables the establishment of new ecosystems.

According to Aslam and Karjaluo (2017), the shift to a more digital approach in the advertising paradigm is happening more rapidly than expected which is concluded referenced to the overcoming investment in digital aspects compared to classical media since the trackable results can be easily estimated. The reasonableness of the increasing investment is confirmed by the direct correlation between the digital tools' cost and digital revenue (Al-Ababneh, 2020). Thus, in order to boost the visibility and reach the results faster, especially by focusing on data-driven decisions and by having a detailed analysis of the customer journey, there is a need to apply and integrate new tools, bidding strategies and accuracy analysis with the help of new applications in a shorten time which leads to being in a changeable environment on a constant base (Gupta, 2020).

2.2. Online marketing and Internet of Things (IoT)

New marketing concepts have emerged as a result of technological advancements in internet media and other digital media (Ziamba et al., 2018). Moreover, nowadays online marketing is an important tool for building strong client relationships (Karczmarczyk et al., 2018). The IoT enables to use of a more comprehensive term as the internet since the major marketing relevant factor nowadays is a stable connection (Ferrell et al., 2021). Simões et al. (2019) stated the IoT opens up new possibilities for marketing activities and strategies. Nistor and Zadobrischi (2022) extended the statement and pointed out that through innovative product creation, customer relationship management, and product support, IoT has the potential to improve the marketing results and the quality of the marketing strategy. Kumar et al. (2021) pointed out the rapid development of the Internet of Things and allocated the IoT to the core of the marketing strategy. Joghee (2021) summarized that the goal of the data provided by IoT solutions has to be focused on the improvement of the marketing strategy by influencing each phase of the marketing distribution

process, especially for customer communications and retention.

Despite the many advantages of IoT integration in e-marketing, there are some drawbacks (Abdel-Basset et al., 2019). Hanafizadeh et al. (2021) classified the IoT challenges into four groups connected to technological, legal, social, and market-related categories. Stoiber and Schönig (2021) stated that lots of companies are facing a variety of challenges linked to different internal areas during the implementation of the IoT.

In order to boost the visibility and reach the results faster especially by focusing on data-driven decisions there is a need to apply and integrate the new tools (Gupta, 2020). Islam et al. (2022) stated that the Internet of Things is getting more popular both for companies and academic studies over the entire environmental world. Nevertheless, many organizations are behind consumers in terms of digital adaptation because in many cases the performance benefits of digitalization are unclear which can be described as a barrier to clear goal setting (Warokka et al., 2020). To overcome the uncertainties a detailed description of the challenges and barriers of the new technology is a critical aspect (Nunn, 2009). Moreover, the transformation outcomes and challenges need to be overcome and estimated in advance (Stoiber & Schönig, 2021).

3. Research method

3.1. The PSALSAR framework

The methodology of the systematic review enables to minimize the subjectivity and bias and helps to achieve transparent conclusions (Hulland & Houston, 2020; Ismail et al., 2021; Siddaway et al., 2019). For the purpose of the current research, we used the PSALSAR (Protocol, Search, Appraisal, Synthesis, Analysis and Report) method (Mengist et al., 2020). This extended framework has been justified as a powerful tool for conducting a literature review and, in addition, for estimating the scope and the size of the researched topic (Booth et al., 2021, Codina & Lopezosa, 2021). The establishment of the protocol as a part of PSALSAR method (as shown in Table 1) enables to get the reproducibility and the transferability of the systematic review (Ismail et al., 2021).

Currently it is not possible to accurately estimate the extent of the changes caused by the development of the Internet of Things, however it is expected to significantly impact online marketing (Ramlowat & Pattanayak, 2019). Thus, we propose the following research questions:

1. What are the opportunities for online marketing the implementation of the IoT can lead to from the perspective of producers, consumers, and the environment?
2. What factors are acting as barriers to online marketing from the perspective of producers, consumers, and the environment?
3. Which types of opportunities and barriers are described in the highest and the least number of articles?

Table 1. The PSALSAR framework for the systematic literature review

Steps	Outcomes	Description
Protocol	The definition of the scope of the study	Studies on influences of the Internet of Things on online marketing in a form of opportunities and barriers for producers, consumers, and environment; publications between 2018–2022
Search	The definition of the search strategy	– Databases (Scopus, Google Scholar, Web of Science) – Searching strings defined in Table 3
Appraisal	The definition of the selection of the studies	– The usage of PRISMA flowchart for structuring the browsing process – Defining inclusion criteria – Defining exclusion criteria
Synthesis	Extracting the data	Sorting, categorizing and exploring the data
Analysis	– Summarizing of the data – Formulation of the result – Conclusions	– Description and classification of opportunities – Description and classification of barriers – Identifying trends and gaps with a recommendation for further studies
Report	Reporting the outcomes	The detailed arrangement of the information in a form of a literature review

4. What is the most critical research gap that is mostly recommended for further research?

The analysis and report phases set the aim to evaluate the synthesised data and present the outcome in a form that can clearly answer the research questions and define recommendations for future research directions. However, as there is no consistency in the personal rules, the outcome depends on personal judgment, understanding, and expertise (Svenson et al., 2018). Thus, we used the PICOC (Population, Intervention, Comparison, Outcome, and Context) framework as shown in Table 2. Davies (2011) stated that the PICOC framework is the powerful tool for guiding the search strategy formation.

