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FORMATION OF AN INTELLECTUAL AND INNOVATIVE ENVIRONMENT OF THE INSURANCE SYSTEM DEVELOPMENT IN UKRAINE AND WORLDWIDE

Introduction. *The article highlights the main innovative trends in the development of the insurance system of Ukraine and analyses innovative insurance technologies with the possibility of their implementation in the domestic insurance practice. The insurance system is the largest investor in Europe, so investments are a key component of the insurance business model. The priority of the modern insurance system is the use of digital platforms, artificial intelligence, the Internet, and blockchain technologies.*

Problem Statement. *A key prerequisite for the development of society in today's economic environment is innovation. The proliferation of digital electronic technologies, the emergence and widespread testing of universal multifunctional mobile phones, and the increasing reliance on Internet resources have all become pivotal factors in transforming the fundamentals of economic relations. Consequently, business processes are becoming more streamlined, innovative product channels and services are being developed, and customer service technologies are advancing.*

Purpose. *The purpose of the research is to study global trends in the development of innovative insurance technologies and the possibilities of their application in the insurance system of Ukraine.*

Materials and Methods. The general scientific and special methods of analysis and synthesis, comparison, systematization, statistical and graphical methods, tabular method have been employed.

Results. *In Ukraine, notable examples of co-branding with banks include alliances such as Piraeus Bank with IC UNIQA and IC Alfa Insurance; Unex Bank with IC VUSO; and OTP Bank with IC Arsenal Insurance. This article highlights the main global achievements of insurance systems in the Insurtech field. The most promising ways to enhance insurance services are through artificial intelligence, machine learning, and big data analysis. Each year, the domestic insurance system is enriched with innovative products, including sales automation, home security, mobile security, extreme security, and the CyberEdge cyber risk insurance program, among others.*

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Conclusions. *The priority areas for the development of innovative technologies in the domestic insurance system include the utilization of advanced sales channels for insurance products based on telematics and artificial intelligence, the implementation of blockchain technology, and the introduction of microinsurance. These advancements aim to enhance risk protection and to simplify customer access to the services offered by insurance companies.*

Keywords: innovations, innovative products, innovative technologies, insurance companies, insurance system.

The dynamic nature of insurance development necessitates ongoing research to comprehensively assess the primary challenges, trends, and prospects within the insurance system. Research, development, and innovation are becoming essential elements of the knowledge-based economy, as highlighted by the European Union at the Lisbon Summit in 2000. EU countries have aimed to create an economic environment where innovation drives economic development and competition. By 2015, European countries attributed up to 30% of GDP growth to innovation. Globally, the top five countries recognized for their dynamic implementation of strategic innovation are Taiwan, Ireland, Singapore, Hong Kong, and Korea [1]. In the context of insurance system innovations, Japan, Switzerland, Sweden, Finland, and Germany continue to be among the global leaders.

In general, the amount of insurance reserves, insurance assets, insurance capital, controlled by participants in the world insurance system, exceeds USD 22.6 trillion, which testifies to their global importance and investment potential. To improve the insurance system and its service, insurance companies are forced to use innovative technologies.

Domestic and foreign researchers have explored the challenges of implementing innovative technologies in insurance. O. Valieva (2015), A. Suprun, and A. Ariyenchuk (2019) focused on specific features of innovation in insurance companies. S. Bunin (2017) examined development trends in the European insurance market. P. Horyslawets and L. Aleshko (2015) analyzed the essence of innovations and their role in the insurance sector. N. Novak (2018) discussed the role of startups and the integration of insurance products in the digital world. V. Fedyna and I. Kobzar (2018) investigated the use of internet marketing in insurance company activities. V. Zakolodyazhnyj and O. Sova (2017), along with L. Zavoloka and I. Silina (2018), conducted in-depth research on contemporary trends in the innovative development of insurance. M. Canaan, J. Lucker, and B. Spector (2016) analyzed the application of the Internet of Things (IoT) in modern insurance systems and its impact on future development. Artificial intelligence, machine learning, and blockchain technologies were comprehensively discussed by S. Smith (2016). The analysis of recent publications has revealed a clear need for further research to expand and implement innovative technologies in the practice of insurance companies. The studies have indicated a growing interest in innovation within insurance processes. The dynamic nature of global economic growth necessitates continuous research into the primary challenges, trends, and prospects for developing the domestic insurance system.

Having analyzed the European insurance market, we can conclude that the insurance system is the largest institutional investor in Europe and a key source of investment necessary to support economic growth. This factor is crucial for the implementation of innovations, as this process requires significant costs. Since 2009, Europe's insurance investment portfolio has reached EUR 10,228.7 billion annually until 2017, significantly contributing to GDP. However, in 2018, this figure dropped to nearly EUR 10,055.5 billion, similar to 2015 levels. Since 2018, there has been an upward trend in investments, reaching EUR 10,627.3 billion in 2020. European insurer investments from 2009 to 2020 are shown in Fig. 1.

