

INDUSTRY 4.0 TECHNOLOGIES ENABLEMENT IN MARKETING ACTIVITIES OF SMES TO FULFILL CUSTOMERS' NEEDS FOR PERSONALIZATION: A SYSTEMATIC REVIEW

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Abstract. Over the last few years, a significant number of studies have examined the concept of Industry 4.0 and its impact on business operations. As current business digitalization processes provide a significant opportunity for SMEs to enable the newest marketing tools and customer-oriented approaches, this study aims to investigate the enablement of Industry 4.0 technologies in marketing activities within SMEs for fulfilling customer needs for personalization. The study was based on a systematic analysis of 8 core databases, which generated more than 1400 articles published during 2016–2020. Using PRISMA steps, 50 articles were used for the qualitative content analysis. The findings of this research confirmed that 4th Industrial Revolution technologies enablement impacts all elements of the Marketing Mix and provides the chance to increase customer needs for personalization: it enhances the co-creation opportunities and enables a higher customized shopping experience. This study deepens the understanding of Industry 4.0 technologies' impact on marketing and identifies potential unexplored research gaps in this area.

Keywords: Industry 4.0, technology adoption, marketing, personalization, SMEs.

JEL Classification: M310, O330.

Introduction

Historically, three industrial revolutions had already happened which till now have had a strong influence on different business processes, such as the way products are produced, delivered, and consumed (Balmer & Yen, 2017). In 2011, at the Hannover Technology Fair in Germany, concepts such as the 4th Industrial Revolution and Industry 4.0 were first mentioned and discussed publicly, as recently developed technological advancements provide the foundation for Industry 4.0 implementation. Therefore, Industry 4.0 can be characterized as the combination of digital manufacturing, network communication and integration systems inside and outside of companies. Industry 4.0 implies massive changes in various aspects of the micro and macro level business environment (Fathi & Ghobakhloo, 2020; Młody, 2018; Schmidt et al., 2020). It largely affects the competitiveness of the economy, forms new types of cooperation structures between industry players and impacts the emergence and adoption of new business models within separate

business units. According to Bettiol et al. (2017) – the main difference between Industry 4.0 in comparison with the previous Industrial Revolutions is the ability to involve customers in the manufacturing processes.

Various authors (Pech & Vrchota, 2022; Saniuk et al., 2020; Torn & Vaneker, 2019) state that in recent years, the demand for personalized products and services has increased. Although the mass customization paradigm is not an entirely new phenomenon and within Industry 3.0 many different customized goods were produced, there was no efficient mechanism for customers to participate or communicate throughout the entire manufacturing cycle. Meanwhile, the enablement of Industry 4.0 technologies provides the opportunity to fully explore the benefits of connection and sharing throughout the product lifecycle, thus allowing customers to participate actively in the design process at a low cost (Guo et al., 2020).

Recognizing the changes of Industry 4.0, small organizations are becoming increasingly proactive in improving their business operations and transforming their

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business models (Rauch et al., 2018; Sima et al., 2020; Ungerman & Dědková, 2019). However, as some companies can carry out a comparatively smooth technological revolution in their surroundings – others endure rather sluggish evolutionary processes (Da Silva et al., 2019). For example, the degree of digitization varies significantly across SME size classes, and particularly smaller SMEs continue to think that digitalization is neither beneficial nor required for them and that the costs outweigh the advantages (European Commission, 2021).

Although in recent years the interest of scholars researching Industry 4.0's impact on SMEs has been increasing – most of the present studies are concentrated on the separate technologies' implementation possibilities (Guo et al., 2020), roadmaps for the Industry 4.0 principles implementation within manufacturing SMEs (Erol et al., 2016; Ibarra et al., 2018), or discussing possibilities on how the 4th Industrial Revolution could change SMEs business models and act as an enabler for more sustainable production (Prause, 2015). Up until now, there has been a research gap regarding how Industry 4.0 technologies can be enabled in SMEs' marketing activities to provide personalized goods and experiences for customers. Consequently, this study aims to investigate the enablement of Industry 4.0 technologies in marketing activities within SMEs for fulfilling customer needs for personalization.

