
DIGITALIZATION AND SUSTAINABILITY – OPPORTUNITIES AND CHALLENGES FOR INSURANCE INDUSTRY¹

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Abstract: Digital revolution and demands for sustainability are the most important determinants of the economic development in the last years. Insurance as a risk protection mechanism can support the achievement of many Global Sustainable Development Goals of the United Nations in direct or indirect manner. Decision engines and artificial intelligence support to decision-making allow insurers to propose tailored customer-centric services based on micro-segments and personalized risk profiles. Providing a more adequate set of products insurance creates a financial safety net for women, families and businesses and contributes to poverty alleviation and supports economic growth, innovations and employment. Therefore, the aim of this paper is to present the possibilities of application of information technology in insurance and challenges for its implementation.

Key words: digitalization, insurance, sustainability

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1. Introduction

Considering a miscellaneous role of insurance industry in the society, its engagement in sustainability issues can be considered as a milestone in achieving a sustainable financial system and, moreover, a sustainable economic development (Dahlström, Skea, & Stahel, 2003; Sato & Seki, 2010). Therefore, the UN Environment's Finance Initiative developed the Principles of Sustainable Insurance (PSI), which were presented at the 2012 UN Conference on Sustainable Development. The PSI framework represents the most comprehensive initiative between the UN and the insurance industry, that is accepted by almost 150 insurance companies and various supporting institutions in the field of insurance². As specialized risk managers and providers of risk coverage, insurance companies use diverse tools for pooling risks and, thus, provide financial resilience of people, business and society as a whole. Involving insurance companies in regional multi-stakeholder partnerships and innovative financial policy frameworks may increase access to insurance, as well as creation of solutions for environmental and social sustainability. On the other hand, insurers, as institutional investors, can support sustainable development by ensuring financial sustainability of projects implementing innovative technologies in various fields and different geographical regions. Responsible usage of intelligent systems and growing amount of digital data has the potential to enhance risk pooling and risk reduction and yield economic and societal benefits for insurers and various stakeholders.

Digital technologies transform insurance industry and virtualise the insurance value chain increasing the effectiveness of the industry and parameterizing the insurance products. However, the speed and model of digitalization in insurance industry varies across the lines of business and type of economies. Therefore, the aim of this paper is to present the potential model of information technology implementation and impact of these changes on insurance industry. The implications of this process for sustainable development are presented in the second part of the paper, while the impact of digitalization on insurance industry and framework for its implementation are explained in third and fourth part, respectively. Concluding remarks are presented in the fifth part of the paper.

² The complete list of the signatory companies and supporting institutions can be find at the following link: <https://www.unepfi.org/psi/>

2. The implications of digital revolution for sustainable development and insurance

Over the past decade the development of the world economy and society has reached the highest level recorded in the history and one of the most important drivers of socio-economic change in the 21st century is digitalization. The process of digitalization is based on the tendency to connect the physical world with the digital one ushered in by the information technology. It has had such an impact on the economy and society that brought into question the basic structures of these systems. Moreover, the contemporary understanding of the global economies and societies development focuses on two issues: (1) the potential of information and communication technology (ICT), and (2) the challenge of environmental sustainability (Ciocoiu, 2011).

Information and communication technology have a major role in redefining products, processes, organization and entire business models in many industries. Digital transformation can be defined as the expanded use of modern information technology, such as analytics, mobile devices, social networks or smart integrated devices, as well as advanced use of traditional technologies, such as ERP (Westerman et al., 2014). Such a powerful process has been posited as both, an emerging opportunity and a challenge to the UN Global Sustainable Development Goals (SDGs), particularly regarding reducing inequalities, decent work, and responsible consumption and production. The growth and maturation of the digital world is creating unique opportunities to enhance social and environmental well-being, and further improve global standards of living while preserving and improving environmental health for future generations (Linkov et al., 2018). ICT significantly contributes to achieving the long-term balance between human development and the natural environment that is essential for sustainable development (Souter et al., 2010). The radical changes in communication technologies label the transitions to a postindustrial economy, in which knowledge and networks play a more preeminent role than capital. It is widely accepted that new technologies are having major positive and negative impacts on economic and social relationship and, especially, on environment. However, the sustainable development cannot be expanding without global communications and knowledge exchange (MacLean, Andjelkovich, & Vetter, 2007). ICT sustainability impacts can be classified in four different orders (Forge et al., 2009). The first order effects can be observed in production of ICT. These effects, though, are assessed as negative, since manufacturing processes involved in production of ICT causes pollution and greater usage of energy. However, the implementation of ICT in business processes can have multiple

positive effects. The second order positive effects are reflected in impacts and opportunities created by the application of ICT to optimize unsustainable energy consuming processes. The third order positive impacts are expected to be achieved due to using ICT as substitute for lifestyle practices of large number of people, while improving society's overall decision-making capacity to implement sustainability policy with metrics to measure impacts in real time, which can be achieved by using ICT, are characterized as the fourth order effects.