In 2020, the total investment of European insurers amounted to EUR 10.7 trillion, equivalent

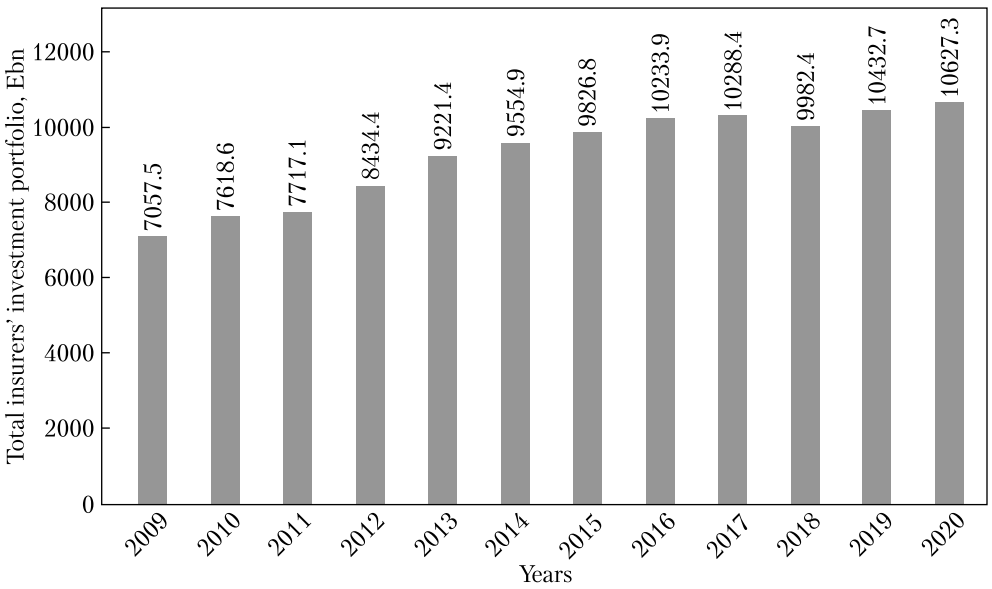

Fig. 1. European insurers' investment portfolio, 2009—2020

Source: [2].

to 73% of European GDP [5]. Despite political and economic uncertainty in 2022, the global insurance industry has maintained revenue growth. Among developed insurance markets, the largest growth was seen in North America and the Asia-Pacific region. In emerging markets, the most notable growth occurred in China and India. Latin American insurance markets demonstrated moderate growth.

The European Insurance and Reinsurance Federation, based in Brussels, represents European insurance companies, accounting for about 95% of total European premium income. As of the first quarter of 2020, *AXA Insurance Company* was the most active investor in *InsurTech* globally, investing in 19 *InsurTech* companies. In contrast, the well-known insurer *Comcast Ventures* invested in only four insurance companies. Insurance makes a major contribution to Europe's economic growth and development. European insurers pay nearly EUR 1,100 billion annually (EUR 2.9 billion daily), directly employ more than 900,000 people, and invest almost EUR 10,200 billion in the economy [4]. Analyzing the investments of insurance companies in European countries in 2020, France led with EUR 2572.8 billion, followed by Germany and the United Kingdom with EUR 2000 billion and EUR 1876.9 billion, respectively. The least investment (EUR 563 million) was made by Romania. The total investments of the European insurers by country are presented in Fig. 2.

In 2015, there were 3,700 insurance companies in Europe (the largest number (539) was reported for Germany), in 2020, their number reached about 9,000 [6]. In 2015, the European insurance industry employed more than 950,000 people. This figure does not include freelancers and independent intermediaries [3, 7]. In 2020, their number decreased to 924 thousand, as compared with the previous year. Having analyzed the dynamics of employment in 2009—2020 (Fig. 3), we can conclude that the number of employees in the insurance industry grows every year, and so does the number of the insurance companies, despite some negative dynamics in some years.

The reason for this phenomenon is various structural changes as a result of mergers, acquisitions, or liquidations of insurance companies [6].

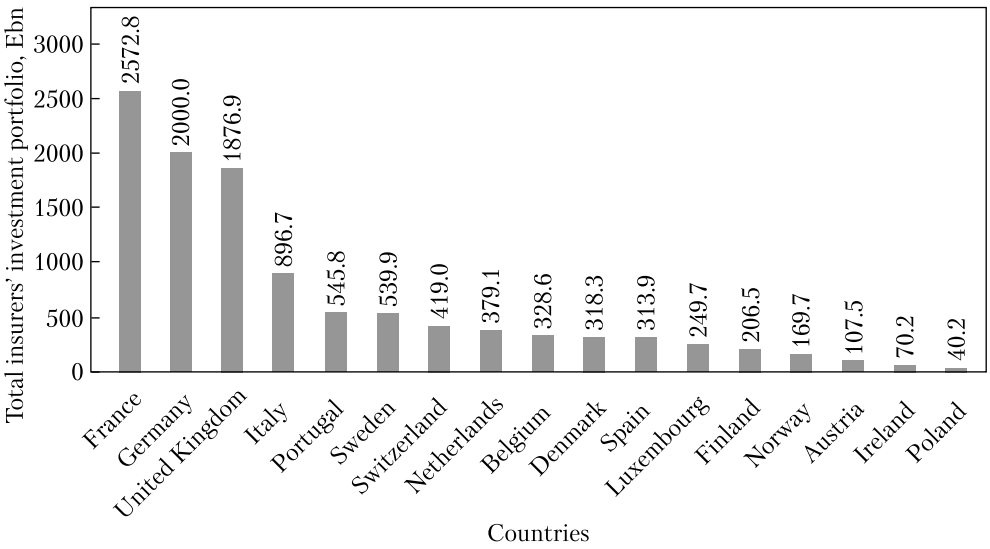

Fig. 2. The total investment portfolio of insurers operating on the European market in 2020, by country

Source: [2].

