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Digitization in the insurance sector – challenges in the face of the Covid-19 pandemic

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Abstract

The Covid-19 crisis has accelerated the need for a digital transformation of insurance companies, which has shifted from being a strategic option to a necessity. Dynamic changes are transforming the insurance sector. Insurance market leaders who look boldly into the future have not resorted to observation alone and they take actions that allow them to be more customer-oriented, improve their offers, and increase operational efficiency. The aim of this article is to present the digitization processes taking place in the insurance sector in the face of the crisis caused by the Covid-19 pandemic and an attempt to answer the following research question: has digitization in the insurance sector taken the right direction and is a response to the needs of the insurance market participants (insurers, insured persons, intermediaries, etc.) as a consequence of the actual epidemic risk (Covid-19) and its consequences. In order to verify the research question and achieve the set goal, a critical analysis of the source literature, the analysis of trends and digital solutions in the insurance sector and the analysis of secondary data were performed. The study was based on data available in national and international reports, including data published by the Polish Insurance Association, OECD or the Geneva Association.

The presented results of the considerations indicate that the use of new technologies and ubiquitous digitization have a great impact on customer expectations, which was particularly noticeable in the aftermath of the epidemic risk come true (Covid-19). The article highlights the changes introduced in the organization's processes (the importance of decision support systems in insurance activities), as well as supporting consumer users (the universality of social media, and the availability of speech and image recognition technology).

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1. Introduction

Apart from its impact on public health, the Covid-19 pandemic has caused severe economic turbulence[1]. There have been three main trends in the insurance market. Firstly, the number of personal insurance products sold (life, health) has increased. Secondly, there has been a significant drop in demand for travel and motor insurance. Thirdly, all insurance companies have experienced changes in the system of interaction and communication with customers. As a result, insurers faced the challenge of using digital technology to attract new and retain existing customers[2].

Over the last decades, digital technology has become a driving force for the development of society and the global economy, causing radical changes in socio-economic processes through its digitization [3]. Digitization now covers almost all aspects of human life[4]. Moreover, technologies are changing the digital ecosystems of all industries [5]. They improve and create new financial services in order to better meet the increasing demands of clients [6]. Furthermore, online retail platforms are starting to dominate sales worldwide [7].

Before the Covid-19 outbreak, the insurance sector, as compared to the banking sector, had been implementing digital technologies at a slower pace [8] [9]. However, the crisis caused by the pandemic has forced insurance companies around the world to accelerate their digitization efforts. The insurance sector began to be subject to these processes intensively, benefiting from the development of both specialized technology companies offering services for insurance companies, as well as their own digital projects. Digitization, if technically feasible, affects all parts of the insurance value chain, as well as has the biggest impact on the way insurer work when interacting with their customers.

The aim of this article is to present the digitization processes taking place in the insurance sector in the face of the crisis caused by the Covid-19 pandemic and an attempt to answer the research question formulated as follows: has digitization in the insurance sector taken the right direction and is a response to the needs of the insurance market participants (insurers, insured persons, intermediaries, etc.) as a consequence of the actual epidemic risk (Covid-19) and its consequences.

In order to achieve the research goal, the first part of this article presents a literature review, while the second part covers selected studies on digitization processes taking place in the insurance sector, which were accelerated by the Covid-19 pandemic. The publication has been completed with conclusions. As the discussed issue is extensive and multi-threaded, the article focuses on the presentation of the most important problems.