Insurance as a risk protection mechanism can support many SDGs, some directly and others indirectly, but it will be critical to the achievement of the goals related to reduction of poverty, hunger and gender inequality, as well as the ones aimed at achieving good health and well-being, decent work and economic growth and climate actions (Wanczek et al., 2017). Providing a financial safety net for women, families and businesses insurance contributes to poverty alleviation and supports economic growth and employment. Indirect and less obvious effect insurance will have on achievement of quality education, reduced inequalities within and among the countries, providing sustainable cities and communities, supporting industry, innovation and infrastructure, as well as partnerships for the goals. By offering additional components in insurance coverage and recognizing needs of low-income countries for supplementary funds, insurance complements government social protection schemes and reduces economic disparities on a global level.

Implementation of ICT in insurance can have numerous benefits, such as expansion of scope and reducing the cost of risk pooling, as well as novel risk insights that can help in risk mitigation and prevention by creating early warning systems (Keller, 2020). Therefore, it can be concluded that, undoubtedly, insurance companies benefit from data science application within the spheres of their great interest (Bohnert, Fritzsche, & Gregor, 2019). Moreover, included in multi-stakeholder and policy and regulatory actions, more efficient insurance companies may utilize its potential in the purpose of achieving sustainable development (Bacani, McDaniels, & Robins, 2015).

Implementation of ICT in insurance companies, as well as in companies of other industries, has initiated business transformation from traditional to digital business models. However, the speed and scope of changes in insurance business due to the implementation of ICT did not follow the trend of changes in other industries. Specifics of insurance industry, particularly in terms of data protection and strict regulatory requirements, have slowed down the implementation of information technology in innovative ways. On the other hand, while the digitalization in other industries can induce creation of new product offerings and services, intangibility of insurance products limits the need for digital transformation. After prolonged

start of implementation, the digital transformation of insurance is gaining momentum today, affecting every component of the insurance company's value chain. As the implementation of ICT in the insurance leads to fundamental changes in almost all aspects of the insurance company operations transforming existing and introducing new business models (Lehmann, 2018) for adequate application of technical and technological innovations, it is necessary that insurance companies determine their strategy for digitalization.

3. The impact of digitalization on the insurance companies' operations

Digital technology deeply impacts insurers' existing business models by redefining insurance products, processes and organization. This is undoubtedly a challenge, where the key factor is the speed at which insurers will be able to take advantage of the technological innovation. Many technological innovations can affect insurance business models, which can be used both in the back end and in the front end (Nicoletti, 2016). The most important are big data analytics, blockchain technology, artificial intelligence, chat bots, robo-advisors and other systems relevant for the core insurance business and its support.

Primary activities in the value chain of insurance company are related to the insurance business and include: product development, marketing, sales, underwriting, policy administration and claims and risk management. Information technologies enable transformation of the value chain and/or change of any element of this structure. Innovations in the insurance are dominant in the property and causality insurance, especially in the process of sales and distribution of insurance products, as well as in the pricing and underwriting process (Table 1).

Table 1

Distribution of innovations in the insurance industry

Type of insurance	Product development	Marketing	Sales and distribution	Pricing and underwriting	Claims management
Property and causality	8%	4%	17%	10%	7%
Health	5%	3%	11%	8%	6%
Life	3%	2%	9%	5%	2%

Source: Catlin & Lorenz, 2017, pp. 10.

While some aspects of technological change - such as better operating efficiency, the need to engage with consumers digitally, and increased disintermediation - are common to many industries, others are specific to insurance. Digital technology changes the type of data that insurers use to assess risk, the way in which information is analyzed, and, ultimately, the size of the actual risk pools (Table 2).

Table 2

Impact of digitalisation on the insurance value chain

Product development	The use of Big Data facilitates new behavioural, granular data collection and enables service personalisation Telematics reduce associated risks, but may create new ones (for example, cyber risk)
Sales and distribution	Comparison platforms present customers with a comprehensive choice of all kinds of insurance covers and in some cases enable to buy insurance online InsurTech start-ups entry in the insurance market from adjacent markets
Pricing and underwriting	Instantaneous information and Big Data allow more predictive and evaluative analytics Finer segmentation is driven by greater processing capabilities
Claims management	Telematics provides instantaneous information which can help insurers with more accurate claims assessment and reduce fraud Technology decreases processing time

Source: Cappiello, 2018, pp. 12.