3.2. The searching terms and screening process

The search string is listed in Table 3 and concentrates on the combination of the keywords containing the term “Internet of Things” and “online marketing” since the deter-

mination of keywords for the search tends to be derived from the research questions: “challenge”, “barrier”, “opportunity”. Researchers should strike a balance between the degree of exhaustiveness and precision (Wanden-Berghe & Sanz-Valero, 2012). One of the most important factors by definition of the search string is the issue of the evolving vocabulary (Bayliss & Beyer, 2015). Thus, we added substitutes to the search string: “smart things”, “IoT”, “e-marketing”, “digital marketing”, and “applications”. The cultural difference in terminology has also been taken into consideration. Based on research questions and objectives, as well as by reviewing similar studies, a list of initial keywords has been compiled and tested using the open-source tool Google Keyword Planner and directly in the target databases. The search terms applied for titles, abstracts, and keywords. The search databases for this paper were Scopus, Google Scholar, and the Web of Science. Martín-Martín et al. (2018) mentioned that the mentioned databases are actively used by researchers and have similar available articles, Google Scholar has, nevertheless, a

Table 2. The framework based on the PICOC methodology for determining the research scope

Concept	Definition	Application
Population	The influences that implementation of the Internet of Things solutions have on online marketing.	The influences can affect the development of the online marketing in both directions – as an opportunity and barriers that are applicable for all parties: producers, consumers and the environment.
Intervention	Existing material and publications related to the topic of the current research.	The detailed search for the information in the published articles with an aim to find the impacts on online marketing caused by the implementation of the Internet of Things. The indication of the possible gaps for the further research is applicable here, for instance the measurement of the influences and the examination of the nature of the changes.
Comparison	Critical comparison and summarizing techniques.	The classification and detailed analysis of the controversial opinions and the summarizing of the existing information.
Outcomes	The formulation of the summary of the existing knowledge and formulating the gaps in the selected publications.	The summary of the knowledge from the existing publications with the formulation of the most and least studied areas; the classification of the influences; the summary of the research trends, challenges and gaps.
Context	Studies and publications related to the Internet of Things and online marketing	Browsing the most related publication (2018–2022 years) with a focus on online marketing and the Internet of Things areas including analyses, case studies and summaries.

Table 3. The searching terms

Description	Searching string	Database	The number of articles	Date
Main searching terms	"Internet of Things" AND "online marketing" AND "barriers"	Scopus	0	22.07.2022
		Google Scholar	905	15.07.2022
		Web of Science	7	15.07.2022
	"Smart Things IoT" AND "online marketing" AND "barriers"	Scopus	1	22.07.2022
		Google Scholar	637	15.07.2022
		Web of Science	7	15.07.2022
"Internet of Things" AND "online marketing" AND "opportunities benefits"	Scopus	1	22.07.2022	
	Google Scholar	2320	15.07.2022	
	Web of Science	32	15.07.2022	
"Smart Things IoT" AND "online marketing" AND "opportunities benefits" AND NOT "Internet of Things"	Scopus	1	22.07.2022	
	Google Scholar	415	16.07.2022	
	Web of Science	23	15.07.2022	
"Internet of Things" AND "online marketing" AND "challenges"	Scopus	1	22.07.2022	
	Google Scholar	2010	22.07.2022	
	Web of Science	42	15.07.2022	
"Smart Things IoT" AND "online marketing" AND "challenges" AND NOT "Internet of Things"	Scopus	3	22.07.2022	
	Google Scholar	1130	22.07.2022	
	Web of Science	35	15.07.2022	
Secondary searching terms	"Internet of Things" AND "opportunities benefits" AND "e-marketing digital marketing" AND NOT "online marketing"	Scopus	55	22.07.2022
		Google Scholar	905	15.07.2022
		Web of Science	93	15.07.2022
	"Smart Things IoT" AND "challenges barriers" AND "e-marketing digital marketing" AND NOT "online marketing"	Scopus	36	22.07.2022
Google Scholar		813	15.07.2022	
Web of Science		74	15.07.2022	

broader range of outputs. The tasks of storing, screening, and excluding articles were facilitated using software tools, including Zotero, Microsoft Excel, and Microsoft Word.

We evaluated the selected articles after removing the duplicates based on the predefined work objectives and on the inclusion and exclusion criteria that are listed in Table 4.

Table 4. The inclusion and exclusion criteria

Decision	Criteria
Inclusion	Papers published in a scientific journal (in English language)
Inclusion	Papers in which the predefined keywords are present in full or in a meaningful quantity
Inclusion	Papers that are answering the research questions (title, abstract, body screening)
Exclusion	Papers that are not full, review papers, meta-data, out of date (before 2018)
Exclusion	Papers of non-English language, not original research
Exclusion	Papers exclusively connected to specific countries and/or companies (reviews)
Exclusion	Papers connected specifically to COVID-19 influences
Exclusion	Papers not directly connected to online (digital) marketing

The eligibility part of the appraisal phase has been applied in a three steps funnel approach: title, abstract and main body skim reading. The outcome of the appraisal phase is the transparent database of the related articles prepared for the synthesis phase. The extraction of the relevant data has been synthesised into three main groups: studies related to producers, consumers, and environmental impacts. In addition, in order to standardize the extraction, the studies have been marked as containing information about the opportunities, related to barriers or covering both dimensions.