In this study, the systematic analysis approach will be applied. Industry 4.0 technologies' will be identified and will be ascribed to the marketing activities of SMEs based on the 7P model. This study provides the originality aspect, as it suggests a new way of categorizing Industry 4.0 technologies based on their possibilities to be applied in the marketing activities within SMEs while enhancing the personalization level of the offerings for the customers. Also, this study provides additional insights for business, the scientific community and society.

1. Marketing activities within SMEs

The official definition of SMEs includes three distinct characteristics: level of employment, level of turnover and size of the balance sheet. Henceforth, SMEs may be defined as businesses with less than 250 employees and have an annual turnover not surpassing EUR 50 million, and/or an annual balance sheet total not surpassing EUR 43 million (European Commission, 2018).

To define marketing activities within SMEs – the marketing mix model can be used. According to Jain and Jain (2022), the marketing mix can be identified as a collection of controllable variables that are being employed by the company to affect its target market. Thus, according to the authors, marketing mix components can be perceived as crucial and tactical elements of the marketing strategy. It must be mentioned that, according to Konopa (1969), E. Jerome McCarthy is credited as being the first to propose the four P's model, which included these variables: price, promotion, product, and

place of distribution. Over the years, the 4P model has been discussed and argued over regarding its suitability only for traditional marketing methods (Goi, 2009). Consequently, various authors proposed to include additional variables to improve the 4P Marketing Mix model. Booms and Bitner (1981) added the variables of participants, physical evidence and process to the original 4 Ps model. Meanwhile, Goldsmith (1999) proposed eight components (product, price, place, promotion, participants, physical evidence, process and customization).

It is important to note that most of the suggested extended 4P models enhance the influence of people within the provision of goods or services. Also, newly added elements, such as process management highlight the importance of the company's management and the existence of effective processes (Khan, 2014). According to Goi (2009), the significance of some aspects of the marketing mix will fluctuate over time. In Table 1, Marketing 7P models' elements are described.

Table 1. 7P Marketing Mix Model (source: created by the author based on Al Muala, 2012; Cengiz & Yayla, 2007; Goi, 2009; Khan, 2014; Konopa, 1969; Magrath, 1986; Shahhosseini & Tohid Ardahaey, 2011)

Marketing activities	Description
Product	Marketing is based on product or service characteristics, quality, advantages, and quantity.
Price	Includes product lines and assortments, as well as price modifications and options of payment.
Place	Place where a product or service is provided to clients. The distribution channels are included.
Promotion	Market communication consists of personal selling, advertising, direct marketing, public relations, sales promotion and sponsorship.
Process	It describes the use of action and function that raises the customer value of low-cost, high-benefit products; considered to be more crucial for services than products.
Physical evidence	Context in which the service and any physical items that facilitate its operation and communication are being provided.
People	Refers to the personnel producing and delivering the service.

Some authors (Gilmore et al., 2001; Resnick et al., 2016; Walsh & Lipinski, 2009) state that SMEs tend to have different characteristics in their marketing practices than large companies. Resnick et al. (2016) examined the relevance of traditional marketing theory and its application to practices in SMEs. According to the study, SMEs do not engage in "textbook" marketing but are instinctively aware of key marketing concepts to which they add their own "personal brand" of expertise, capabilities, and character. According to Gilmore et al. (2001), these traits may be defined by the entrepreneur's or owner's underlying attributes and practices, or by the enterprise's inherent size and development stage. Thus, SME marketing is

likely to be unplanned, unstructured and impulsive and SMEs' restrictions can be summed up as follows: scarce resources, lack of specific expertise, and limited market influence by SMEs. However, Pranjic and Rekettye (2019) state that Industry 4.0 enabled technological changes is a significant opportunity specifically for the SMEs' marketing function – to identify, predict and even influence the behaviour of customers in ways that were previously only available to large companies.