The insurance industry is industry based on the data. Modern technology, such as telematics and Internet of Things (IoT), generates vast amounts of data that will be increased by the 39% by 2025 (Anchen & Dowe, 2019). Data is collected from different sources, such as customer history, online clickstream data, data on sales channels, credit cards usage history, Customer Relationship Management (CRM) systems, as well as through social media. However, technology development has not diminished the importance of the data that have been traditionally collected by insurers, such as age, gender, marital status and profession of insureds, data on the subject of insurance, insurance contract data, records of paid premiums and claims. In insurance IoT currently finds its application in the field of vehicle insurance and health insurance. In an vehicle insurance context, the added value may be achieved by the usage of telematics driving behaviour data in order to improve drivers' insurance risk profiles and policy pricing. In the field of health insurance, wearable devices capable of tracing various parameters - from vital parameters to the sleep cycle, allow insurers to collect a wide range

of data related to risk assessment and premium calculations. Similarly, advanced medical technology is making healthcare more proactive and reliable, changing the metrics by which insurers assess health. As the data generated by these advanced technologies become connected, the amount of insight that can be developed from the data grows powerful (Haddud et al. 2017). On the one hand, insurers can use increasingly advanced tools to quickly analyze volumes of data coming from various sources and drive actionable insight in real time. On the other hand, benefits include the use of robotic process automation, which is suitable for handling insurers' rules-based administrative tasks (Craneld & White 2016; Keller & Hott 2015). The usage of the Big Data science and data analytics is demanded in both cases in order to foster efficiency of insurance companies' operations.

Big data analytics can be described as the solutions, processes, and procedures allowing an organization to create, manipulate, store, retrieve, and manage a relatively large amount of data to get information for an organization. Its ultimate objective is to support the decision-making process. Using big data enables insurance company to process available data in a more integrated way, drawing meaningful insights at virtually every stage of the insurance life cycle, from customer targeting to product design and pricing, underwriting, claims processing, and reporting.

To satisfy highly variable and dynamic customer demand, insurance companies need to understand and anticipate customer needs, but also to create and propose offers that are personalized, easy to consume, and consistent across indirect and direct channels of distribution. The new digitized technologies and the new habits of customers initialize major changes in the way insurance services are offered and used by customers. Digital platforms and systems create direct sales channels increasingly reducing the need for intermediaries, such as agents and brokers (Petrovic & Stankovic, 2019). In the distribution process, however, different categories of technological innovation may be applied. The application of devices, context-aware and location aware services allow insurers to deal with the customers and offer customer-centric services, as well as a rich multichannel, multidevice digital customer experience.

The increasing collection of data through the new digital technologies permits more granular underwriting in risk insurances. Smart analysis techniques, predictive modelling and connected telematics devices allow insurers to create products and set premiums based on actual risk profiles rather than on general standards. Some insurers have gone as far as to introduce fully automated underwriting systems which provide final decisions on life insurance applications without intervention by an underwriter. Due to the use of ICT, now, during the policy period, it's possible to gather in real time various

parameters of the insured. Insurers can use the real-time data and powerful analytics to reassess the current risks and recalculate the premium for current risks at regular intervals. Also, insurers develop tailor-made products with pricing adjusted to individual risk levels and very accurate selection (Porter & Heppelmann, 2015). The usage-based insurance products have escalated in vehicle insurance and it is expected that the number of insurers will grow to 142 million globally by 2023, while reducing collisions by up to 20%, operating costs by up to 10%, and fuel consumption of between 8% and 11% (OECD, 2017).

