

# TOWARD THE "NEW NORMAL" AFTER COVID-19 – A POST-TRANSITION ECONOMY PERSPECTIVE

Ewa Mińska-Struzik  
Barbara Jankowska  
Editors

ISBN 978-83-8211-060-9  
eISBN 978-83-8211-061-6  
<https://doi.org/10.18559/978-83-8211-061-6>



© Copyright by Poznań University  
of Economics and Business  
Poznań 2021



This book is available under the Creative  
Commons 4.0 license – Attribution-  
Noncommercial-No Derivative Works

# **6. Consumer acceptance of AR Technology in e-commerce in the light of the Covid-19 pandemic: A conceptual perspective**



**Małgorzata Bartosik-Purgat**

Poznań University of Economics and Business  
Institute of International Business and Economics  
Department of International Management  
[malgorzata.bartosik-purgat@ue.poznan.pl](mailto:malgorzata.bartosik-purgat@ue.poznan.pl)



**Tomasz Grzegorczyk**

Poznań University of Economics and Business  
Institute of International Business and Economics  
Department of International Management  
[tomasz.grzegorczyk@ue.poznan.pl](mailto:tomasz.grzegorczyk@ue.poznan.pl)



**Wiktoria Rakowska**

Poznań University of Economics and Business  
Institute of International Business and Economics  
Department of International Management  
[kzm@ue.poznan.pl](mailto:kzm@ue.poznan.pl)

## **Abstract**

**Purpose:** The main objective of the chapter is threefold: to conduct literature review, to develop a model of consumer acceptance of augmented reality (AR) in e-commerce, and research hypotheses. The model will emphasize the factors (motives and risks) affecting the acceptance of AR technologies by e-commerce consumers.

**Design/methodology/approach:** The study used inductive research approach whose results will be the key basis for primary research. The main research method was literature review: the meta-synthesis method.

**Findings:** We developed a model of factors influencing the acceptance of AR technology in e-commerce based on the Unified Theory of Acceptance and Use of Technology (UTAUT2).

### **Suggested citation**

Bartosik-Purgat, M., Grzegorczyk, T., & Rakowska, W. (2021). Consumer acceptance of AR Technology in e-commerce in the light of the Covid-19 pandemic: A conceptual perspective. In E. Mińska-Struzik, & B. Jankowska (Eds.), *Toward the "new normal" after Covid-19 – a post-transition economy perspective* (pp. 186–195). Poznań University of Economics and Business Press. <https://doi.org/10.18559/978-83-8211-061-6/I16>

The following factors were included into the proposed model as predictors of acceptance: performance expectancy, effort expectancy, hedonic motivation, perceived AR risk, privacy risk.

**Research limitations/implications:** The main limitation of this research is its conceptual character. Future research should aim to empirically verify the proposed model.

**Practical implications:** By showing the possibilities and actual acceptance of AR's use in selected countries, the research might contribute to the development of a set of guidelines for enterprises in the e-commerce branch and, eventually, improve their international competitiveness, e.g. by guiding product and promotion strategies.

**Originality and value:** Based on the literature review, this chapter proposes a novel research model of consumer acceptance of AR in e-commerce, which can be verified in the future research.

**Keywords:** Augmented Reality, consumer acceptance, e-commerce, covid-19.

## 6.1. Introduction

The development of digital technologies led both producers and consumers to changes in their preferences and activities. The Covid-19 pandemic that exploded at the end of 2019 in China also changed consumer behaviors and attitudes in terms of shopping. One of the rapid effects was an increase of online shoppers' number regarding to different categories of products; even those that have been purchased only offline so far.

Interactive technologies are transforming retailing by e-commerce development and increasing the competitiveness of local and international companies (Caboni & Hagberg, 2019). One of such technologies is augmented reality (AR), whose use has increased especially during the Covid-19 pandemic. Augmented reality is a digital technology that could be considered impactful in redefining the concept of retail stores. It shapes a new space where physical and augmented/virtual objects are integrated (Flavián Ibáñez-Sánchez & Orús, 2019). Increasingly, retailers rely on interactive technologies to improve consumers' shopping experiences. For example, dedicated interactive devices like kiosks and smart mirrors can configure and recommend products and explain their features. Moreover, applications are installed on a consumer's own device for the same purpose. In all cases, AR can improve consumer experience by placing virtual content in a real environment (Rese, Baier, Geyer-Schulz, & Schreiber, 2017).