2. Literature review

Understanding the contribution of digital technology to the development of business operations is one of the main research areas of information systems [10] [11]. Digital technology should be viewed not only as a cost measure, but also as an investment in revenue growth [12]. Information systems can have a strong impact on organizational performance. Moreover, they are associated with numerous intangible assets related to the implementation and operation of systems that affect organizational capabilities in various ways. Information systems are the engine of organizational change as they influence the concepts and operational structures of a business practice. Digitization increases competition in the financial market, broadens consumer choices, and in many cases democratizes access to financial services. At the same time, it also leads to new monopolistic threats, especially those related to the expansion of big tech, referred to in the context of finance as fintech [13]. Financial technology (FinTech) means a technology used to provide broadly understood financial services [14]. Part of FinTechs is InsurTech, defined as a set of innovative technologies using IT and insurance services [15]. Before the Covid-19 pandemic, insurance companies had begun the transition to digital technology [16]. Initial work on the implications of advanced digital technology for the insurance industry focused mainly on new online distribution channels, especially with regard to their implications for insurance agents, customer focus and regulation [17]. While legacy data processing systems in companies have been seen primarily as a means of increasing efficiency, new generations of digital technologies are expected to increase market dynamics and competition through greater transparency and comparability, lower transaction costs
and wider reach of online platforms [18]. Consequently, the possibilities for convergence of financial services as well as the implications of formal models of insurance business are being discussed.

Among the precursors of research on the digitization of insurance, there can be distinguished M. Eling and M. Lechmann [19], who managed to use over 80 scientific studies and expert studies on digitization†. A similar nature of considerations is presented in the publication by Ch. Eckert and K. Osterrieder [20]. The authors were able to refer to 102 articles‡ that were found in scientific databases according to the following keywords: "digitalization" and "insurance", "big data" and "insurance", "artificial intelligence" and "insurance", "internet of things" and "insurance", "cloud computing" and "insurance", "distributed ledger technology" and "insurance", "blockchain" and "insurance".

Digitization covers a wide research area. Therefore, the resulting scientific works on the insurance sector have so far included, inter alia, research lines such as: digital transformation in the financial services sector [21], the impact of digitization on the insurance market [22], development of intelligent data processing systems [23], digital insurance [24], digital technologies in the insurance sector [25], Big Data [26], technology and innovation in insurance [27], machine learning [28], Blockchain technology and insurance contracts [29], telematics and insurance [30], digital security [31].

The sources of knowledge on digital insurance include studies and opinions prepared by entities of the regulatory and supervisory system. In this case, the achievements of the International Association of Insurance Supervisors (IAIS)§, the European Insurance and Occupational Pensions Authority (EIOPA)** are particularly important. Another source of knowledge are studies prepared by experts representing institutions in the insurance sector [32]. Within which the indicated companies there should be distinguished: The Geneva Association for the Study of Insurance Economics†† and the Swiss Re Institute‡‡. Global consulting companies that publish reports and studies on the insurance market that include international analysis should also be mentioned. These include: McKinsey & Company [33], Capgemini [34], PwC [35], Deloitte [36], EY [37], Accenture [38].

3. Methodology

The research question was verified and the goal was achieved on the basis of a critical analysis of the source literature, an analysis of trends and digital solutions in the insurance sector, and an analysis of secondary data. The study was based on data available in national and international reports, including reports published by the Polish Chamber of Insurance (PIU), OECD or the Geneva Association.

The time scope of the research covered the years 2015-2022. On the other hand, the analysis was carried out in the period of January - April 2022.

4. Results and Discussions

The use of modern technologies significantly affects the functioning of companies in the financial sector, with the insurance sector not being an exception. Over 80% of insurers believe that the future on the insurance market belongs to those organizations that will make significant investments in the area of innovation and digitization [39].

Despite the fact that digitization processes in the insurance sector are only at the initial stage of development, the

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† They based their considerations on extensive research on the subject literature in selected international databases in the period 2000-2017.
‡ The authors identified 102 articles using the same databases as Eling and Lehmann. The following databases were used: Business Source Complete, EconLit Full Text, ABI / INFORM Collection.
§ Publishes reports and studies on: innovation in the insurance sector, the impact of digitization on insurance products, supervision over cybersecurity of insurance companies, the use of digital technology in inclusive insurance
** Publishes studies on: big databases, cyber risk, new business models
†† In 2016, it created a special research program "New technologies and Data", focusing on the issues of digitization of insurance.
‡‡ Reports on, among others, insurance analytics, application of machine intelligence in insurance.
changes that take place there are very fast [40]. In terms of digitization in the insurance market, certain trends have already emerged:

- Reduction of the insurer - customer distance.
- Cooperation in creating new solutions.
- Increasing number of interactions.
- The use of artificial intelligence in insurance.