The summary of the screening process is a form of a flow diagram enables a better comprehension (Vu-Ngoc et al., 2018). Thus, the flow chart is presented in Figure 1.

4. Results

4.1. General trends

The results of the systematic literature review show the increasing interest in the Internet of Things applications and influences from different perspectives and application areas. Since the focus of the current review is set directly on online marketing, Figure 2 presents the development over time of the number of publications that have been selected for the analysis. Although the graph depicts an increasing interest from researchers by illustrating a rise

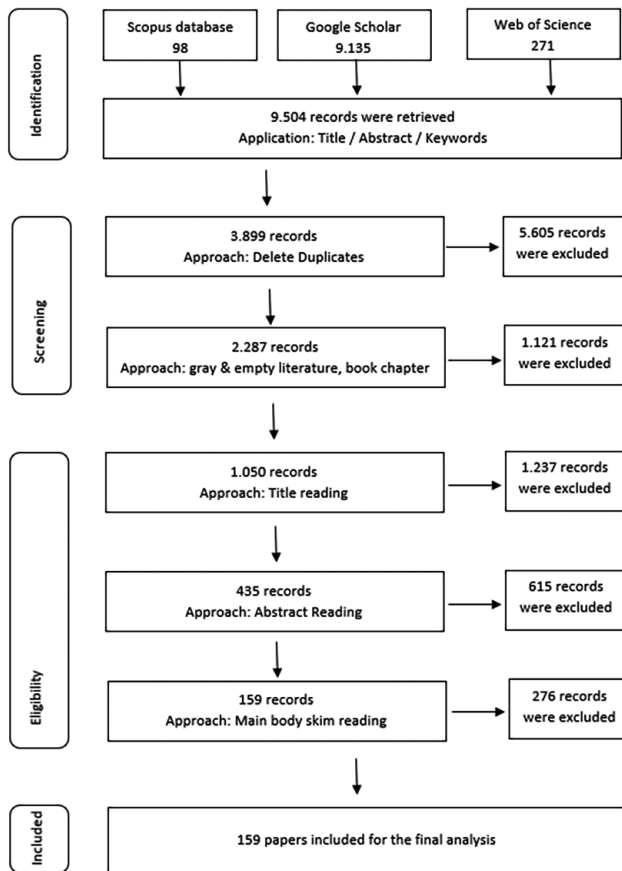


Figure 1. The flow chart of the screening process (source: authors' illustration using MS Word software)

in the number of publications, it also reflects the growing interest and the diverse range of problems that have been addressed and discussed in these publications. The 2022 data has a timeline from January to the middle of July. It illustrates and justifies the importance of the topic both from scientific and practical perspectives (Blasco-Arcas et al., 2022).

The main focus of reviewed articles is targeted at online marketing producers. The estimation of the possible benefits, the list of barriers, and the applied analysis with an aim to estimate a possible outcome are named as one of the main goals of the reviewed publications (Figure 3). Even though the consumers' impacts and perceptions are being researched by 20% of the sample group – the outcomes have been presented through the prism of the managerial implications and linked to the possible practical implementation.

The analysis has shown a notable spread of the research sub-areas. However, the question regarding the opportunities for product development and customisation as a part of a competitive advantage creation process is one of the most highlighted areas within the selected literature that has been published over the last years. Since nowadays technologies are a part of every social and economic area, businesses in general and marketing experts, in particular, are seeking opportunities within all available services (Sharma & Venkateswaran, 2020). Basically, IoT

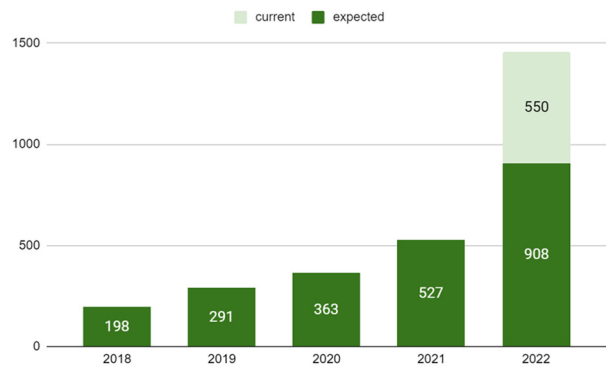


Figure 2. The number of publications per year (source: authors' illustration using MS Word software)

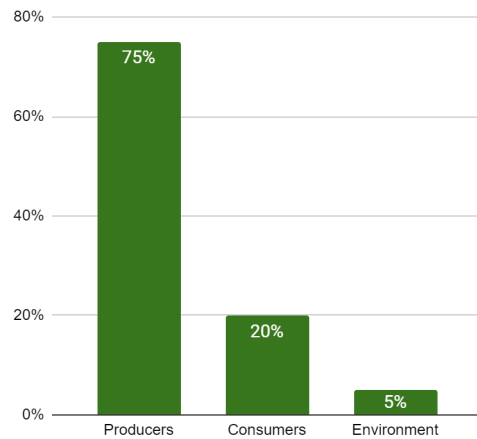


Figure 3. The main focus of reviewed publications (source: authors' illustration using MS Word software)

technologies are a boon for blue ocean strategies (Amjad et al., 2022).