2. Research methodology

In order to identify the impact of Industry 4.0 technologies' enablement on marketing activities within SMEs, the systematic analysis approach was applied. The systematic review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations (Moher et al., 2015). According to Hizam-Hanafiah et al. (2020), the systematic review is becoming increasingly significant for social science studies, as it gives researchers a chance to identify and collect all available information about a particular topic, and on the basis of this data, it is possible to determine a particular trend that is specific to the theme or domain under study.

This method is commonly used by various researchers while identifying Industry 4.0 technologies' impact on different business activities and industries, i.e., the systematic review method was selected by Zheng et al. (2021) to identify how to apply Industry 4.0 technologies in the manufacturing industry, Da Silveira et al. (2019) analysed the deployment of Industry 4.0 technologies in the healthcare sector, Efthymiou and Ponis (2021) investigated the technologies impact on contemporary logistics, Ali and Phan (2022) researched technologies' impact on sustainable warehousing, Yadav et al. (2022) explored technologies application in the agricultural food supply chain and etc. Such a wide scope of systematic review method usage in regard to the Industry 4.0 topic supports the method's suitability towards marketing activities and Industry 4.0 technologies relation investigation.

The systematic review was conducted from October 2020 to February 2021. To build up the research base concerning Industry 4.0 and marketing activities relation, a few different databases were selected, such as Clarivate Analytics, Scopus, Emerald, Sage Journals, Elsevier, Taylor and Francis Online, Wiley Online, in addition to a search of grey literature on Google Scholar. With budget constraints, only open-access sources were used for the review. The initial search of publications addressed terms such as "Industry 4.0"/"4th Industrial revolution" in relation to the "Marketing" mentioned in the title. As only 86 papers were found, the search field was expanded to search the same keywords in the articles' titles, abstracts and keywords. The data source creation phase led to the collection of 1496 papers: 986 from Clarivate Analytics, 230 from Scopus, 68 from Emerald,

120 from Sage Journals, 14 from Elsevier, 1 from Taylor and Francis Online, 54 from Wiley Online and 23 from Google Scholar.

During the screening phase – 498 articles were excluded from further analysis as they were found to be duplicates. The following analysis included 998 articles of which 663 were excluded because only peer-reviewed journal articles were included in further research. Additionally, articles written in non-English languages, were also excluded, leaving the remaining database for the eligibility phase consisting of 339 articles. During the qualitative analysis stage, the abstracts were reviewed first and 145 records were eliminated because they lacked a relevant approach to the specifically investigated topic. Subsequently, 194 full-text papers that met the eligibility requirements were thoroughly analysed.

For the systematic qualitative content analysis 50 articles were selected and quoted in this study. Selected articles were divided into groups: Personalization (11), Marketing in Industry 4.0 (9), Industry 4.0 implementation in SMEs (7), specific Industry 4.0 technologies adoption within marketing functions (6), digital marketing (7), consumer behaviour prediction (5), communication (5). Such segmentation enabled the identification of the various applications of Industry 4.0 technologies toward marketing activities in business.

The year restriction was imposed by the research methodology, inquiring only publications published between 2016–2020, reasoning that until the end of 2015 – most of the published articles were concentrated on the Industry 4.0 phenomenon explanation and its' readiness models. Only after 2016 – the researchers' interest in the enablement of Industry 4.0 technologies towards marketing activities within businesses appeared. The full data source creation path, according to PRISMA is noted in Figure 1.