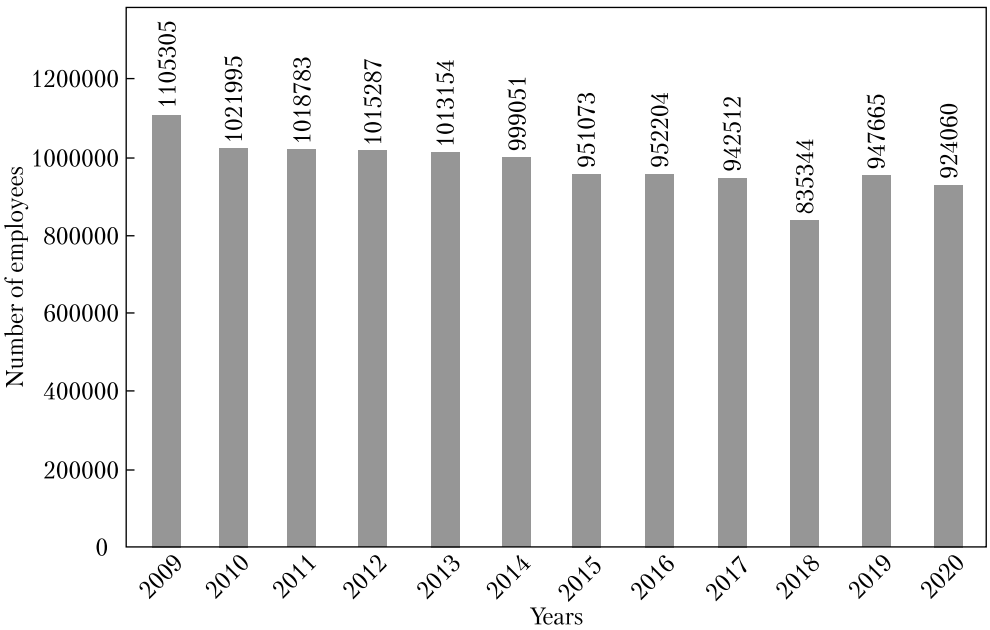

Fig. 3. The total number of employees employed with insurance companies in Europe, 2009—2020

Source: [8].

Thus, innovations in the insurance system encompass new solutions, newly created and improved technologies, products, or services that bring about progressive changes and further development of the insurance system. It has been scientifically proven that competitors need six months

to replicate insurance products and at least five years to establish a positive image [9]. Therefore, it is essential for insurance companies, as the main entities of the insurance system, to respond promptly to market conditions, understand the needs of potential policyholders, and address them effectively. Consequently, the insurance system shall embrace innovation.

Foreign experience in insurance operations has highlighted that the effectiveness of insurance activities hinges on the establishment of comprehensive innovation management systems within insurance companies. A study by *Accenture* in 2013, focusing on Consumer-Driven Innovation, emphasized the necessity for insurers to provide relevant and affordable insurance products [10]. *Accenture's* 2019 *Technology Vision* survey, involving 602 companies across 26 countries, revealed that 88% of these firms are actively experimenting with new technologies to foster innovation [11]. Technological advancements in the insurance sector are reshaping the sales channels for insurance products used by policyholders, enabling the reduction of intermediary services, lowering policy costs, and transforming customer service approaches.

We believe that the modern insurance system's priority lies in leveraging digital platforms, artificial intelligence, the Internet, and blockchain technologies. According to research by the French consulting company *Capgemini* in the insurance sector, insurers are increasingly transitioning to fully digital environments, relying on innovation to enhance customer retention, expedite the introduction of insurance products, boost efficiency, and reduce costs. External factors such as intense market competition, regulatory pressures, the rise of alternative distribution channels for insurance products, and the integration of artificial intelligence are compelling insurers to fundamentally rethink their value propositions [12]. *Capgemini's* World InsurTech Report 2020 highlights a growing trend where more insurance companies are engaging with InsurTech firms. Specifically, in 2021, 67% of insurers have entered into agreements with InsurTech companies to automate their processes and drive digital transformation [13].

Recently, many innovative products have emerged in the domestic insurance system, attracting the attention of potential customers and enhancing the competitive advantages of insurance companies that implement them. Among these products, the most noteworthy are programs involving the investment of funds in precious metals held by banks, housing programs, and children's social projects.

Ukraine's educated workforce, respected worldwide, also facilitates these innovations. Multinational technology companies such as *Oracle*, *Ring*, *Siemens*, *Cisco*, and *Samsung* are establishing large research centers in the country. The Ukrainian IT market has doubled in the last four years, reaching 184,700 IT specialists. According to the CEE report for 2019, the Ukrainian software development sector grew by 19% in 2018 and continues to grow steadily. The technology industry is one of the main exporters of Ukraine's services, generating approximately USD 5 billion annually [14].

Insurance companies, as the primary entities in Ukraine's insurance system, often lack the necessary information for making managerial decisions, such as concluding insurance contracts or processing insurance payments and claims. Reliable information about clients and the insured objects is crucial. Despite significant technological advancements, insurance companies still face information deficits. To address this issue, it is essential to establish a centralized electronic database on insurance cases and a Bureau for Combating Insurance Fraud. These initiatives would enhance the ability to combat fraud within the insurance system.

Moreover, insurance companies should leverage innovative sales channels for their products and services. Co-branding is an important tool for promoting insurance products. Co-branding partnerships between insurance companies and banks or other non-bank financial institutions are particularly effective. When insurers form alliances with

banks in a Bancassurance model, they can significantly reduce marketing costs, better target specific market segments, conduct market research more efficiently, and expand their product range.

In Ukraine, some of the most common examples of co-branding with banks include the alliances of *Piraeus Bank* ICB with *UNIQA* IC and *Alfa Insurance* IC [15]; *Unex Bank* with *VUSO* IC [16]; and *OTP Bank* with *Arsenal Insurance* IC [17].