The major opportunity is connected to advanced behavioural and customer analysis (Figure 4). The high amount of data gained through IoT influences and enables a targeted and clustered advertisement, and ad-hoc adjustment of the CRM communications and strategies by shifting the online marketing processes towards data-driven decisions whose outcomes are applicable beyond the online marketing expertise field. Therefore, some reviews are connected to customer perception questions and emphasize the importance of customer acceptance research. The automation of the processes, speeding up the decision-making, reducing errors, and adoption of the interactions opens an opportunity for justification and estimation of the application needs. Thus, nearly a quarter of the reviewed articles are reporting the outcomes of the process automatization actions.

The systematic review has found some important but rarely described opportunities and factors influencing the entire online marketing paradigm, such as the positioning of the marketing job within the organisation with regards to a decision-making responsibility, social-related aspects such as quality and quantity of the information flow as well as audience engagement opportunities in terms of long-term influences.

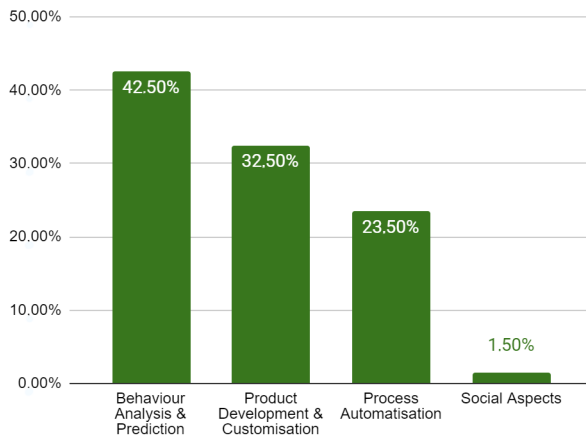


Figure 4. The main focus of reviewed publications connected to benefits and opportunities (source: authors' illustration using MS Word software)

The outcomes of the research on factors that can act as barriers and challenges are mainly connected to security and legal as well as technological issues. Since the new technology needs to be adopted, companies may face lots of technological difficulties (Wagner & Cozmiuc, 2022). Thus, specific implementation techniques and technical guidelines as well as questions concerning the importance of the development and deployment of IoT-related tools and processes applied to different areas of economics are covered in half of the reviewed publications. The systematic review has also identified concerns connected to uncertainties within the legal environment as well as unexpected government movements (Arora, 2020).

On the other hand, social challenges connected to long-term consumer perception, employee mindset development, and unprotected social group privacy issues are not researched well (Figure 5). In addition, the sustainability questions as a part of the social-related issues are not the focus of the current publications. One of the most important concerns is connected to the unclear benefits of the technology implementation. Numerous researches have mentioned the benefits and expected opportunities of the implementation of IoT-driven information flows into online marketing strategies without a clear estimation of the level of those benefits.

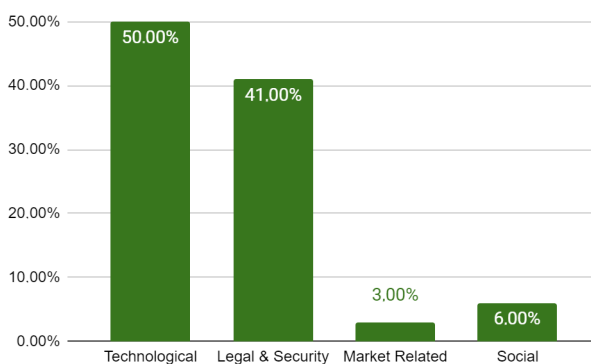


Figure 5. The main focus of reviewed publications connected to barriers and challenges (source: authors' illustration using MS Word software)

The review revealed that while the IoT has significantly disrupted e-commerce and augmented online marketing capabilities, current literature predominantly focuses on technical aspects and the producer's perspective. There's a notable research gap concerning consumer perceptions of IoT-driven e-commerce tools, even as online marketing evolves to be more customer-centric. Additionally, security and sustainability concerns related to IoT in online marketing persist. Thus, for businesses to maximize IoT benefits in online marketing, there's an urgent need for balanced strategies that address consumer sentiments, security risks, and environmental implications, while also advocating for future research into consumer behaviour and sustainable IoT solutions.

4.2. Opportunities for online marketing

The integration of the Internet of Things (IoT) in online marketing has garnered significant attention in recent academic discourse, with a consensus highlighting its transformative potential for increasing both effectiveness and efficiency (Chepurna & Criado, 2018; Chung & Liang, 2020; Ismail Abdulkarim Adamu et al., 2020; Nagy et al., 2018; Sheoran & Vij, 2021; Parra et al., 2019; Ramhormozi et al., 2019; Turhan, 2022). With the development of data analysis, propelled by IoT capabilities, the measurement of productivity is taken to a new level since almost every touchpoint and decision that is done can be tracked and optimized (Wedel & Kannan, 2016). As Weng (2021) noted, marketing intelligence activities, deeply intertwined with IoT advancements, has emerged as a foundation of marketing nowadays.

Yanyan (2022) stated that the availability of the IoT is not only influencing online marketing performance but also changing the way marketing is being proceeded. Bajpai and Pillai (2022) stated that IoT data has a significant impact on marketing strategies (Table 5).