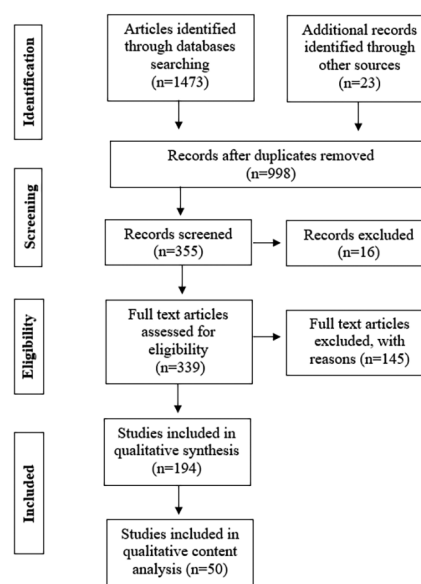


Figure 1. PRISMA flowchart to identify Industry 4.0 technologies' relation towards Marketing activities in SMEs (source: created by the author)

3. Benefits of Industry 4.0 application in Marketing activities

The systematic qualitative analysis revealed that Industry 4.0's impact on the marketing function in SME companies is growing in importance. Many studies that have been analysed, emphasize the relevance of customer involvement in marketing-related processes in the context of Industry 4.0. (Bettiol et al., 2017; Botha, 2019; Saniuk et al., 2020; Torn & Vaneker, 2019; Wang et al., 2017). For instance, the Bettiol et al. (2017) study focuses on the role of customers and marketing elements in B2C and B2B markets concerning the choice to invest in new technologies and the type of technologies adopted. According to Wang et al. (2017), companies will be able to develop customized products with faster cycle times and cheaper costs than those associated with standardization as a result of direct client involvement in the design process. This idea is also supported by Botha (2019), who states that the inherent nature of production is questioned and disturbed, with the customer in control. Fathi and Ghobakhloo (2020) indicate that modern firms are seeking to use mixed-model assembly lines to concurrently achieve client oriented and production sustainability objectives. Meanwhile, Guo et al. (2020) in the context of Industry 4.0, propose a framework for personalized production based on digital twins, block-chain technology, and additive manufacturing.

Other studies that have been examined focus on the changes in the marketing function as a result of Industry 4.0. Sima et al. (2020) state that changes in the creation and delivery of customer service by organizations require the adoption of new business models, manufacturing processes, and academic curricula. Schmidt et al. (2020) analysed how digital technologies influence the design of ecosystems as well as value chain activities, including marketing function changes within firms. According to a study by Caliskan et al. (2020), the effects of Industry 4.0 on the marketing mix are most noticeable in the product, the process and the physical evidence. Arromba et al. (2021) study supports the importance of product element changes and identifies 28 benefits and 14 difficulties related to product element in the context of Industry 4.0. Meanwhile, Ungerma and Dědková (2019) recognized the significance of 17 novel marketing tools and identified 11 impacts resulting from their adoption in businesses.

Analysed studies confirm the importance of SMEs managers role in the context of Industry 4.0 impacted changes towards the marketing function. For instance, Guven (2020) emphasizes the significance of marketing managers adapting to Industry 4.0 transformations and utilizing digital marketing media techniques. In addition, according to Pranjic and Rekettye (2019), implementing big data analytical skills and making effective use of accessible social media platforms is a difficult challenge for top executives.

Hence, Balmer and Yen (2017) present a framework for corporate marketing managers to examine and plan strategically how Industry 4.0 technologies should be

enabled to better communicate their company's identity, image, and reputation, as well as to answer unmet consumer demands. Such studies' results confirm that Industry 4.0 technological breakthroughs influence marketing function changes with a particular focus on customer involvement in marketing related activities.

4. Industry 4.0 technologies applicable for marketing activities

A systematic literature review allowed to identify Industry 4.0 related technologies. The description of such technologies is listed in Table 2.