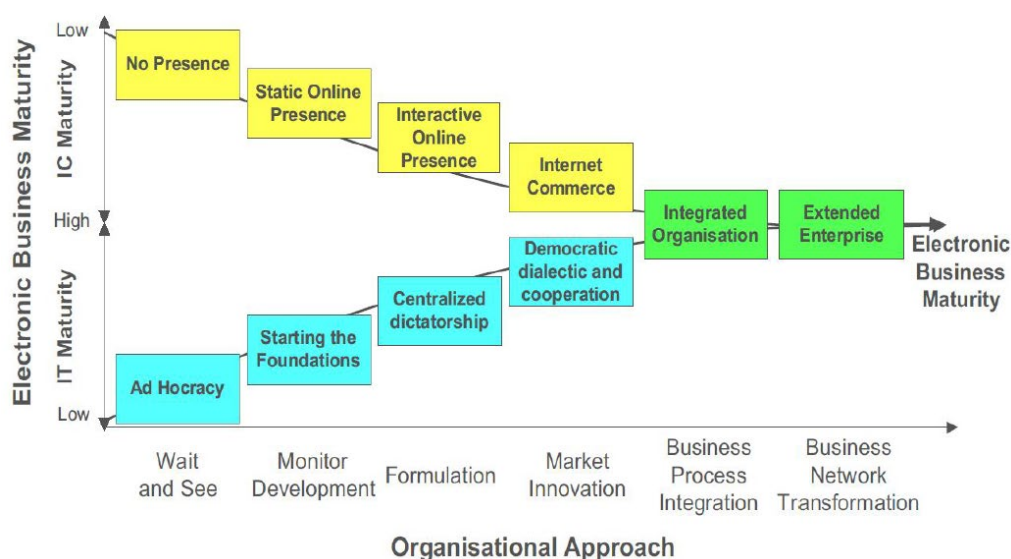
New technologies make claim management more efficient, and enable detection of fraudulent claims. Claims can be managed via online platforms, with less time for processing. Automation, analytics, and consumer preferences are transforming claims management processes, enabling insurers to improve fraud detection, cut loss-adjustment costs, and eliminate many human interactions, as well as to reduce reserves needed to cover claims volatility, which can, all things considered, reduce claims expenses by up to 8% (Schanz & Sommerrock, 2016). Moreover, insurers with strong distribution networks, brand and ability to adapt to customers' needs could develop new post-sales services, which will adjoin value-add and preventive services to traditional risk protection. These services in property and casualty, health and life insurance, due to various safety features enabled by technology, will become more sophisticated as insurers harness network effects within cross-industry ecosystems (Swiss Re, 2020). These changes will blur the industry boundaries as insurance connects with other sectors through digital platforms focusing on an end-to-end buying experience.

4. Implementation of ICT in the insurance companies' operations

Although electronic business has been developed and implemented in the existing business models rapidly, in the insurance industry, especially in emerging economies, its implementation is slower and influenced by many factors. The dissemination of new technologies is forcing insurance companies to alter long-held business practices. Insurers have to deal with a flood of new technologies, with range from wearable devices to driverless cars, and are expected to be taken up by a large number of consumers in coming years. With the fast advancement of such technologies, insurers must develop strategies that take full advantage of the opportunities they present, while minimizing the risks (Schmidt et al., 2017). Depending on the previous experience in the implementation of ICT, the current level of ICT implementation, as well as the prospects for the expansion and development of e-business, insurance companies define individual e-business strategies. A frame-

work that provides insight into the possible development path of e-business is a useful tool for the development and implementation of adequate business models. Assuming that the diffusion of ICT in the organization takes place according to predictable patterns, which can be conceptualized into stages that are sequential, hierarchical, irreversible and involve a variety of organizational activities and structures (Gottschalk, 2009), the adoption of ICT into insurance operations can be explained by the stages of the growth model. According to the level of implementation of ICT in insurance companies, especially in emerging markets, based on the analysis of the basic models (Morais et al., 2007), it can be concluded that the Stages of Growth (SOG) e-business model, which has been verified in practice, is a suitable model for analysis of the adoption and implementation of ICT in insurance companies. This model takes into account the activities of Internet-based and IT-based enterprises, as well as the traditional forms of IT implementation in the enterprise.

The SOG model is based on 6 levels (McKay et al., 2000): no online presence, online presence, Internet commerce, integrated organization, and extended enterprise, and level assessment is based on four layers (Prananto et al., 2003): e-business strategy, e-business system, human resources and impact on business processes (Figure 1).



Source: McKay, Marshall, & Prananto, 2000.

Figure 1. The SOG Model of E-Business Maturity

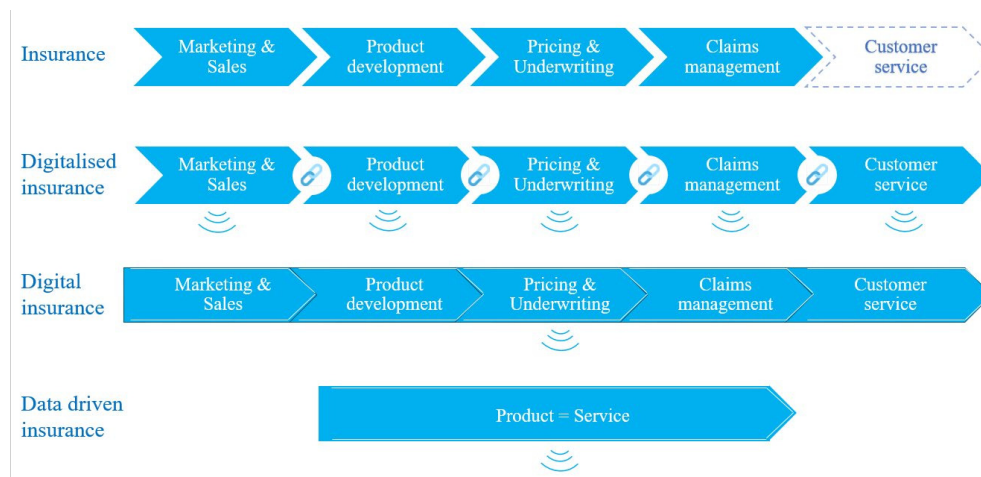
During the first phase of development (no online presence) the insurance company does not implement ICT in its operations and has no clear strategy for the development of electronic business. This approach is the result of ignoring information technology due to the inability to assess the costs and benefits of its implementation. In this case, the insurance company awaits the outcome of the changes that its competitors or business partners made by adopting ICT.