Chepurna and Criado (2018) highlighted the integral effect of IoT in value creation that can help to differentiate the value proposition of the product placement by the marketing department. Thus, the Internet of Things availability is a core competence of the company's development and not the supporting tool – IoT can be a part of the project or a new system (Broo et al., 2022). Diving deeper, Broo et al. (2022), Puiu et al. (2022) applied an analogy to Internet development. According to Varnali (2010) Internet can be described as a driver for significant market transformations and the establishment of online marketing that force significant changes to marketing strategy. On the controversy, Tridalestari et al. (2022) name the IoT a supply function of marketing but not the forming one. Guo et al. (2022) confirm the statement mentioning the optimization of marketing sources being the core of changes and suggests proving the outcomes of marketing opportunities with numbers in order to estimate to what extent the changes have an impact on marketing to define the place of the IoT in the marketing paradigm.

Table 5. The top-level classification of IoT opportunities for online marketing

Product Development & Customisation	Behaviour Analysis & Prediction	Social Aspects	Process Automatisation
<ul style="list-style-type: none"> ■ Product Customisation; ■ New product development; ■ Ability to create a competitive advantage. 	<ul style="list-style-type: none"> ■ Improvement of targeted advertisement and impact on CTR; ■ Improvement of the CRM communications & strategies; ■ Internationalization possibilities. 	<ul style="list-style-type: none"> ■ New positioning of marketing jobs; ■ Purification of advertisement & information flow; ■ Expanded engagement opportunities. 	<ul style="list-style-type: none"> ■ Automatisation of social media activities & ads placement; ■ Adoption of SEO towards user-friendly environment; ■ Reducing error rates; ■ Optimisation of the overall performance incl. cost reduction; ■ Faster decision-making.

Abd Latib et al. (2021) summarized the discussion by stating that a company needs to implement new technologies for improving efficiency and enhancing effectiveness even though the question regarding the measurement of the impact is open. Online marketing is a field where all possibilities including edge technologies should be implemented (Cruz, 2020) because marketing managers are continuously searching for new opportunities (Hasler et al., 2020). In general, online marketing and pure performance marketing cannot be detached from other aspects of the company's development (Islam, 2018). Apasrawirote (Apasrawirote et al., 2022) proves that IoT has an impact on marketing tools, strategy, relationships, and leadership. Thus, the marketing research area is also affected by digital developments. This has led to a significant shift from intuition-driven campaigns to data-driven strategies.

One of the core applications of IoT is linked to improvement in customer relationship management (Sheoran & Vij, 2021). The cornerstone is connected to machine-to-machine communication (Edquist et al., 2021; Ismail Abdulkarim Adamu et al., 2020; Ungerma et al., 2018). Parra et al. (2019) highlighted target communication as a prime example of the IoT's influence on online marketing, with its ability to provide real-time feedback offering marketers a distinct advantage in swiftly adapting to evolving market dynamics and customer preferences. Ramhormozi et al. (2019) extend the statement by connecting the opportunities with the new data streams. Along with the optimisation of the core principles of customer relationship strategies in digital marketing real-time data is making a difference in effectiveness and efficiency (Zare & Honarvar, 2021).

In connection to relationship management, the IoT enables to determine customer needs and adjust of the targeted offer (Gasimov & Aliyeva, 2020). That helps to increase customer faithfulness (Rajesh et al., 2022). According to Wagner and Cozmiuc (2022) that can be achieved by exploring new channels and data especially focused on buying experience. Nusairat et al. (2021) connected it to significant improvements in the prediction of user behavior caused by IoT integration. Malik et al. (2022) named precise forecasting based on IoT data as the main point of the success determination. Thus, the availability of IoT increases precision and the prediction results of the marketing analysis (Bajpai & Pillai, 2022; Daskalakis et al., 2022).

The major difference to marketing without IoT exists in factors building success – it has always been human and

personal experience; the availability of IoT is adding an additional component (Volkmar et al., 2022). Yu (2022) pointed out the change in the marketing paradigm through the marketing role perception: the leading role of the subconscious level based on marketer experience is continuously replaced through a data-driven approach. Joghee (2021) mentioned the changeable role of digital marketing within the company hierarchy – with an increased amount of marketing intelligence analyses the decision-making has been downshifted from the management to the digital marketing perspective. The digital marketing role nowadays is going beyond the marketing role (Yarali et al., 2019). In order to fulfil the marketing principles, companies have to ensure the interconnection, transparency of information, and decentralized decisions under newly available data generated through IoT (Rosário, 2022).

From the implementation of IoT-related information also business-to-business marketing activities can be improved; customer preferences analysis is relevant in all areas of marketing communications (Aras et al., 2022). In addition, Ismail Abdulkarim Adamu et al. (2020) along with the highly described benefits points to the flexibility of the tools in unexpected stressful situations.

The systematic review has identified the opportunity for internationalization and re-internationalization strategies (Strange et al., 2022). Mondal et al. (2022) pointed out the significance of the ability to adopt a marketing strategy based on the region. In addition, the IoT enables more detailed region and customer segmentation for delivering local and customized advertisement messages (Granheim et al., 2022). The efficiency of online marketing differs based on the regional aspect of the landscape and social factors, mainly due to misunderstanding the principles of message delivery (Kahn & Burrell, 2021). Thus, additional detailed information gained through IoT can help to overcome the issue and has an impact on marketing productivity.

Few researches underlined the demand for digitalization for SMEs. The availability of IoT is for small and medium enterprises a necessity for being competitive (Zauskova et al., 2022). That stemmed lack of investment and pressure which is not the case for multinational corporations (Ungerma et al., 2018). According to Ungerma et al. (2018) the market is highly competitive and one of the main goals of marketing strategy is to find a unique or smart way for highlighting the unique value

proposition of products to the right people at the right time. The implementation of usage of the IoT data can be the power tool to overcome the increasing competitiveness issue and a basement for growth (Lu et al., 2022). In addition, Puiu et al. (2022) highlighted the importance of IoT outcomes for building relationships with young generation consumption.