Table 2. Key technologies of Industry 4.0 (source: created by the author based on Brkljac & Sudarevic, 2018; Calabrese et al., 2020; Cimini et al., 2017; Čočkaló et al., 2019; Młody, 2018; Saniuk et al., 2020; Saucedo-Martínez et al., 2018; Da Silva et al., 2019)

Industry 4.0 Technologies	Description
NETWORK TECHNOLOGIES Internet of Things (IoT), Internet of Services (IoS)	Key technologies for interconnecting objects and devices in industrial systems facilitate communication and collaboration.
CYBER SECURITY TECHNOLOGIES Cyber Physical Systems (CPS)	Control and protect internet-based processes and systems, ensuring that only authorized users have access to the system.
DATA ANALYTICS TECHNOLOGIES Big data (BD)	It describes the propensity of communications and information technologies to handle immense quantities of information to make decision-making more efficient.
SHARING TECHNOLOGIES Cloud computing, Cloud manufacturing	Permit access to software and data storage on the Internet's cloud representation. It helps increase productivity and reduce costs.
SMART WORK TECHNOLOGIES Artificial intelligence (AI), Augmented/Virtual reality (AV/AR)	Offers fundamental technologies for Industry 4.0 system solutions. These are the organizational, administrative, and decision-making principles.
COMPUTING TECHNOLOGIES Simulation, Digital twin	The creation and design of a real or fictitious system using physical or mathematical models.
PRODUCTION LINE TECHNOLOGIES Additive manufacturing, 3D, Robots	Enables the production of varied product components without requiring extensive programming preparation.

Based on the literature review, Industry 4.0 technologies can be categorized into seven groups such as network technologies, cybersecurity technologies, data analytics technologies, sharing technologies, smart work technologies, computing technologies and production line technologies that are supporting the transition from traditional manufacturing toward Industry 4.0.

One of the most emphasised technologies of Industry 4.0 in the researched literature was the Internet of Things (IoT). Miskiewicz (2020) notes that machine to machine communication within the companies allows expanding the opportunities for data collection, processing, and distribution, which could be transferred into information or knowledge, and it also creates the base for the Industry 4.0 implementation. Additionally, Da Silva et al. (2019) mention other supporting technologies associated with the Industry 4.0 implementation, such as advanced traceability systems, real-time location systems, cognitive computing, streamlined logistics, smart solutions, smart innovation, smart supply chain, etc. Thus, it can be stated that some of the listed technologies may be utilized extensively while others are more specialized for clearly defined business operations (Čočkalo et al., 2019).

5. Enablement of Industry 4.0 technologies in SMEs Marketing activities

To analyse the enablement of Industry 4.0 technologies in marketing activities within SMEs, the marketing mix approach of 7P was selected based on the research carried out by Caliskan et al. (2020). This study expands the previous author's research results by including Industry 4.0 technologies and emphasizing their enablement impact on personalization. The complete analytical findings are presented in Table 3.

Analysis indicated that the *product* element of the 7P marketing mix approach is the most widely analysed by researchers. As this Industry provides a unique opportunity for the customer to be the co-creator of the product while enabling different types of technologies (AI, AR, 3D) – in addition to being closer to contributing to innovation in the products and services they demand, customers will be able to accomplish this innovation with the assistance of intelligent machines. Additionally, the enablement of these technologies facilitates the gathering of real-time, customer-provided information on product usage, hence expanding the range of product personalization offerings and enabling the maximum level of customization possible. The expansion will be facilitated by social commerce, a fresh perspective on e-commerce and new marketing channels (Caliskan et al., 2020).

The element of *place* is also influenced by different Industry 4.0 technologies, such as Augmented reality or mobile app marketing. Not only do different Industry 4.0 technologies enable shopping online, but they also fulfill the delivery preferences of consumers. Moreover, omnichannel allows customers to receive their desired items at their preferred time and location (Caliskan et al., 2020). Consequently, location-based services enable customers to obtain integrated information based on time, place, and context, thus improving the shopping experience (Sima et al., 2020).