Insurance companies are increasingly striving to build a positive brand image and to deepen their relationship with the client by, among others, increasing the number of interactions with the insured, and involving the consumer in the process of creating new products and solutions. Changing the approach may contribute to an increase in customer satisfaction and, consequently, increased loyalty towards insurers. One way to build a partnership with customers is to consider their opinions and needs when developing new products and solutions. 80% of insurers believe that understanding customer expectations is crucial when looking for new directions in the development of the insurance market [41].

Another approach to bridging the gap between the insurer and the insured person is to introduce an element of ongoing communication and increase the number of interactions between these parties. The use of modern technologies allows insurers to collect detailed data about customers in order to provide them with personalized products and solutions (such as risk assessment, distribution, claims settlement, etc.), and also allows automating a significant part of these processes.

Today, artificial intelligence allows the automation of some business processes (especially simple interactions), thus reducing service costs, improving customer satisfaction and involving human effort only in complex activities that require individual decisions. Digital technology, and therefore technological advances and the availability of completely new data sources, are changing the insurance industry. The growing use of (big) data, Artificial Intelligence and the Internet of Things (IoT) is expanding the role of data in the insurance business model. Moreover, technological progress allows for more effective risk reduction and handling. Technological progress applies to virtually all stages of the provision of insurance protection. Automatic insurance contracting, risk assessment, loss notification, real-time claims processing, loss prediction, self-service and electronic payments are increasingly used to improve the management of insurance processes (Table 1). Insurance is becoming more customer-oriented. The role of insurers expands and goes beyond the standard process of concluding an insurance contract and the compensation process, putting additional emphasis on broadly understood advice for clients, which allows gaining knowledge that can then be used to prevent and mitigate insurance risk. The new possibilities introduced by real-time monitoring and visualization are a fundamental change in the relationship between insurers and customers.

| An example of a column heading | Tools | Impact on insurance |
|--------------------------------|-------|---------------------|
| **Product design and Development** | Big data, IoT, Blockchain, Cloud computing | Data collection and service personalization, Product/service innovation, Product/service diversification |
| **Insurance risk (assessment)** | Big data, Artificial intelligence, IoT, Blockchain, Cloud computing | Reduction of information asymmetries, Finer risk assessment, More possibility of risk prevention, Finer segmentation driven by greater processing capabilities, More risk appropriate pricing, Contract information stored digitally |
| **Sales and Distribution** | Big data, Cloud computing, Artificial Intelligence, Social networks | More spread of information to the market, Contract information stored digitally |
Insurance distribution channels are also evolving. While traditional insurance intermediaries such as agents and brokers continue to dominate insurance distribution, worldwide this trend is gradually shifting towards mobile and online channels. This is especially the case in product groups such as motor insurance and where the scope of insurance coverage is increasingly standardized. E-commerce, sales including online sales, telemarketing or targeted advertising efforts are constantly increasing. Most likely, digital technology will eventually enable customers to arrange almost all of their insurance needs through remote digital channels.

Insurance technology is used by insurers to create advanced analyses, such as machine learning, early warning systems, and practical information gathering that also prevent accidents. Post-incident estimation techniques using drones, sensors and satellite images for quick and easy loss indemnification (e.g. after natural disasters) are more commonly used. The use of technology can also be effective in identifying and mitigating insurance fraud.

Thus, digital technology is changing the business model of the insurance industry. Not only distribution channels, risk and claims management methods are transformed, but also the design and essence of insurance products themselves. There are many examples of how digitalisation is changing them. To illustrate, the examples of on-demand insurance or those based on the principles of the sharing economy [42] can be used.