The analysis of the geographical implementation of the new technologies has shown the non-linear correlation between economic development and smart device implementation, the main beneficiary here is the SMEs – the IoT allows them to build value propositions for forming a competitive advantage (Jaković et al., 2021).

Bayer et al. (2021) opened a discussion focusing on the customer-centric model of modern marketing. Rajesh et al. (2022) continued the idea by stating that the availability of IoT features is becoming more relevant and convenient for consumers. Shen et al. (2022) stated that IoT will change society. Ganesan and Gopalsamy (2022) warn that the IoT, on the controversy, has the potential to be a dangerous tool for mind games with society.

From the user perspective, some features of the IoT have a positive impact on customer satisfaction (Sinha & Brar, 2022). Andarwati et al. (2020) mentioned that also for consumers IoT features are now a necessity. Consumers are often ready to provide personal information in exchange for benefits, and that behavior is actively used in online marketing (Robinson, 2018). According to Yang et al. (2017) customized products are preferable from the customer's perspective.

Sinha and Brar (2022) named the allowance of the automated collections and gathering of customers' behavioral and purchasing patterns, location, and information for analyzing the lifecycle without direct communication and irritation a phenomenal job. Therefore, the new way of data procedure is the core of marketing transformation. However, the main reason for IoT implementation is the need for more precise data to stay competitive. Moreover, the traditional marketing methods and strategies do not meet the requirements of the current social development (Bai, 2022). Thus, the benefits that IoT is bringing for online marketing are the pre-requirements of the market needs (Bogoviz et al., 2021).

Chakroun et al. (2022) correlated the massive amounts of data gained by IoT as a core factor for determining the next phase of marketing development. Thus, the simplicity

and effectiveness of the data procedure are the determination of future success and development. The final decision of every marketing strategy as well as the interpretation results and right usage of the received data is under the marketing manager's competence. Thus, the ability to think outside the box and the experience of the marketing manager is the crucial element of success (Bajpai & Pillai, 2022). Furthermore, Chuang et al. (2020) noted that these shifts have also started to influence hiring practices within the domain, emphasizing the need for professionals who can harness these opportunities.

Ren et al. (2021) have mentioned that e-commerce will benefit from the applied technologies that have been used in the other steps of the product life cycle. Wu (2021) proposed a solution to the controversial opinions about whether the IoT has a direct impact on digital marketing by stating that e-commerce development is the following step of the initial technology development, and, therefore, is mostly affected indirectly through the supporting functions. A parallel sentiment was echoed by Abbass and Mehmood (2020) in their exploration of the nexus between IoT and marketing strategies, concluding that these opportunities brought forth by IoT indirectly shape the contours of modern online marketing.

4.3. Barriers for online marketing

Rekha et al. (2021) mentioned the rapid increase in build devices used for marketing purposes based on the studies done within the last few years. Despite costs and uncertainties lots of companies have already integrated some of the new device-to-device and data-automated technologies into their marketing process (Hannan et al., 2022). Leurent and De Boer (2018) concluded that just a third of organizations that are trying to implement IoT integration succeeded in the deployment stage.

We have used the standard classification of the IoT-related challenges proposed by Hanafizadeh et al. (2021) and extended it based on the result of the systematic review (Table 6).

Thus, the listed challenges are the recommended list of known issues that need to be estimated during decision-making towards the IoT implementation within the online marketing environment.

One of the biggest challenges that the implementation of the IoT will face is the security issue. Rao and Corral de Zubielqui (2022) based on a summary of the main

Table 6. The top-level classification of IoT challenges for online marketing

Legal & Security	Technological	Social	Market Related
<ul style="list-style-type: none"> ■ Security issues connected to consumer privacy; ■ Security issues connected to company data and know-how; ■ Legal incl. changeable legal environment issues; ■ Government regulation. 	<ul style="list-style-type: none"> ■ Technological implementation; ■ Cost & speed of implementation; ■ Large & increasing amounts of data; ■ Geographical acceptance. 	<ul style="list-style-type: none"> ■ Consumer perception & psychological challenges; ■ Employees' ethical responsibilities & mindset; ■ Children privacy; ■ Sustainability challenges. 	<ul style="list-style-type: none"> ■ Unclear benefits & usage; ■ Increasing importance of educational needs; ■ Human Resources issues: internal positioning & hiring methodology.

technical issues related to security and privacy stated that these types of issues are a variable element that needs nonstop detailed attention. Mainly it can be described as a challenge in securing sensitive information from unauthorized access as well as authorizing access only for relevant information (Perwej et al., 2019). The IoT has multiple connections to the different aspects of social life, and, therefore, each one has a security issue (Anand et al., 2020). Highlighting the magnitude of this challenge, Ismail Abdulkarim Adamu et al. (2020) underscored privacy and security risks as paramount barriers in the domains of business and marketing. Numerous researches characterized the security issue as one of the main challenges that need to be taken into consideration before the decision towards IoT usage has been made (Lo & Campos, 2018; Mann et al., 2022; Sheoran & Vij, 2021; Ramhormozi et al., 2019; Rekha et al., 2021; Robinson, 2018; Rosário, 2022). Besides that, Ramhormozi et al. (2019) have connected the high risk in the area of security to a lack of research about the usage of IoT data by corporate marketing.