With the Fourth Industrial Revolution, *promotional activities* are changing to emphasize interactive communication with customers, therefore, it is of utmost

Table 3. Industry 4.0 and 7P marketing mix approach (source: created by the author based on Brkljac & Sudarevic, 2018; Caliskan et al., 2020; Cimini et al., 2017; Młody, 2018; Saniuk et al., 2020; Saucedo-Martínez et al., 2018; Sima et al., 2020; Ungerman & Dědková, 2019)

SMEs Marketing activities based on 7P's approach	Industry 4.0 technologies
PRODUCT:	
Enable customers to take part in the fast prototyping and testing of products. It extends the personalization, enables the highest possible level of customization. Technologies enable direct, real-time data collection from the client.	Internet of Things 3D printing Additive production Simulation Cloud computing Augmented reality
PLACE:	
Real-time communication between stakeholders for transparency. Product and service accessibility. Diversified information sources have increased the online purchasing performance of consumers.	Mobile app marketing Augmented Reality Internet of Things E-commerce
PROMOTION:	
The voice assistant solutions, interactive communication, personalized advertising.	Chatbots, Virtual assistants Advergaming, Mobile app marketing
PRICE:	
The Internet facilitates consumers' pricing management and allows businesses to dynamically adjust prices.	Artificial Intelligence Internet Big Data
PROCESS:	
Advancement of real-time monitoring systems. Digital tools that enhance consumer experiences.	Internet Internet of Things
PHYSICAL EVIDENCE:	
Customizable physical area designs are enabled by augmented reality and simplified by mobile technology.	VR/AR Fitting rooms, Mobile technologies
PEOPLE:	
Superior client experience with robot-assistants.	Artificial Intelligence Additive production Robots VR/AR

importance to analyse customer behaviour and manage promotional activities appropriately. Ungerman and Dědková (2019) mention that digital marketing trends are being widely used in promotion element, such as artificial intelligence – which analyses the behaviour of social network members automatically, conversational marketing – engages people in genuine communication using chatbots to discover everything a customer desires,

omnipresence – customers utilize many channels simultaneously and businesses must disseminate their messages over all communication channels. With voice assistants like Siri or Google Assistant, Industry 4.0 turns one-way communication with customers into two-way communication that is more personal and interactive. This makes it easier to divide customers into segments and reach the target audience. Additionally, IoT enables the establishment of huge networks that will connect all members of the value chain and influence purchasing and consumption patterns (Sima et al., 2020).

Digitalization also influences *the pricing policies* of companies. Through auctions and negotiations with many suppliers, digital technologies make it easier for customers to control the pricing of the desired goods. Thus, instead of set pricing, a dynamic pricing approach is frequently used nowadays. Using advanced analytics, dynamic pricing focuses on the product and, more importantly, on the customer – to create optimal revenue and develop a successful relationship with the customer (Caliskan et al., 2020). Moreover, transparency in pricing sharing through Internet technologies is a crucial feature of marketing activity, where stakeholders have increased knowledge about the market.

While employing different tools of Industry 4.0 *processes* can be optimized and automated. It aids in avoiding falling behind rivals' marketing strategies and enhancing the consumer experience by employing digital tools. Meanwhile, *physical evidence* is related to the customer experience of the process of product or service delivery, thus AR and virtualizations play a crucial role in boosting the client experiences. *People element* regarding Industry 4.0 enablement will be changed by using robots instead of salespersons, also the usage of virtual assistants will increase. Both of them impact the high-level personalized customer experience.

Moreover, based on the findings above, it can be stated that, in aiming for a higher personalization level, part of the Industry 4.0 technologies can be enabled in a wide spectrum of marketing mix activities, for instance, the most universal technology that impacts several Marketing mix activities was found to be the Internet of Things. Meanwhile, the other technologies can be enabled only in a small range of marketing activities. For example, robots can be defined as niche technology as it have influence only over one specific marketing function.