- **On-Demand Insurance** is a new business model that specializes in providing insurance regarding only those risks that people face at the moment. Consumers only pay for insurance when the resource is actually used and "compromised". This is an innovation that makes insurance coverage literally is carried out with the swipe of a finger on a smartphone.
- Coverage is another emerging form of on-demand insurance. For example, Metromile sells car insurance on a pay-per-mile basis. These rules are geared towards people who drive very little.
- Insurance start-ups take advantage of the opportunities offered by the sharing economy. For example, Cuuva [43], a British insurance start-up, allows customers to borrow their friends' cars for hours and insure them for the duration of their driving.

In the activities of insurance companies, it is necessary to create completely new IT systems dedicated to management information. Such systems were called decision support systems, and databases collecting data for these systems - data warehouses. In the insurance sector, data warehouses have proven to be very useful as they support business decision making. Data warehouses in which customer data from various IT systems of individual insurance products or services has been collected, allow you to increase the profit on existing policies by [44]:

- risk reduction;
- reducing fraud;
- reduction of marketing and sales costs related to products (agents, independent salesmen);
- introducing new products to the market and taking over a part of the market from other institutions in the sectors of pension, health and property insurance (through more detailed knowledge of customer needs).

The growing use of new technologies and the ubiquitous digitization have a huge impact on customer expectations, which was particularly noticeable in the aftermath of the pandemic risk (Covid-19). The key factors shaping the expectations of modern customers are, among others, constant connectivity with the online world, the universality of social media, and the availability of speech and image recognition technology. Therefore, the ongoing changes require insurers to introduce changes in many areas – both in the processes inside the organization and in relations with
5. Conclusions

Technological innovations in the insurance services sector, which are based on information technologies, combine elements of finance, insurance and technology. They are an important element in building a competitive advantage and serve to create new business models, better suited to the needs and expectations of customers.

The greatest source of value creation through the digitization of insurance lies in the ability to develop new and more customer-oriented products and solutions to reduce costs. Digital technology leads to the desired automation of many processes related to the provision of insurance services. Moreover, in a competitive market, this is expected to further reduce premiums, increase affordability and extend coverage.

The digitization changes, accelerated as a result of the epidemic risk (Covid-19), can be combined with the claims of Eling and Lehmann [45], who proposed three broad categories of digitization changes in the insurance industry:

- New technologies are changing the way insurers and customers interact (e.g., social media, chatbots and robo-advisers).
- New technologies can be used to automate, standardize and improve the efficiency and effectiveness of business processes (e.g., online sales and digital claim settlement).
- New technologies open up the possibility of modifying existing products (e.g., on-demand insurance) and allow for the development of new products (e.g., cyber insurance).

The emergence of Covid-19 created new challenges for the insurance market, enabling it to accelerate the implemented digital innovations. Digitization remains the key in the development of insurance at various levels of creating its value (product, risk, distribution, or the settlement process). Covid-19 contributed to insurers having to significantly streamline, improve and digitize their insurance claims management operations. However, the activity in the field of digitization processes remained adequate to the needs of the insurance market as a result of the Covid-19 risk. Thus, the considerations presented in the article allow for a positive verification of the research question, as the activities undertaken in the area of digitization are fully consistent with the expectations and needs of customers (insurance market participants).

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References

[1] Bartik, Aleksander W., Bertrand, Marianne, Cullen, Zoe, Glaeser, Edward L., Luca, Michael, and Stanton, Christopher. (2020) “The impact of COVID-19 on small business outcomes and expectations.” Proceedings of the National Academy of Sciences 117 (30): 17656–17666, DOI: 10.1073/pnas.2006991117.

[2] Itapro. (2020) “COVID-19 Accelerates Insurance Digitalization to Meet Customer Demand: World InsurTech Report 2020.” https://www.emagazine.itapro.org/Home/Article/COVID-19-Accelerates-InsuranceDigitalization-to-Meet-Customer-Demand-World-InsurTech-Report-2020/3325 Accessed 17 March 2022.

[3] S. V. Filyppova and O. L. Malin. (2020) “The essence and challenges of digitalization in the economy for public-private partnerships.” Economic Journal Odessa Polytechnic University 3 (13): 55–63. DOI: 10.5281/zenodo.4445634.