Consumers have different attitudes and preferences toward AR technology use. Their acceptance (understood as the intention to use) of AR in e-commerce may be shaped by different factors associated both with AR's advantages and risks. The research related to the problem of consumer acceptance of AR technology in e-commerce is still at its early stage and is rarely presented in the literature.

The main objective of the chapter is threefold: to conduct literature review, develop a model of consumer acceptance of AR in e-commerce and research hypotheses. The model will emphasize the factors (motives and risks) affecting the acceptance of AR technologies by e-commerce consumers. Authors used inductive research approach and the results will be the key basis for primary research. The main research method was literature review: the meta-synthesis method.

## 6.2. Model and hypotheses development

The Covid-19 pandemic shapes new life and work styles, business models, and our attitudes to the environment. The things and behaviors (e.g. online working, teaching, and learning, mostly online shopping) that recently seemed impossible became standard. The Covid-19 pandemic contributes to the destruction of many types of businesses in various industries, e.g. tourism, gastronomy, hospitality, and airlines, but it also leads to an increase in the number of online transactions. The technology that helps in making online purchasing decisions is augmented reality (AR).

Despite the diverse possibilities of AR application and its advantages (e.g. better product selection, fewer online shopping returns), AR is still not widespread in e-commerce. One of the reasons is the cost of AR implementation, while other reasons are consumer acceptance of new technologies and associated risks. However, during the Covid-19 pandemic and its immediate aftermath, e-commerce is likely to flourish. For a long time, it was highly likely that consumers will prefer to buy products online rather than go shopping in crowded shopping malls. According to Kissler, Tedijanto, Goldstein, Grad, & Lipsitch (2020) prediction of different scenarios of post-pandemic behavior, one of the main conclusions is that people would maintain social distancing over a long time. Hence, traditional shopping will likely become more often replaced by online shopping. The AR technology allows consumers to mitigate the drawbacks of online shopping by giving the possibility to try on a product by e.g. showing a pair of glasses on a consumer's face or showing how a new wardrobe fits in the bedroom. Another reason for AR's growing popularity is the forthcoming introduction of high-speed mobile Internet thanks to the 5G standard, which will allow many industries to greatly benefit from introducing AR. Some e-commerce specialists like Nate Smith (Group Manager of Product Marketing for Adobe Analytics) say that "right now, as consumers increasingly use digital methods to prepare for a possible emergency, retailers need to ensure smooth, frictionless, and fast experiences on their e-commerce websites and mobile applications. Meeting your customers' needs and expectations at a time like this is imperative: it could either make or break your brand" (Abramovich, 2020).

AR technology offers many solutions that are difficult to achieve in traditional online shopping, e.g.:

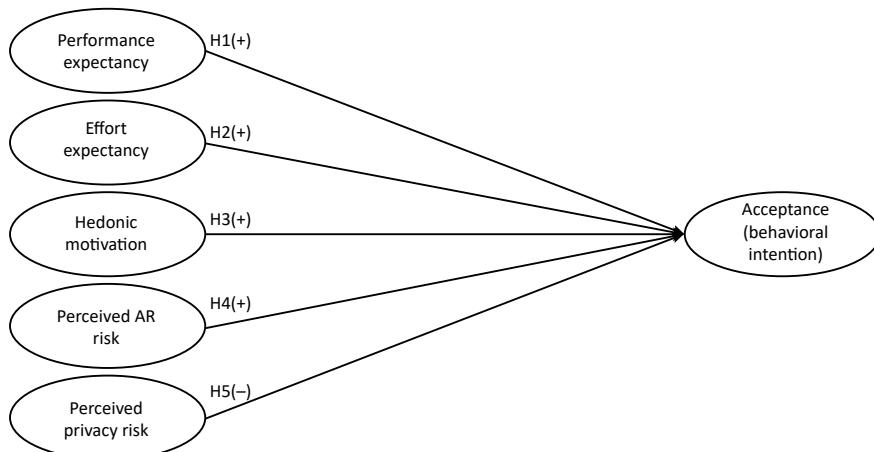
- AR allows the customer to visualize the experience of using the product before buying it, which solves the issue of lack of physical contact;
- AR in e-commerce can reduce the number of returned products ordered online (which is very costly for online stores);
- AR gives an opportunity to see other variants of the product (color, size, texture, etc.) and compare them easily with each other without having to visit a stationary store;
- AR facilitates product selection while reducing the risk of dissatisfaction after purchase (returns, exchanges, complaints); the product can be viewed in conditions similar to a real store visit;
- AR allows companies to post additional information about the product and to present it more accurately; the seller can describe the item using virtual, interactive texts, graphics and video formats that appear when the customer focuses on the selected product.