Conclusions

According to the literature review, with the help of Industry 4.0 technologies, customers can be involved in the process of creating value, especially through marketing activities. Nevertheless, as the existing studies mostly highlight the benefits and challenges of Industry 4.0 technologies' enablement in marketing activities, there is a research gap regarding the possibilities of creating more personalized offers and experiences for customers while enabling Industry 4.0 technologies' in marketing

activities within SMEs. Consequently, this research aims to solve the scientific problem: how does the enablement of Industry 4.0 technologies in marketing activities within SMEs fulfill customer needs for personalization? This study relies on scholarly articles on the subject of Industry 4.0 that emphasize the significance of changes to marketing activities. To answer the study's questions, a systematic literature review method was applied.

The literature review has shown that the current development of Industry 4.0 is commonly perceived as the spread of digital technologies within SMEs. The new technical solutions enable new types of production within the companies and generate new linkages between the organization and its market. As the distinctions between producer and customer, and between innovation and market adoption become less distinct, customer alignment and personalization rise in importance. According to the literature, marketing activities within SMEs can be defined using the 7P marketing mix model. Such activities include product, pricing, promotion, place, process, physical evidence and people. However, while comparing the marketing practices between SMEs and large corporations, it was found that typically, the marketing practices of SMEs lack structure, resources and are highly influenced by the SMEs owner or its' manager. Based on the previous studies – Industry 4.0 technologies can be categorized into seven different groups. The core technology of Industry 4.0 was found to be the Internet of Things. This technology application allows expanding the opportunities for data management and its' transferring to the knowledge for gaining a competitive advantage. Also, it was found that the enablement of Industry 4.0 technologies impacts all components of the Marketing Mix.

Results obtained during this study provide a new, original aspect to the existing information regarding Industry 4.0 technologies' enablement in marketing activities. This study provides an Industry 4.0 technologies' categorization into two groups based on their enablement possibilities in the marketing activities of SMEs while reaching higher personalization levels. Accordingly, Industry 4.0 technologies' can be categorized as either universal (having an impact on several marketing activities) or niche (having an impact on one marketing activity). The most universal technologies of Industry 4.0 related to marketing activities were found to be the Internet of Things, Artificial Intelligence and Augmented Reality. These technologies were found to be influential toward product and place elements of the marketing Mix. The marketing activity, which is influenced by the widest range of Industry 4.0 technologies was found to be a product element.

This study's main theoretical implications are that Industry 4.0 technologies enablement' into marketing activities provides the chance to increase customer needs for personalization: while enabling different types of networking technologies customers can become the co-creator of the product and it also enables the omnichannel

shopping opportunity. Meanwhile, digital tools usage, such as robots, augmented reality, voice assistance can enhance the customized shopping experience. Also, Industry 4.0 technologies' enablement, such as artificial intelligence, provides the ability to have interactive communication with the customers, meanwhile, Big Data helps to collect and analyse the data, which can be used for a better understanding of customers' behaviour and needs, as well as applying the gathered knowledge for more personalized pricing or bundle offers to the clients.

This study provides necessary information for the SMEs while evaluating the possibility of enabling Industry 4.0 derived technologies in their marketing activities to reach higher levels of personalization for the customers. This research also suggests new ways of categorizing the Industry 4.0 technologies. Accordingly, future researchers can select the category of Industry 4.0 technologies and explore its impact on specific marketing activity. This research also extends the current knowledge about Industry 4.0 and the insights gained in this study can help society be informed and benefit from cooperating with SMEs while achieving more personalized offers.

Limitations

This study had a restriction for the literature published years (included only the sources published from 2016 to 2020). Expanding the initial database with the sources published since 2011 would help to fill the missing literature gaps. Therefore, for a better understanding of the 4th Industrial revolution's impact on SMEs' marketing activities, it is advisable to fulfill this study of primary data through interviews with industry experts and policymakers, as well as, to include additional secondary data (e.g. ongoing research / industrial projects).

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