[4] Malenkov, Yury, Kapustina, Irina, Kudryavtseva, Galina, Shishkin, Victor V., and Shishkin, Victor I. (2021) “Digitalization and Strategic Transformation of Retail Chain Stores: Trends, Impacts, Prospects.” Journal of Open Innovation: Technology, Market and Complexity 7 (108): 1-21. DOI: 10.3390/joitmc720108.

[5] Chaparro-Peláez, Julian, Acquila-Natale, Emilia, Hernández-García, Ángel, and Iglesias-Pradas, Santiago. (2020) “The Digital Transformation of the Retail Electricity Market in Spain.” Energies 13 (8): 1-18. DOI: 10.3390/en13082085.
[6] Keller, Benno, Eling Martin, Schmeiser, Hato, Christen, Markus, and Loi, Michel. (2018) “Big data and insurance: implications for innovation, competition and privacy.” https://www.genevaassociation.org/research-topics/cyber-and-innovation-digitalization/big-dataandinsurance-implications-innovation Accessed 18 March 2022.

[7] Reinartz, Werner, Wiegand, Nico, and Imbschloss, Monika. (2019) “The impact of digital transformation on the retailing value chain.” International Journal of Research in Marketing 36 (3): 350–366. DOI: 10.1016/j.ijresmar.2018.12.002.

[8] Puschmann, Thomas. (2017). “Fintech.” Business and Information Systems Engineering 59 (1): 69–76. DOI: 10.1007/s12599-017-0464-6.

[9] Stoeckli, Emanuel, Dremel, Christian, and Uebernickel, Falk. (2018) “Exploring characteristics and transformational capabilities of InsurTech innovations to understand insurance value creation in a digital world.” Electron Markets 28 (3): 287-305. DOI:10.1007/s12525-018-0304-7.

[10] Bohnert, Alexander, Fritzsche, Albrecht, and Gregor, Schirley. (2019) “Digital agendas in the insurance industry: the importance of comprehensive approaches.” The Geneva Papers on Risk and Insurance - Issues and Practice 44 (1): 1–19. DOI: 10.1057/s41288-018-0109-0.

[11] Schryen, Guido. (2013). “Revisiting IS Business Value Research: What We Already Know, What We Still Need to Know, and How We Can Get There.” European Journal of Information Systems 22 (2): 139–169. DOI: 10.1057/ejis.2012.45.

[12] Lu, Ying, and Ramamurthy, K. (Rami). (2011). “Understanding the Link between Information Technology Capability and Organizational Agility: An Empirical Examination.” MIS Quarterly 35 (4): 931–954. DOI: 10.2307/41409967.

[13] Zetzsche, Dirk Andreas, Arner, Douglas W., Arner, Douglas W., Buckley, Ross P., and Kaiser-Yücel, Attila. (2020), “Fintech Toolkit: Smart Regulatory and Market Approaches to Financial Technology Innovation.” University of Hong Kong Faculty of Law Research Paper 2020/027, 61 pages. DOI: 10.2139/ssrn.3598142.

[14] Daoqar, Mohammad, Arqawi, Samer, Karsh, and Sharif Abu. (2020). “Fintech in the eyes of Millennials and Generation Z (the financial behavior and Fintech perception).” Banks and Bank Systems 15(3): 20-28. DOI: 10.21511/bbs.15(3).2020.03.

[15] Svitlana Volosoyvich, Iryna Zelenitsa, Diana Kondratenko, Wojciech Szymla, and Ruslana Mamchur. (2021). “Transformation of insurance technologies in the context of a pandemic.” Insurance Markets and Companies 12(1): 1-13. DOI:10.21511/ins.12(1).2021.01.

[16] Daoqar, Mohammad, Arqawi, Samer, Karsh, and Sharif Abu. (2020). “Fintech in the eyes of Millennials and Generation Z (the financial behavior and Fintech perception).” Banks and Bank Systems 15(3): 20-28. DOI: 10.21511/bbs.15(3).2020.03.