In the past ten years, studies all over the world investigated AR's attractiveness, mainly in the sectors of education or tourism (Yuen, Yaoyuneyong, & Johnson, 2013; Buhalis et al., 2019). These studies often present AR as a device delivering customer value (Dacko, 2017). However, these are mainly conceptual articles that present literature studies with proposed theoretical models to be empirically tested in the future. Empirical studies researching consumer behavior or attitudes toward AR are quite rare (e.g. Ha & Jang, 2013; Grzegorczyk, Sliwinski, & Kaczmarek, 2019).

This chapter presents a conceptual consideration that can be treated as pre-research study before empirical measurement, in which the main aim will be to identify the significance of factors (motives and risks) that affect the acceptance of AR technologies among e-commerce consumers. The theoretical background of the project refers to the consumer behavior and motivation theories, Technology Acceptance Model (TAM) and its subsequent developments such as the Unified Theory of Acceptance and Use of Technology (UTAUT) and the theory of perceived value. In 2016, Venkatesh et al. adapted the UTAUT to consumer use by creating UTAUT2. According to the UTAUT2, technology acceptance is determined by performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit, while being moderated by age, gender, and experience. However, lately many studies do not directly use TAM and its successors to study the acceptance of a particular technology but instead combine them with other theories and variables. Authors decided to follow this approach as it allows us to consider the characteristics of a specific innovation.

Authors noticed similarities between the concept of user acceptance and perceived consumer value. One of the main ideas behind the latter is that perceived value consists of both positive and negative elements (benefits and costs; Zeithaml, 1988). Consequently, authors decided to introduce the factors negatively influencing user acceptance into conceptual model. To that end, authors used the concept of perceived risk that is “the expectation of losses associated with purchase and acts as an inhibitor to purchase behavior” (Peter & Ryan, 1976). Another common point between the UTAUT2 and the theory of perceived value is that many of the factors from the UTAUT2 bear significant similarity to the four elements of value in accordance with the PERVAL model (Sweeney & Soutar, 2001), based on the theory of consumption values (Sheth, Newman, & Gross, 1991).

For the purposes of this study, authors developed a model of factors influencing the acceptance of AR technology in e-commerce based on the UTAUT2 (Figure 1). The literature review allowed us to formulate the research hypotheses that should be verified in the empirical stage of research process. Authors do not consider personal factors, although authors are aware of their importance.



**Figure 1. Conceptual model presenting factors influencing customer acceptance of AR technology in e-commerce**

Source: Own elaboration.

Almost every acceptance model includes a construct responsible for the functionality aspect that usually turns out to be the most important one in terms of various technological innovations (e.g. Gao & Bai, 2014; Morosan & DeFranco, 2016). The performance expectancy factor answers the question whether consumers deem AR useful, worthy of their attention, and improving their productivity.