In addition to banking and insurance alliances, insurers can be members of holding companies and financial supermarkets, which provide significant benefits such as additional profits and new sales channels for insurance products. For example, *Alfa Insurance* IC (Ukraine) is part of the European private investment holding company *ABH Holdings S.A.* (ABHH) that includes banking groups in Ukraine, Russia, Kazakhstan, Belarus, and the Netherlands [18]. The *TAS Group* is another example of combining financial capital; it encompasses *TAS Insurance Group*, *ULF-Finance* LLC, *Universal Bank*, *TASCOMBANK*, *Credit Market* FC, *European Debt Repayment Agency* LLC, *TAS Link* LLC, and *TAS-Logistics* LLC [19].

In the area of reinsurance, *Raiffeisen Bank Aval* and *FlyRe* LLC have launched an online mortgage insurance exchange for borrowers, simplifying the process of obtaining insurance cost information from various insurers without needing to visit offices [20].

Ukraine's largest foreign partners in reinsurance include *Allianz* AG (Germany), *Hannover Reinsurance Company* (Germany), *Munich Re* (Germany), and *Swiss Reinsurance Company* (Switzerland). The global reinsurance market has well-known centers of development in North America, Europe, Latin America, and Australia. Newer reinsurance centers have emerged over the last 10—20 years, such as those in Bermuda, Asian markets, and Eastern Europe, which have contributed to increasing reinsurance capital [21].

International insurance companies bring capital and extensive experience in international management to Ukraine, along with a variety of insurance products and innovative methods for promoting them in the financial services market. *ALICO AIG Life* has achieved significant success in Ukraine by employing the MLM (Multi-Level Marketing) system that actively engages clients by transforming them into both buyers and agents. The national insurance industry is increasingly attracting investors. The entry of foreign insurance companies will benefit both individuals and businesses by increasing the supply of insurance products in terms of coverage and service range. Enhanced competition compels companies to lower tariffs on certain types of insurance where they are currently inflated. In the short term, the state will benefit as the insurance business generates more tax revenue and becomes less susceptible to tax evasion.

The world is experiencing rapid digitalization across many sectors, including insurance. For instance, in February, *Apple* and *Cisco* partnered with *Allianz* to offer more favorable cybersecurity insurance terms [22]. Financial startups and services represent one of the most dynamic segments of the innovative economy. While Silicon Valley is traditionally seen as a leader in fintech, startups in other countries are also revolutionizing financial services.

In the age of globalization, the insurance system is evolving, incorporating the cutting-edge technologies and adapting to modern challenges. At the intersection of technology and traditional insurance, scientists and practitioners are developing entirely new technologies in insurance.

InsurTech is a technology industry based on the development of IT solutions in the field of insurance (consumer services, tools for insurance professionals). According to IBM research, about 81% of successful insurers work with *InsurTech* projects. For the insurance system to function and develop successfully, it must invest in its technological innovations, buy system products from IT companies, or support startups that develop appropriate technologies. *McKinsey* experts conducted research and identified the most popular technological solutions already used in *InsurTech* projects: microinsurance (3%), blockchain (4%),

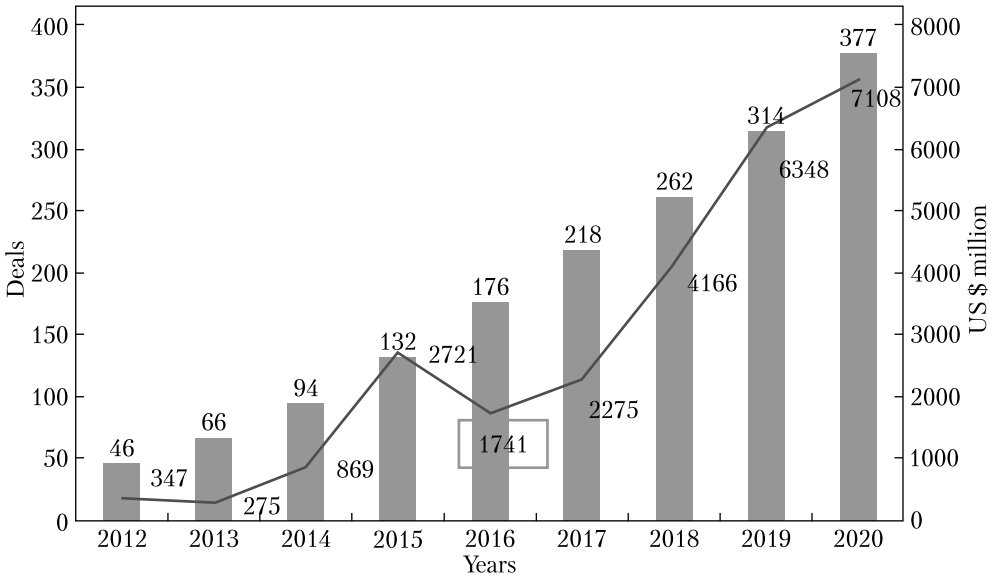

Fig. 4. Annual InsurTech funding trends including the number of deals and their amount in USD, 2012—2020

Source: [25].

P2P (4%), robot advisor (10%), gamification (10%), insurance for the IT sector (12%), insurance based on use (13%), big data and machine learning (20%) [23]. In 2020, the upward trend in insurance technology financing remained at the same level as in 2019, while the number of transactions decreased by about 30%, as compared with 2019. During 2019—2020, the European investments in insurance technologies increased by 31%, while the Asian ones grew by 11% [24]. If we estimate the global trends in investing in *InsurTech*, in 2020 they amounted to USD 7.1 billion with 377 signed agreements on the introduction of insurance technologies (Fig. 4).