Diving deeper, the study shows a bench of challenges connected to legal issues and regulations. Security is strongly connected to confidentiality and, therefore, it is critical for the IoT (Aman et al., 2020). By not following the regulations that can be changeable over time and differ based on the region the security challenge can be transformed into a legal-related challenge. Yarali et al. (2019) warned about the risk of implementation of specific government regulations. Gasimov and Aliyeva (2020) mentioned the diversity of government regulations in different countries. Haryanti and Subriadi (2021) pointed out the diffused commerce regulations in general.

Another important challenge is connected to the technological implementation of the newly designed tools. With the rapid increase in the number of smart devices, the need for future IoT network architecture has arisen. The existing architectures cannot accommodate the voluminous number of smart devices expected in the future (Aman et al., 2020). Strange et al. (2022) named the technological challenge as a technical bottleneck. Wagner and Cozmiuc (2022) stated that the technological part cannot be overcome without additional resources. Due to the high investment need in technology development, the challenge is especially related to SMEs (Ungerma et al., 2018). Gasimov and Aliyeva (2020) stated that the technological challenge cannot be overcome in all cases, as an example of the initial requirement of the availability of the Internet has been named. The result of the analysis has shown that the detailed discussion and applied analysis of security and technological challenges have been covered from different perspectives. On the contrary, most literature does not cover enough less technical challenges (Wang et al., 2021).

The findings from the study related to technological challenges bridged the path to market-related challenges and, namely, the need for technical professionals (Rosário, 2022). Strange et al. (2022) named the lack of digital capabilities as one of the core underestimated barriers that can

lead to uncertainties and failures. Bajpai and Pillai (2022) pointed out the need for technically skilled professionals as a crucial part of marketing success. Chen (2021) warned about the new approach to for searching marketing talents due to changes in the branch. The need to combine technical skills with problem-solving and design-thinking abilities is the most desired skill nowadays (Chuang et al., 2020). According to Volkmar et al. (2022) many marketing managers remain concerned about the full usage of IoT data in decision-making. It is connected to a high share of technical part in assisting the right marketing decision (Bajpai & Pillai, 2022). Miklosik et al. (2019) findings, on the controversy, show that exceptionally experience and knowledge are about opportunities. Volkmar et al. (2022) raised a question about the leadership conflict mentioning the competition between technical skills and personal creativity and concluding the second is more valuable.

There is also a risk connected to the amount of information (Rosário, 2022). Strange et al. (2022) mentioned that information overload that can lead to uncertainties and misleading which is a result of the rapid increase in received data over the globe (Miklosik et al., 2019).

The further step is strongly related to the perception and motivation of the continuing usage of IoT-related tools. The increased penetration of smart devices and services in the home environment affects individual well-being (Sequeiros et al., 2021). Thus, the challenge is to generate convenience in order to gain consumer trust so that more IoT devices will be welcomed (Manyika et al., 2015).

IoT platforms are middleware, meant to bridge the hardware and application layers. Platforms provide seamless integration of third-party applications, sensors, legacy equipment, and other connected devices in heterogeneous IoT settings. Platforms, like an operating system on a computer, govern application functionality, devices, and data flow, as well as ensure smooth IoT system connection (Htun et al., 2021). The growth of the internet has enabled intelligent information flow between devices, allowing new goods and services in both the real and virtual worlds. Intelligent industry, smart housing, and intelligent transportation are just a few examples of daily life solutions. That several items with single addresses may communicate and accomplish similar objectives is key to IoT. Several resources may be exchanged over the Internet (Sheoran & Vij, 2021).

The market competition between these items might help customers distinguish services and create value. The technological acceptance model states that the degree of user motivation is directly controlled by incentives such as design and performance (Țoniș-Bucea-Manea & Blăjină, 2019). The features of IoT devices impact users' sentiments, comprehension, objective, and subjective cognition, allowing them to choose the best technology. The product's presence stands out, leading to a good appraisal of the IoT gadget and a pleasant customer experience. The rapid growth of IoT enabled the internet linking of several smart things, allowing more data to be assessed

(Bhatnagar & Kumra, 2020). The future of interconnecting these items is automation, minimizing the need for human interaction. Intelligence refers to the degree of automation in an IoT product's functioning. If these features are difficult to use, the IoT product will be less efficient and users will be less satisfied. The internet enables users to look for and compare goods and services from anywhere in the globe. Online collective purchases are intimately tied to social networks, which are built by users and their contacts (Ho-Sam-Sooi et al., 2021). Convenience saves time and effort during purchase planning, therefore buyers will like this IoT device (Fu et al., 2020). The engineers who designed these connectable items and sensors may not be qualified to handle data security issues. Sensors may impair a consumer's well-being if information and data are captured by a third party.

The classic approach argues that customers can determine the optimum action route if they have enough knowledge about the product, but they don't always examine all options. Consumers form associations with products based on both functional and emotional factors. There may be varying quantities of each (Raza et al., 2020). The perceived utility of IoT technology contributes to the functional experience of the product–customer connection. In general, contentment is decided by the customer's expectations of the product or service, as well as their opinion of the same after consumption or usage. However, corporations prefer to strengthen emotional relationships. To create sentiments of trust, admiration, and intimacy, reflecting cultural aspects such as consumers' values, corporations are increasingly trying to offer their goods using IoT technology.