While the majority of research (e.g. Hilken, De Ruyter, Chylinski, Mahr, & Keeling, 2017; Rese et al., 2017; Yim, Chu, & Sauer, 2017) finds that the utilitarian aspect of AR is the most important predictor of AR acceptance in e-commerce, Bonnin's study (2020) presents surprisingly mixed findings. This underlines the need for further studies and clarification of previous research findings. Authors believe that AR's application in e-commerce brings significant functional benefits to consumers which they consider. Therefore, authors hypothesize that:

**H1:** Consumers' performance expectancy has a positive effect on their acceptance of AR in e-commerce.

Effort expectancy also stems from the UTAUT2, and it measures how easy it is to use AR in e-commerce (Venkatesh, Thong, & Xu, 2016). Consumers often resist new, undiffused technologies due to their fear of lack of technological proficiency. The role of the ease of use in the acceptance of various technological was confirmed multiple times (e.g. Su, Wang, & Yan, 2018). The significance of the ease of use was confirmed by Huang and Liao (2015), Rese et al. (2017), and Spreer and Kallweit (2014). Authors believe that consumers' effort expectancy of AR is especially important at the current low stage of diffusion of AR, as most consumers still have not had any previous experience with AR. Therefore, authors hypothesize that:

**H2:** Consumers' effort expectancy of AR's use has a positive effect on their acceptance of AR in e-commerce.

Hedonic motivation also stems from the UTAUT2, and it measures the degree to which users perceive using AR in e-commerce as enjoyable; similar to emotional value from the PERVAL model. Previous research shows that it plays a significant role in the acceptance of various technologies (e.g. Ingham, Cadieux, & Mekki Berrada, 2015; Yang, Yu, Zo, & Choi, 2016). Moreover, in the area of AR research, hedonic motivation and similar factors (e.g. enjoyment) are confirmed to influence both AR's acceptance in e-commerce (e.g. Hilken et al., 2017; Rese et al., 2017) and similar measures such as user experience or attractiveness (e.g. Bonnin, 2020; Grzegorczyk et al., 2019; Poushneh, 2018). Authors believe that hedonic motivation is crucial for AR's acceptance in e-commerce, as traditional online purchases may lack the "thrill" associated with the shopping process linked with a greater degree of contact with the offered goods and the possibility of trying them on. AR in e-commerce may mitigate this issue to some extent and imitate the thrill of shopping. Therefore, authors hypothesize that:

**H3:** Consumers' hedonic motivation has a positive effect on their acceptance of AR in e-commerce.

One of the main ideas behind the theory of perceived value is that it consists of both positive and negative elements (benefits and costs; Zeithaml, 1988). Consequently, authors decided to introduce the factors negatively influencing user acceptance into our model. To that end, authors used the concept of perceived risk, which is “the expectation of losses associated with purchase and acts as an inhibitor to purchase behavior” (Peter & Ryan, 1976).

Various facets of perceived risk are distinguished in literature: psychosocial risk (harm to identity or self-esteem), financial risk (loss of money), time risk (loss of time because of late delivery for example), social risk, physical risk, privacy loss risk, and product/service risk (when the expectations about the product or service are not met; Aghekyan-Simonian, Forsythe, Suk Kwon, & Chattaraman, 2012; Nepomuceno, Laroche, & Richard, 2014). Bonnin (2020) found that perceived product risk negatively influences attractiveness of AR store and its patronage intention. These findings are interesting as AR is a tool aimed at decreasing the risk of unwanted online purchase by allowing to get a better sense of product features and its fit (Beck & Crié, 2018). Authors believe that similar results can be achieved when analysing the influence of perceived AR risk on AR’s e-commerce acceptance. Authors define perceived AR risk as the risk of not being satisfied with the product purchased in an online store evaluated with the use of AR. Therefore, authors hypothesize that:

**H4:** Perceived AR risk negatively impacts consumers’ acceptance of AR in e-commerce.

As mentioned, another dimension of perceived risk is the vulnerability in terms of possible loss of consumer’s personal information (data privacy risk). Research on a variety of technological innovations (e.g. Gao, Li, & Luo, 2015) shows that this factor may negatively influence technology acceptance. The use of AR requires access to the device’s (e.g. laptop’s or smartphone’s) camera and employs facial recognition or spatial tracking functionalities, which increases the amount of data sent and stored – and their significance – making AR especially vulnerable to attacks on data security. Furthermore, consumer concerns about marketers collecting and using personal data seem to be a relevant issue (Martin, Borah, & Palmatier, 2017), particularly in relation to AR technologies (Dacko, 2016). Future AR users expect AR applications to protect their privacy. Consumer’s awareness of privacy practices influences the process of decision making in relation to online shopping with AR’s use (Hilken et al., 2017). However, there currently is a scientific debate on the privacy paradox: while online consumers are concerned over their privacy, they fail to take adequate precautions or abstain from disclosing information (Bandara, Fernando, & Akter, 2020). In terms of AR, it is still unknown if consumers are generally aware of privacy risk and, if yes, whether they actually

care to such an extent that it would influence AR's acceptance. Authors believe that this may be the case. Therefore, authors hypothesize that:

**H5:** Perceived privacy risk negatively impacts consumers' acceptance of AR in e-commerce.

### 6.3. Conclusions

The created and verified in the future conceptual model will have a cognitive significance as input into consumer behavior and motivation theories, but also as the use of the theory of perceived value in relation to innovations such as AR. The empirical results will provide valuable practical information for e-commerce enterprises, those already competing in foreign markets and those which are preparing to operate internationally. The findings might be of substantial benefit to the e-commerce branch, which deals with constant changes due to hypercompetition, along with mega- and microtrends (e.g., technological development, globalization, consumer preferences). The findings will aid decision-makers in the inclusion of AR technology and its scope. By showing the possibilities and actual acceptance of AR's use in selected countries, the research might contribute to the development of a set of guidelines for enterprises and, eventually, improve their international competitiveness e.g., by guiding product and promotion strategies. The main limitation of this research is its conceptual character. Future research should aim to empirically verify the proposed model.

### References

- Abramovich, G. (2020). *How Covid-19 is impacting online shopping behavior. People turn to e-commerce in light of Covid-19 anxiety*. Retrieved from <https://theblog.adobe.com/how-covid-19-is-impacting-online-shopping-behavior/>
- Aghekyan-Simonian, M., Forsythe, S., Suk Kwon, W., & Chattaraman, V. (2012). The role of product brand image and online store image on perceived risks and online purchase intentions for apparel. *Journal of Retailing and Consumer Services*, 19, 325–331.
- Bandara, R., Fernando, M., & Akter, S. (2020). Explicating the privacy paradox: A qualitative inquiry of online shopping consumers. *Journal of Retailing and Consumer Services*, 52.
- Beck, M., & Crié, D. (2018). I virtually try it ... I want it! Virtual fitting room: A tool to increase on-line and off-line exploratory behavior, patronage and purchase intentions. *Journal of Retailing and Consumer Services*, 40, 279–286.
- Bonnin, G. (2020). The roles of perceived risk, attractiveness of the online store and familiarity with AR in the influence of AR on patronage intention. *Journal of Retailing and Consumer Services*, 52, 101938. <https://doi.org/10.1016/j.jretconser.2019.101938>

- Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in Services: lessons from Tourism and Hospitality. *Journal of Service Management*, 30(4), 484–506.
- Caboni, F., & Hagberg, J. J. (2019). Augmented reality in retailing: a review of features, applications and value. *International Journal of Retail & Distribution Management*, 47(11), 1125–1140.
- Dacko, S. G. (2017). Enabling smart retail settings via mobile augmented reality shopping apps. *Technological Forecasting and Social Change*, 124, 243–256.
- Flavián, C., Ibáñez-Sánchez, S., & Orús, C. (2019). The impact of virtual, augmented and mixed reality technologies on the customer experience. *Journal of Business Research*, 100, 547–560.
- Gao, L., & Bai, X. (2014). A unified perspective on the factors influencing consumer acceptance of internet of things technology. *Asia Pacific Journal of Marketing and Logistics*, 26(2), 211–231.
- Gao, Y., Li, H., & Luo, Y. (2015). An empirical study of wearable technology acceptance in health care. *Industrial Management & Data Systems*, 115(9), 1704–1723.
- Grzegorczyk, T., Sliwinski, R., & Kaczmarek, J. (2019). Attractiveness of augmented reality to consumers. *Technology Analysis and Strategic Management*, 31(11), 1257–1269.
- Ha, J., & Jang, S. (2013). Attributes, consequences, and consumer values: A means-end chain approach across restaurant segments. *International Journal of Contemporary Hospitality Management*, 25(3), 383–409.
- Hilken, T., De Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. I. (2017). Augmenting the eye of the beholder: exploring the strategic potential of augmented reality to enhance online service experiences. *Journal of the Academy of Marketing Science*, 45(6), 884–905.
- Huang, T. L., & Liao, S. (2015). A model of acceptance of augmented-reality interactive technology: the moderating role of cognitive innovativeness. *Electronic Commerce Research*, 15(2), 269–295.
- Ingham, J., Cadieux, J., & Mekki Berrada, A. (2015). e-Shopping acceptance: A qualitative and meta-analytic review. *Information & Management*, 52(1), 44–60.
- Kissler, S. M., Tedijanto, Ch., Goldstein, E., Grad, Y. H., & Lipstich, M. (2020). Projecting the transmission dynamics of SARS-CoV-2 through the postpandemic period. *Science*, 368(6493), 860–868. <https://doi.org/10.1126/science.abb5793>
- Martin, K. D., Borah, A., & Palmatier, R. W. (2017). Data privacy: Effects on customer and firm performance. *Journal of Marketing*, 81(1), 36–58.
- Morosan, C., DeFranco, A. (2016). It's about time: Revisiting UTAUT2 to examine consumers' intentions to use NFC mobile payments in hotels. *International Journal of Hospitality Management*, 53, 17–29.
- Nepomuceno, M. V., Laroche, M., & Richard, M. O. (2014). How to reduce perceived risk when buying online: the interactions between intangibility, product knowledge, brand familiarity, privacy and security concerns. *Journal of Retailing and Consumer Services*, 21, 619–629.
- Peter, J., & Ryan, M. (1976). An investigation of perceived risk at the brand level. *Journal of Marketing Research*, 13, 184–188

- Poushneh, A. (2018). Augmented reality in retail: a trade-off between user's control of access to personal information and augmentation quality. *Journal of Retailing and Consumer Services*, 41, 169–176.
- Rese, A., Baier, D., Geyer-Schulz, A., & Schreiber, S. (2017). How augmented reality apps are accepted by consumers: A comparative analysis using scales and opinions. *Technological Forecasting & Social Change*, 124, 306–319.
- Sheth, J., Newman, B., & Gross, B. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research*, 22(2), 159–170.
- Spreer, P., & Kallweit, K. (2014). Augmented reality in retail: Assessing the acceptance and potential for multimedia product presentation at the PoS. *Transactions on Marketing Research*, 1(1), 20–35.
- Su, P., Wang, L., & Yan, J. (2018). How users' Internet experience affects the adoption of mobile payment: a mediation model. *Technology Analysis and Strategic Management*, 30(2), 186–197.
- Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, 77(2), 203–220.
- Venkatesh, V., Thong, J., & Xu, X. (2016). Unified Theory of acceptance and use of technology: A synthesis and the road ahead. *Journal of the Association for Information Systems*, 17(5), 328–376.
- Yang, H., Yu, J., Zo, H., & Choi, M. (2016). User acceptance of wearable devices: An extended perspective of perceived value. *Telematics and Informatics*, 33(2), 256–269.
- Yim, M. Y. C., Chu, S. C., & Sauer, P. L. (2017). Is augmented reality technology an effective tool for e-commerce? An interactivity and vividness perspective. *Journal of Interactive Marketing*, 39, 89–103.
- Yuen, S. C., Yaoyuneyong, G., & Johnson, E. D. (2013). Augmented reality and education: applications and potentials. In R. Huang (Ed.), *Reshaping learning, the frontiers of learning technologies in global context* (pp. 385–414). Berlin: Springer.
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence on JSTOR. *Journal of Marketing*, 52(3), 2–22.

# **CONTENTS**

Foreword (*Ewa Mińska-Struzik, Barbara Jankowska*) <https://doi.org/10.18559/978-83-8211-061-6/0>