In 2021, insurance companies have significantly increased investment in startups as compared with 2020, from USD 978 million to USD 1.6 billion. The recovery of investments in 2021 was largely due to the activities of *Palantir Technologies*, *iCapital Network*, *Vazyme Biotech*, and *Hippo*, which account for USD 1.1 billion. The most notable aspect is that all these investments were made by Asian insurance companies such as *Sompo*, *Ping An*, *China Life*, and *Sumitomo*. The insurance industry maintained its investment in insurance technology in 2020 (as compared with USD 450 million, in 2019). These investments were also concentrated in only three insurance companies: *Hippo Insurance*, *Acko Insurance*, and *Getsafe* [24].

Let's highlight the main world achievements of insurance systems in the technological field of InsurTech. For example, in the field of life insurance: *Ethos* has created a platform that can quote urgent life insurance in minutes through its application based on forecast analytics and data from the applicant without a medical examination [26]; Bestow allows users to purchase life insurance products online, and also uses forecasting analytics to instantly determine the level of risk and provide customers with access to comprehensive life insurance solutions [27]. In the field of property insurance, *Hippo Insurance* has a simplified claim process based on publicly available data, satellite images and smart home devices [28]; and New York-based *Lemonade* offers ren-

ters and homeowners insurance based on artificial intelligence and behavioral economics, using bots and machine learning [29]. *InsurTech* is likely to be a tool to influence the development of the insurance system.

P2P (peer-to-peer insurance) is a startup created by the German insurer *Friendsurance* and the Chinese insurance company *Tong Ju Bao*. The essence of this technology is to form a fund of contributions of policyholders, united on certain grounds. Most of the funds are used to reinsure large risks in insurance companies, with the rest assigned for developing a startup and covering insurance claims. With this startup, consumers can save up to 50% of the cost of the insurance policy, because the funds intended for payments, can return be returned to them at the end of the year. An example of peer-to-peer insurance is the Israeli-American company *Lemonade*, in which insurance payments are formed from the contributions of policyholders. This startup uses insurance technology (*InsurTech*) mainly in the real estate market. Since 2015, the company has raised USD 60 million. from *Aleph*, *Sequoia*, *Allianz*, *XL Innovate*, *General Catalyst*, *GV* (*Google Ventures*), *Thrive Capital*, and *Tusk Ventures*. *Lemonade* uses AI and machine learning, so operations are fast. The company's website states that the user will need 90 seconds to take out insurance, and to receive payment in 3 minutes [29]. The total investment in this technology is USD 180 million. Modern technology allows protecting documents, keys, small gadgets. This area is only developing, but in a few years, such protection will become commonplace.

Not only insurance but also the financial services sector, in general, is experiencing a crisis of confidence. *Edelman's* research shows that mobile telecommunications and blockchain can solve this problem. The main goal of these latest technologies is to protect customer data, develop more transparent and affordable insurance solutions. Insurance is the area where blockchain needs to be implemented, but in practice, this is not easy due to technological difficulties. In the global report 2018, *Edelman Trust Barometer* analysts call 2017 the year of the crisis of confidence, and 2018 the year of the battle for truth. Blockchain technology is one of the examples of innovations, the application of which allows reducing the time spent on certain business processes of the insurer and the risk of insurance transactions. Now, this technology is a database for faster exchange of information with a high degree of protection, therefore, the subjects of the insurance system are interested in its implementation [30].

The development of the Internet of Things (IoT) is associated with the growth of cyber threats. IoT is a network of smart devices connected to the Internet. All devices on this network can interact by collecting and sharing information about their scope. This can include any number of technologies, from smart homes and self-driving cars to fitness devices and fully automated and connected production centers. Currently, there are more than 26 billion such network devices, and, according to analysts, by 2025 their number will reach 75 billion [31]. This proliferation of devices with connectivity and real-time connectivity allows IoT to grow rapidly in efficiency and additional capabilities across a wide range of industries. IoT can change the way insurance companies assess and limit risks with a wide range of potential consequences for the insurance system. IoT technology was first used by *Progressive Insurance* to purchase car insurance online in real time in 1997 [32].

For example, smoke detectors in the apartment allow detecting fires and extinguish the fire in time until it caused great damage, and payments under the insurance policy will be lower. This is beneficial to insurance companies because of the reduced cost of services for customers who have installed smoke, flood, and motion sensors. In the UK, *FloodFlash* insurance technology was launched in 2019, with the use of the touch technology that provides flood protection for British companies and landlords. When the sensor detects flooding, it sends readings to the insurance company via mobile networks, which allows im-

mediate start of the claim process. The American insurance company *Erie Insurance* uses drones to inspect a property in case of a claim for property damage. It is the first insurance company in the United States to receive official permission from the Federal Aviation Administration (FAA) for the commercial use of drones [33].

One of the promising methods of insurance system development is the organization of sales of insurance policies via the Internet. The development of the Internet is rapid, insurance companies should improve their websites and electronic resources in a timely manner. The advantage of an insurer that actively uses the Internet is the reduction of insurance costs, as sales are made online.

An innovative approach in the activities of insurance companies is the conclusion of insurance contracts via the Internet. In Ukraine, users are actively offered a virtual service of *Oranta Incorporated*, *ASKA* Insurance Company, *ARX* Insurance Company, *INGO* Insurance Company, *PZU Ukraine* Insurance Company, and *TAS* Insurance Company. Experts believe that concluding an insurance contract via the Internet has a number of advantages: saving time, speed, simplification of the procedure, versatility. However, in order to use this service in Ukraine, it is necessary to provide and constantly develop payment systems in Ukraine [34].