Numerous researches pointed out the necessity to understand people's behavior not only in order to adopt and adjust the technological implementation or to meet the decision on whether the implementation has to be done but also with an aim for future adaptation and learning process (Haryanti & Subriadi, 2021; Lo & Campos, 2018; Rangsom & Khan-Am, 2019). Zauskova et al. (2022) considered the educational part as critical to consumer awareness obtainment.

Ethical issues of the IoT have not gained much attention despite the vast interest in the ethicality of information technology in general (Vermanen et al., 2021). According to Vermanen et al. (2021) ethical responsibility within an organizational structure is not predefined yet and is based on individual moral principles which are unacceptable due to the rapid development of IoT.

One of the additional challenges is connected to the speed of digital adoption. Manyika et al. (2015) pointed out that most of the IoT data is used for detection and control functions, but that is not used for providing prediction or optimization which provides the greatest value. Warokka et al. (2020) pointed out that many organizations are behind consumers in terms of digital adaptation because in many cases the performance benefits of digitalization are unclear which can be described as a barrier to clear goal setting (2020). Paramita and Dachyar (2020)

raised the question of whether it is reasonable to proceed with the IoT implementation development at any cost and circumstances. Therefore, we state that the uncertainty of the possible benefits should be explored as one of the core challenges.

Corlis (2020) pointed out that only a balance between innovation, opportunity and risk will lead to success in IoT implementation because of the deep penetration of the impact of the tools on every aspect of organizational system. Manyika et al. (2015) mentioned that the focus on B2B applications of the IoT solution has more potential since more value can be created compared to pure consumer applications. Corlis (2020) confirmed the statement by pointing out cost reduction and productivity improvements as the core strategy out of the possibility of having better business insights with the help of the information the company can get. Nevertheless, if the entire company ecosystem will be connected to IoT then it can lead to a precarious and unsteady strategy. Delgosha et al. (2021) mention that IoT technologies changing the nature of competition, and therefore, the traditional business models. Joghee (2021) summarized that the goal of the data provided by IoT solutions has to be focused on the improvement of the marketing strategy by influencing each of the different phases of the marketing distribution process, especially for customer communications and retention. The derivation of actionable information is challenging. One of the examples of the successful implementation of valuable data analysis can be the possibility to provide real-time marketing for consumers (Manyika et al., 2015).

Diving deeper into IoT vulnerabilities, Anand et al. (2020) spotlighted sustainability concerns tied to the rampant proliferation of smart devices. Almalki et al. (2021) link the development of IoT products and ecosystems with increases in energy consumption and, therefore, environmental pollution. Thus, the sustainability questions should be addressed and stated in the early stages of the massive IoT implementations.

5. Conclusions, discussion and further research

The systematic review provides an in-depth exploration of the myriad opportunities and challenges online marketing faces through the prism of producers, consumers, and the environment. Through the last few years, it has been an increasing number of research and publications addressing the issues related to IoT implementations but upon close inspection, many of these studies either envelop broad expectations or delve into specific technical nuances. From the author's perspective, while each study offers valuable insights, there's a palpable disparity in their focal points. Most of them lean towards elucidating either technical specifications or producer-centric viewpoints. Therefore, the current research examines the entire online-marketing related challenges and benefits in order to estimate the extent of the changes and to define the most critical fields for further research. E-commerce is one of

the most disruptive developments nowadays that has been transformed by IoT. Nevertheless, the existing literature mainly explores the technical aspects and highlights the producer's perspective of the features (Bayer et al., 2021). Numerous researches and publications in the field of the Internet of Things that have gained attention are focused on highlighting the technical support and summarizing general recommendations for developing customer insides towards maximization of benefits (Blasco-Arcas et al., 2022). Such observations underscore a critical gap: the evaluation of IoT's real-world implications on marketing practices remains relatively untouched terrain. Thus, the conceptual level of estimation of the technological impact on marketing practice is not well explored yet. We suggest further research in connection to the quantitative estimation of benefits from the IoT on online marketing as a key factor that must bridge the theoretical issues to practical recommendations (Strange et al., 2022).

The studies regarding the human acceptance of new technologies are still in the developing phase (Haryanti & Subriadi, 2021). Partly it is connected to the underestimation of the importance of studies with a focus on the perception of IoT-driven products and tools from consumers (Lo & Campos, 2018). The research of people's habits and perceptions is one of the least-described questions. However, the nature of changes in the online marketing approach lies under the prism of the customer-centric perspective (Bayer et al., 2021). The synthesis of these studies reveals the necessity for a two-pronged research approach in the future: one that fuses the technical with the tangible impacts on online marketing, and another that places the consumer at the epicenter of IoT-driven e-commerce investigations. The systematic review underscores the evolving landscape of IoT in online marketing, revealing a predominant focus on technical facets while highlighting significant gaps in understanding consumer perceptions and sustainable practices. While IoT promises transformation in online commerce, businesses need to strike a balance between innovation and consumer-centric strategies, ensuring secure and sustainable solutions. Future research should prioritize a deep dive into consumer behaviors, environmental impacts of IoT solutions, and establishing robust security measures. Quantitative investigations are also crucial to convert theoretical discussions into practical strategies, ensuring businesses harness the full potential of IoT in online marketing.

Disclosure statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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