[17] Svitlana Volosoyvich, Iryna Zelenitsa, Diana Kondratenko, Wojciech Szymla, and Ruslana Mamchur. (2021). “Transformation of insurance technologies in the context of a pandemic.” Insurance Markets and Companies 12(1): 1-13. DOI:10.21511/ins.12(1).2021.01.

[18] Cappiello, Antonella, (2020) “The Digital (R)evolution of Insurance Business Models.” American Journal of Economics and Business Administration 12 (1): 1-13. DOI: 10.3844/ajebasp.2020.1.13.

[19] Eling, Martin, and Lehmann, Martin. (2018) “The Impact of Digitalization on the Insurance Value Chain and the Insurability of Risks.” The Geneva Papers on Risk and Insurance - Issues and Practice 43 (3): 359–396. DOI: 10.1057/s41288-017-0073-0.

[20] Eckert, Christian, and Osterrieder, Katrin. (2020) “How digitalization affects insurance companies: overview and use cases of digital technologies.” Zeitschrift für die gesamte Versicherungswissenschaft 109 (7): 333-360, DOI:10.1007/s12297-020-00475-9.

[21] Werth, Oliver, Schwarzbach, Christoph, Rodriguez Cardona, Davinia, Breitner, Michael, and Schelenburg, Johann-Matthias. (2020). “Influencing factors for the digital transformation in the financial services sector.” Zeitschrift Für Die Gesamte Versicherungswissenschaft 109(2–4): 155–179. DOI: 10.1007/s12297-020-00486-6.

[22] Eling, Martin, and Lehmann, Martin. (2018) “The Impact of Digitalization on the Insurance Value Chain and the Insurability of Risks.” The Geneva Papers on Risk and Insurance - Issues and Practice 43 (3): 359–396. DOI: 10.1057/s41288-017-0073-0.

[23] Mustafina, Afliya, Kaigorodova, Gulnara, Alyakina, Darya, Velichko, Elena, and Zainullina, Marina. (2020) “Digital Technology in Insurance: Increasing Livelihood Security.” The Sundarbans: A Disaster-Prone Eco-Region: 678–685. DOI: 10.1007/978-3-030-11367-4_65.

[24] Catlin, Tanguy, Hartmann, Rob, Segev, Ido, and Tentis, Ruxandra. (2015) “The Making of a Digital Insurer: The Path to Enhanced Profitability, Lower Costs and Stronger Customer Loyalty.” McKinsey & Company https://www.mckinsey.com/~/media/McKinsey/dotcom/client_service/Financial%20Services/Latest%20thinking%20Insurance/Making_of_a_digital_insurer_2015ashx, Accessed 17 March 2022.

[25] Bohnert, Alexander, Fritzsche, Albrecht, Gregor, Shirley. (2018). “Digital agendas in the insurance industry: the importance of comprehensive approaches.” The Geneva Papers on Risk and Insurance - Issues and Practice 44 (3): 1–19. DOI: 10.1057/s41288-018-0109-0.

[26] Porrini, Donatella. (2017). “Regulating Big Data effects in the European insurance market.” Insurance Markets and Companies 8 (1): 6–15. DOI: 0.21511/ins.08(1).2017.01.

[27] Revathi. P. (2020). “Technology and Innovation in Insurance– Present and Future Technology in Indian Insurance Industry.” International Journal of Engineering and Management Research 10 (1): 21–25. DOI: 31033/ijemr.10.1.4.

[28] Grize, Yves-Laurent, Fischer, Wolfram, and Lützelschwab, Christian. (2020). “Machine learning applications in nonlife insurance.” Applied
Stochastic Models in Business and Industry 36 (4): 520–537. DOI: 10.1002/asmb.2543.

[29] Sheth, Alpen, Subramanian, Hemang. (2019). “Blockchain and contract theory: modeling smart contracts using insurance markets.” Managerial Finance 46 (6): 803–814. DOI: 10.1108/1081-187X-2018-0510.