The new version of the Law of Ukraine on Insurance provides for the expansion of e-commerce opportunities, in particular the possibility of concluding an insurance contract in electronic form. An example is the EWA software product that does not require capital investment in the development or acquisition, as well as the implementation of the system, no infrastructure costs: server, network, maintenance, security. This software product is interesting for car insurance because it has built-in designers and calculators for CASCO. When it comes to car insurance, insurance companies can track car speed and other behaviors, as *True Motion* does. For cautious drivers, insurance premiums will be lower. Therefore, IoT technologies will be useful in the development of usage-based insurance — insurance based on the use of [35]. There is also a pricing model based on Pay-As-You-Go. Depending on the load that the user creates on the platform, a corresponding usage fee will be charged. In addition, a motivational system that accrues bonuses to each user for the implementation of the policy has been launched [36].

In Europe, Germany, France, the United Kingdom, and Italy have been leaders in online sales for two years in a row. In these countries, the share of direct sales through the network exceeded 4% of the total insurance system. The annual growth rate of online insurance in Europe reaches 70%. The leaders of distance sales of life insurance services (via the Internet, e-mail, call centers, etc.) are Ireland (21%), the Netherlands (11%), and the United Kingdom [37].

Pay-As-You-Go is the most used startup in the world. For example, the mentioned *Lemonade* retains only 20% of the funds received from customers, and benefits not only users but also the insurance business, due to reduced risks. The mechanism can be considered in the example of the Ukrainian project *YouScore* from *YouControl*, which was created to analyze the reliability of the company and helps insurance companies to determine the possibility of cooperation with the client. The introduction of such technologies will help the insurance industry to reduce the cost of studying partners and to increase the efficiency of analysis. Companies that are the first to master these technologies will gain a competitive advantage. It is easy to integrate such a system into the business processes of the insurance company because it is simple and affordable, so in a few weeks the company will be able to take advantage of the implementation of this system.

Artificial intelligence, machine learning, and big data analysis are the most obvious ways to improve insurance services. Big data will help insurers and policyholders better understand the risks. Robo-advisor style interactions based on artificial intelligence and machine learning will take on routine tasks: advising customers, se-

lection of solutions, paperwork. For example, in Ukraine, the automated selection of an insurance policy is offered by the *Civilkin* project team. The object of insurance is property and data that in the modern world are most vulnerable to cyberattacks. According to *Price Waterhouse Cooper* (*PwC*), cybercrime costs the world economy USD 400 billion a year, and that number will grow every year. Obviously, both businesses and ordinary users will have to actively defend their interests, and doing so without *InsurTech*-solutions will be impossible [35].

Next Insurance (Palo Alto, USA) uses an intuitive universal desktop and mobile interface. Based on artificial intelligence and big data. As of 2017, the company was already licensed in all 50 US states. The startup generated more than USD 1 million in revenue and attracted USD 48 million from early-stage venture investors. The global cyber insurance market is dominated by the United States whose share in 2018 accounted for about 70% of global premiums [38]. In the table 1 lists the 5 largest property and accident insurance companies that insure cyber risks in the United States. These cyber insurance companies are ranked by the total cyber insurance premiums for 2022 by the rating agency *A.M. Best*.

Table 1. **Top Property and Accident Insurance Companies That Insure Cyber Risks in the United States, 2022**

Rank	Company	Direct premiums written, USD million	Market share, %
1	Chubb INA Group	604.9	8.4
2	Fairfax Financial (USA) Group	563.0	7.8
3	XL Reinsurance America Group (AXA XL)	527.4	7.3
4	Tokio Marine US PC Group	367.6	5.1
5	Arch Insurance Group	346.4	4.8
6	Travelers Group	315.3	4.4

Source: [39].

From 2011 to 2018, almost USD 5 billion was invested in insurance technology. The largest investors in insurance technology include Japan's *SoftBank* and its *Vision Fund*, through which USD 300 million was invested. The Israeli-American company *Lemonade* invested USD 205 million in *Collective Health*, while *Policybazaar* contributed USD 152 million [24]. *Lemonade* also uses artificial intelligence and machine learning, so it takes the consumer 90 seconds to get an insurance policy and 3 minutes to get paid [29].

Insurance on demand. This startup is actively used by the American company *Trov* that has received more than USD 9 million profit thanks to this technology. The underwriters include *AXA* and *SunCorp*. *Trov* has become an innovator in the field of digital insurance and personal data storage and insurance for laptops, cameras, sports equipment, jewelry, and more. Digital storage stores data and can allow instant service while having a flexible pricing policy. Artificial intelligence can handle any claim handling procedure.

It is worth noting that the modern insurance market is intensifying the process of combining traditional and virtual tools, expanding the scope of financial technologies, which simplifies consumer access to insurance services and reduces business costs. According to *Juniper Research*, in the coming years, *FinTech* platforms worldwide will grow from USD 175 billion, in 2016, to USD 235 billion, in 2023 [40].

After analyzing global data, the main features of the domestic insurance system include:

1. Remote access environment. In 2020, during the COVID-19 pandemic, insurers around the world switched partially or completely online. In a recent Mercer survey, the majority of respondents, including 83% of the insurance industry, planned to continue to use flexible working options on a larger scale. Strategically, implementing digital solutions such as automation (automated billing systems), mobile solutions (claims adjustment programs), project management software (online task management systems), remote network security software, and

hardware (eg VPN) — insurers will expand the range of their services.