## **Part I**

### **CHALLENGES AT THE SUPRANATIONAL AND NATIONAL LEVEL**

1. The economy battling Covid-19. A macroeconomic approach (*Tadeusz Kowalski*) <https://doi.org/10.18559/978-83-8211-061-6/I1>
2. How Covid-19 impacted the European integration processes? The case of EU Cohesion Policy and budget (*Ida Musialkowska, Piotr Idczak*) <https://doi.org/10.18559/978-83-8211-061-6/I2>
3. The European Union's Common Commercial Policy and the Covid-19 pandemic: reactions and challenges (*Grzegorz Mazur*) <https://doi.org/10.18559/978-83-8211-061-6/I3>
4. The future of the European Migration and Asylum Policy (*Judyta Cabańska*) <https://doi.org/10.18559/978-83-8211-061-6/I4>
5. Central Bank policy toward the Covid-19 pandemic: Seeking patterns among the most powerful central banks (*Anna Matysek-Jędrych, Katarzyna Mroczek-Dąbrowska*) <https://doi.org/10.18559/978-83-8211-061-6/I5>
6. International portfolio diversification during the Covid-19 onset: A study of correlations among CEE post-transition and developed countries (*Paweł Śliwiński*) <https://doi.org/10.18559/978-83-8211-061-6/I6>
7. Foreign direct investment and the Covid-19 pandemic: the real economy perspective and theoretical implications (*Marian Gorynia, Piotr Trąpczyński*) <https://doi.org/10.18559/978-83-8211-061-6/I7>
8. The impact of Covid-19 on the finances of multinational enterprises from the perspective of Balance of Payments transactions (*Monika Andrzejczak*) <https://doi.org/10.18559/978-83-8211-061-6/I8>

## **Part II**

### **CHALLENGES FOR BUSINESS SECTORS AND INDUSTRIES**

1. Internal substitution in the tourism market: Effects of the Covid-19 pandemic (*Agnieszka Niezgoda, Ewa Markiewicz, Klaudyna Kowalska*) <https://doi.org/10.18559/978-83-8211-061-6/II1>
2. Effects of the Covid-19 pandemic on sport, video game, and tourism industry: Sentiment analysis of press, Internet articles and Twitter data (*Łukasz Bryl, Justyna Majewska, Szymon Truskolaski*) <https://doi.org/10.18559/978-83-8211-061-6/II2>
3. Goods road transport sector facing pandemic crisis (*Piotr Banaszyk, Sylwia Konecka, Anna Maryniak*) <https://doi.org/10.18559/978-83-8211-061-6/II3>
4. The Polish logistics real estate market as a link in international supply chains during the Covid-19 crisis (*Waldemar Budner*) <https://doi.org/10.18559/978-83-8211-061-6/II4>
5. Covid-19 disruption of European agri-food markets: The case of Poland (*Magdalena Śliwińska, Rafał Śliwiński*) <https://doi.org/10.18559/978-83-8211-061-6/II5>

6. Consumer acceptance of AR technology in e-commerce in the light of the Covid-19 pandemic: A conceptual perspective (*Małgorzata Bartosik-Purgat, Tomasz Grzegorczyk, Wiktoria Rakowska*) <https://doi.org/10.18559/978-83-8211-061-6/II6>
7. Challenges for innovation co-operation in the biopharmaceutical industry during the Covid-19 pandemic (*Lukasz Puślecki*) <https://doi.org/10.18559/978-83-8211-061-6/II7>

### **Part III**

#### **CHALLENGES FOR COMPANIES**

1. The adoption of Industry 4.0 solutions as a remedy against the pandemic crisis—the case of Polish companies (*Barbara Jankowska, Ewa Mińska-Struzik*) <https://doi.org/10.18559/978-83-8211-061-6/III1>
2. Future competences in times of an economic crisis (*Anna Łupicka*) <https://doi.org/10.18559/978-83-8211-061-6/III2>
3. The impact of the crisis on the maintenance of sustainable development initiatives: A comparative analysis of local and international companies (*Łukasz Małys*) <https://doi.org/10.18559/978-83-8211-061-6/III3>
4. Women's entrepreneurship in the Covid-19 pandemic (*Alicja Hadryś*) <https://doi.org/10.18559/978-83-8211-061-6/III4>
5. Challenges in currency derivatives management in the OTC market in Poland during the Covid-19 pandemic (*Piotr Wybieralski*) <https://doi.org/10.18559/978-83-8211-061-6/III5>
6. Donation crowdfunding as a source of relief for small businesses (*Marcin Wieczerzycki*) <https://doi.org/10.18559/978-83-8211-061-6/III6>