[30] Baecce, Philippe, and Bocca, Lorenzo. (2017). “The value of vehicle telematics data in insurance risk selection processes.” Decision Support Systems 98: 69–79. DOI: 10.1016/j.dss.2017.04.009

[31] Becker, Wolfgang, Schmid, Oliver. (2020). “The right digital strategy for your business: An empirical analysis of the design and implementation of digital strategies in SMEs and LSEs.” Business Research 13: 985–1005. DOI: 10.1007/s40685-020-00124-y.

[32] Monkiewicz, Jan, Gąsiorkiewicz, Lech, Gołąb, Paweł, and Monkiewicz, Marek. (2022). „Ubezpieczenia cyfrowe. Możliwości, oczekiwania, wyzwania” PWN. DOI: 10.53271/2021.041.

[33] McKinsey & Company. (2022). “Creating value, finding focus: Global Insurance Report 2022.” https://www.mckinsey.com/industries/financial-services/our-insights/creating-value-finding-focus-global-insurance-report-2022 Accessed 21 March 2022.

[34] Capgemini. (2019) “Cognitive Document Processing Services for Supplemental Health Insurance.” https://www.capgemini.com/wp-content/uploads/2019/03/CDP_for_Supplemental__Health_Insurance.pdf Accessed 21 March 2022.

[35] PwC. (2019) “How insurers can size Insurtech opportunities.” https://www.pwc.com/us/en/industries/financial-services/library/pdf/pwc-insurtech-innovation.pdf Accessed 21 March 2022.

[36] Deloitte. (2020) “Covid-19 pandemic shifts InsurTech investment priorities.” https://www2.deloitte.com/us/en/pages/financial-services/articles/fintech-insurtech-investment-trends.html Accessed 17 March 2022.

[37] EY. (2019) “Three ways AI will transform the insurance industry.” https://www.ey.com/en_gl/insurance/three-ways-ai-will-transform-the-insurance-industry Accessed 22 March 2022.

[38] Accenture. (2020) “Vision For Insurance 2020 Report.”, https://www.accenture.com/_acmcms/docs/ft2020/Summary.pdf Accessed 22 March 2022.

[39] Rekosz, Maciej, Stanisławska, Katarzyna, Sowulewska, Aleksandra, and Staszczyk, Anita. (2018) “Cyfryzacja sektora ubezpieczeń w Polsce.” Accenture in cooperation with Polish Chamber of Insurance (PIU) https://piu.org.pl/wp-content/uploads/2021/06/ACC_PIU_Raport-Cyfryzacja-Ubezpieczen-w-Polsce.pdf Accessed 18 March 2022.

[40] Łańcucki, Jerzy. (2018). „Klient na cyfrowym rynku ubezpieczeniowym.” Prawo Asekuracyjne 2 (95): 3-14.

[41] Rekosz, Maciej, Stanisławska, Katarzyna, Sowulewska, Aleksandra, and Staszczyk, Anita. (2018) “Cyfryzacja sektora ubezpieczeń w Polsce.” Accenture in cooperation with Polish Chamber of Insurance (PIU) https://piu.org.pl/wp-content/uploads/2021/06/ACC_PIU_Raport-Cyfryzacja-Ubezpieczen-w-Polsce.pdf Accessed 18 March 2022.

[42] Schmidt, Christian. (2018) “Insurance in the Digital Age. A view on key implications for the economy and society.” Published by The Geneva Association—International Association for the Study of Insurance Economics https://www.genevaassociation.org/sites/default/files/research-topics-document-type/pdf_public/insurance_in_the_digital_age_01.pdf Accessed 21 March 2022.

[43] https://www.cuvva.com/, Accessed 16 March 2022.

[44] http://old.ptf.net.pl/ens/studia/ekonofizyka/olaf.morawski.pdf, Accessed 28 April 2022.

[45] Eling, Martin, and Lehmann, Martin. (2018) “The Impact of Digitalization on the Insurance Value Chain and the Insurability of Risks.” The Geneva Papers on Risk and Insurance - Issues and Practice 43 (3): 359–396. DOI: 10.1057/s41288-017-0073-0.