2. Contactless payments. According to the SMA *Market Pulse Insights 2020* report, 81% of insurers will continue to use digital payment technologies next year [41]. Consumers will not only wait but also look for insurers that offer a full range of modern payment options.

3. Digital transformation (*InsurTech Explosion*). Cybersecurity, large data sets, digital payments, virtual claims management, remote access to work, multichannel customer service, and many other trends over the past few years have quickly moved from business efficiency to necessity. A recent poll by *McKinsey* executives estimated that the introduction of technology by the insurance industry in 2020 was equivalent to progress three to four years before the pandemic. The recent increase in investment in insurance technology reflects this increased demand with a record third quarter in terms of both funding and transactions.

4. Robotic process automation. Insurers use robotic process automation to digitize administrative tasks to automate conversational processes, including chatbots, interactive voice response, and virtual assistants to insurance consumers — to handle routine communications and transactions. Other processes that can be automated include generating quotes, detecting fraud, creating invoices, analyzing the capabilities of insurance entities, and making payments.

5. Service or cloud business model. The model allows insurers to expand their technological capabilities without the burden of developing and maintaining full-fledged internal solutions. Cloud services tend to be more cost-effective and faster to build, often providing more functionality due to the specialized nature of the service provider.

The insurance system is replenished annually with innovative products, including: "teleregulation", "sales automation", "home security", "mobile security", "extreme security", cyber risk insurance program *CyberEdge* and others. In particular, products such as *Mobile Security* and *Extreme Security* were launched by *Alfa Insurance* through the *MOYO* chain of stores. These are programs to protect equipment from various risks associated with unforeseen circumstances that occur during operation. Today, this insurance company also cooperates with *COMFY* and *Ringoo* stores. The innovative product *CyberEdge* is presented by the insurance company *Chartis* for insurance against cyber risks [34].

An interesting option for the development of insurance companies is to create mobile applications. The special program allows quickly finding the insurer's office, reporting the occurrence of the insured event, determining the sequence of actions in case of unexpected situations, getting a list of documents required to pay insurance indemnity, calling an insurance agent, etc. The largest providers of the domestic insurance system are already implementing chatbots and mobile applications.

A technologically new product is a mini-terminal that can be connected to a smartphone or tablet-based on *Apple iOS* or *Android*, as well as to a personal computer to make payments. In Ukraine, PJSC *PrivatBank* offers the opportunity to accept payment by *Visa* or *MasterCard* payment cards using a free mini-terminal. The mini-terminal works like a normal POS-terminal. However, at the same time, the employee of the insurance company gets the opportunity to accept payments from customers where it is convenient, and not only at a fixed point of sale. During the transfer, the money goes to the bank account of the insurance company [42].

The main trends of innovative technologies in the insurance system in Ukraine are given in the Table 2.

The balance of human potential with technological solutions and, if necessary, the flexibility to restore the balance continue to be the driving force of success in the development of the insurance system.

Based on a thorough study of innovations in the field of insurance, we recommend that the main priority areas for the development of inno-

Table 2. **Trends of Innovative Technologies in the Insurance System of Ukraine**

Innovative products	The essence of an innovative product	Entities that use this product
Assistance programs	In the process of settling insurance cases, services are provided by assisting companies, specialized centers with which the insurer has entered into a contract. Assistance can be medical, technical, transport, service, apartment, information, legal, tourist.	*Euroins Ukraine IC, Knyazha Vienna Insurance Group IC, ARX IC, Providna IC, Alfa IC.* The main assistants-company working with insurance companies: *AlfaAssistance, Smile Assistance, Garant-Assistance LLC, Eccles LLC, Daedalus-Service, Koris Ukraine PJSC, SOS Service Ukraine LLC, Savitar Group LLC, Savitar Group LLC All-Ukrainian service company "UKRASSIST", "Universal Assistance", LLC Balt Assistance Ltd., NOVA ASSISTANCE, Aibolit, Vash Assistance, LLC "Universal ASSISTANCE"*
Service Doctor online	The program provides constant access to remote telemedicine consultations, offers round-the-clock medical concierge service for the organization of a wide range of treatment and prevention services. Anti-Stress Package covers wellness services and medical consultations to prevent emotional burnout and promote mental health.	*Euroins Ukraine* IC, *Providna* IC, *Kraina* IC
Electronic contract	Technologies provide the possibility of concluding insurance policies in electronic form using Telegram, Viber, Messenger. Property, personal and liability insurance are the most popular.	*Oranta Incorporated, ASKA* IC, *ARX* IC, *INGO* IC, *PZU Ukraine* IC, *TAS* IC, *VUSO* IC, *Knyazha Vienna Insurance Group* IC, *Uniqa* IC
Digital technology	Technology that uses the Internet, mobile devices, and other electronic distribution channels to distribute content, information, and sell insurance services and products.	*Arsenal Insurance* IC
CASCO Smart	Use of a telematics device to analyze and evaluate driving, which reduces the number of accidents on highways.	*ARX* IC, *International* IC
Mobile application Security, Home Security, and Extreme Security	Programs to protect various types of equipment from the risks of its failure during operation.	*Alfa Insurance* IC together with the chain of stores *Moyo*, *Comfy,* and *Ringoo*
Project "One finger"	Online project created by insurers for insurance agents (if they have a smartphone and the Internet) The product contains an electronic form, online calculators, high commissions.	*ASKA* IC together with *ASKA-LIFE* IC
TAS-bot	Viber bot that allows registering the insured event, modifying the financial terms of the contract, ordering a duplicate of the insurance contract or additional agreement, tax or redemption certificate, getting a ransom loan and talking to the Contact Center.	*TAS Life* IC