If the acceptance of information technology in the insurance company can be assessed as a static online presence, it usually reflects the presence of the company on the Internet, but only for the purpose of providing information about its services. In this case it is a one-way communication, and the company commonly uses a website to provide information on its business to the insureds, investors, potential employees and all other interested stakeholders. The strategy developed by the company at this stage is related to the effective dissemination of information. However, this is an essential phase of development in which companies experiment, learn and invest in core systems and technologies, which are necessary for the presence on the Internet.

In the third stage of development, that can be described as an interactive online presence, insurance companies start a two-way communication and interaction with customers via the Internet. Internet communication channels, such as e-mail, search engines and databases are used to provide the required information to customers, but also to gather information from them. Considering the fact that these services contribute to the expansion of the services on the market and offer new opportunities for customer relationship management, this phase is also called informative stage. However, besides the exchange of information and the possibility of ordering insurance products, insurance companies do not offer other benefits to their customers. Payments are still performed in the traditional way, so that it can be concluded that the strategy of the company in this phase is focused on the brand building using the Internet.

The stage of Internet commerce represents a phase in ICT adoption in which a fundamental change in the conduction of business activities can be observed. At this stage insurance companies provide their customers opportunity to sign an insurance contract and execute payments online. The implemented ICT affect the organizational structure and business processes, while a successful realization of online transactions involves investment in applications for online shopping and payment systems. Therefore, this phase is also called the transactional phase, and companies, whose level of ICT implementation in operations is on this level, are strategically oriented towards market repositioning and expanding the base of the insureds. Although information

can be gathered using various ICT tools, multiple digital databases remain unconnected, so digitalized insurers cannot use the potentials of fragmented information strategically (Figure 2).



Source: According to the Swiss Re, 2020, pp. 20.

Figure 2. Insurance value chain transformation

Further investments in ICT leads insurance companies to the sixth stage, in which interaction between traditional and online activities are transforming traditional insurance into digital insurance. Interdependence between investments in ICT and the business strategy of the insurance company is intensified, in order to achieve a complete transformation of business and the integration of all business processes, technologies and networks of stakeholders in the form of a virtual organization – data driven insurance, which is the ultimate goal this process. Typically, the adoption and implementation of ICT unfolds from simple to more complex stages, because the transition to a more advanced stage of development is caused by the accumulation of knowledge, experience and skills gained in less demanding stages of development. However, insurance companies can evolve faster, if they outsource services from other companies to perform certain activities in the value chain, or to establish their operations for the purposes of e-business conduction.

5. Conclusions

Although all UN member states in 2015 adopted the 2030 Agenda for sustainable development, incorporating SDGs into economic and social development is still a challenging task and the sustainability gap remains the major issue. Digital technology could enhance capacities of insurance industry to contribute to a healthy, safe, resilient and sustainable society. However, digital transformation is a specific form of organizational transformation that is initiated by implementation of information technologies (Besson & Rowe, 2012) and requires an appropriate strategy (Bharadwaj et al., 2013). In order to define and implement digital transformation strategy, insurance companies have to consider the use of technology, changes in the value creation, structural reforms and financial aspects of this process (Matt et al., 2015). Taking into account the impact of digitalization on the value chain, it can be concluded that the changes in the insurance industry are related to: (1) the manner in which new technologies are changing the interaction between the insurer and the insured, which can now take place via social networks and virtual counsellors; (2) the manner in which new technologies can be used to automate, standardize and improve the efficiency of business processes; and (3) the opportunities that new technologies offer for modification of existing and development of new insurance products. These changes, which are leading to a complete transformation of insurance industry and cross-sectional integration of all business processes, technologies and networks of stakeholders, shape the global strategies and roadmaps for sustainable development.

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