Source: formed on the basis of insurance companies official websites.

vative technologies in the insurance system of Ukraine include:

1. The use of innovative sales channels for insurance products based on telematics and artificial intelligence. Environmentally sound computer systems think, learn, and respond, and can improve customer service and decision-making. The examples of remotely sent data are GPS data, gyroscope, barometer, compass, or accelerometer data, which are now collected by a smartphone. GPS-enabled devices capture the location of the car (in car insurance) and other data needed to create insurance policies, are transmitted over secure cellular networks, and are presented with the use of a web-based software platform. Telematics technology allows gathering valuable information about travel routes, driver behavior, customer habits, and personal preferences. The main advantage of telematics technologies is productive interaction with insurers on a case-by-case basis to establish long-term partnerships, more effective targeting of individual requirements, as well as the provision of value-added services. Telematics technology when applied to the CASCO insurance product will help reduce the cost of the policy for an individual driver. The main function of this special monitoring system is to track the characteristics of driving a particular car with a monitoring device mounted on the car. However, domestic insurers need time and testing of a large number of programs based on which telematics in insurance is implemented to implement this technology in Ukraine.

2. Application of blockchain technology as a catalyst for the development of the insurance system. Blockchain allows creating a digital register of transactions and sharing this data between a distributed network of computers on which information is encrypted as an electronic list of "blocks." Once the information is recorded, the data cannot be erased or changed without changing all existing records. As a result, all information recorded in the blockchain is highly secure. Gartner estimates that by 2030, the blockchain will bring in USD 3.1 trillion in business revenue. Another potential use of the blockchain could be the transmission of any digital evidence for underwriting, including the use of electronic medical records. The combination of the Internet of Things (IoT) and artificial intelligence (AI) automates insurance processes, which contributes to the development of the insurance system.

3. Microinsurance, as one of the areas of customer, needs management, is a leading area of innovation in the field of insurance technology, based on increasing access to data and analytical tools. Microinsurance covers, as a rule, people without pension savings or low-income, small businesses and is used in developing countries. Ukraine would be interested in the experience of building microinsurance based on the creation of mutual insurance companies to transparent ownership and reduce insurance fraud. We believe that this area of insurance in modern conditions, when the insurance system has changed the cycle of decline to growth, is especially relevant because it can provide insurance protection to the poor, increase confidence in insurance companies, which promotes the insurance system.

Thus, the insurance system operates in an environment of constant innovation and technological globalization. The main task today is to create an intellectual and innovative environment through some global trends in the modern insurance system: expanding the range of insurance products to include innovative insurance policies to cover terrorist, catastrophic, cyber, and other risks; the use of innovative technologies in the activities of the insurance system, which would help to effectively manage business models, expand the marketing system of insurance products, actively use the Internet. In an era of growing information technology, the computerization of society, and the constant updating of business process software, insurance companies are forced to look for new ways to meet consumer needs to maintain a competitive advantage.

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ФОРМУВАННЯ ІНТЕЛЕКТУАЛЬНО-ІННОВАЦІЙНОГО СЕРЕДОВИЩА РОЗВИТКУ СТРАХОВОЇ СИСТЕМИ В УКРАЇНІ ТА У СВІТІ

Вступ. Страхова система є найбільшим інвестором у Європі, тому інвестиції є ключовою складовою моделі страхового бізнесу. Пріоритетом сучасної страхової системи є використання цифрових платформ, штучного інтелекту, Інтернету та технологій блокчейн.

Проблематика. Ключовою передумовою розвитку суспільства в сучасному економічному середовищі є інновації. Поширення цифрових електронних технологій, поява та активне тестування універсальних багатофункціональних мобільних телефонів, зростаюча залежність людства від інтернет-ресурсів стали ключовими для зміни основ економічних відносин. Як наслідок, удосконалюються бізнес-процеси, розвиваються інноваційні канали збуту продукції та послуг, технології обслуговування клієнтів

Мета. Вивчення світових тенденцій розвитку інноваційних технологій страхування та можливостей їхнього застосування у страховій системі України.

Матеріали й методи. Використано загальнонаукові та спеціальні методи аналізу й синтезу, порівняння, систематизації, статистичні та графічні методи, табличний метод.

Результати. В Україні найпоширенішими прикладами кобрендингу з банками є альянси: Піреус Банку з СК «Уніка» та СК «Альфа Страхування», Юнекс Банку з СК «Вусо», ОТП Банку з СК «Арсенал Страхування». Висвітлено основні світові досягнення страхових систем у сфері *Insurtech*. Найбільш очевидними шляхами покращення страхових послуг є штучний інтелект, машинне навчання та аналіз великих даних. Щороку вітчизняна страхова система поповнюється інноваційними продуктами, серед яких автоматизація продажів, домашня та мобільна безпека, екстремальна безпека, програма страхування кібер-ризиків *CyberEdge* та інші.

Висновки. Пріоритетними напрямами розвитку інноваційних технологій у вітчизняній страховій системі є використання новітніх каналів продажу страхових продуктів на основі телематики та штучного інтелекту, застосування технології блокчейн, а також мікрострахування, що дає змогу отримати захист від ризиків та спростити доступ клієнтів до страхових послуг суб'єктів страхової системи.

Ключові слова: інновації, інноваційні продукти, інноваційні технології, страхові компанії, страхова система.