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INNOVATIVE INFORMATION PROCESSES IN THE AVIATION INDUSTRY

Ganna Gurina, Podrieza Serhii «Innovative information processes in the aviation industry» *Innovative information and other numerous developments resulting from the application process of digitalization constitute a comprehensive structure that is important for any industry, and for the aviation industry in particular. This special relevance stems primarily from the defining characteristic of the aviation industry - the ability to rapidly develop, and is also supported by such important management components as the cost structure, safety and intensity of competition, which play an equally important role both for the domestic aviation industry and for global aviation giants. In the era of large-scale digitalization, the aviation IT industry is facing a number of challenges related to the combination of new distribution channels, social networks, Big data, cloud technologies, etc. One of the main challenges of the time is the need to solve the security problem when software components are distributed and operated in hybrid clouds, the providers of which may be independent from each other. The difficulty lies not only in defining and expressing the desired level of security in software, but also in how cloud services affect security assurances in the aviation industry. However, effective digitalization does not begin with the introduction of the latest technologies, but with the transformation of organizations in order to use the potential of digital solutions.*

Keywords*:* Innovation, information, digitalization, digital tools, management, enterprise, aviation industry, implementation of the latest technologies, efficiency, improvement of management, ensuring the activities of enterprises

Ганна Гуріна, Сергій Подрєза «Інноваційні інформаційні процеси в авіаційній галузі» *Інноваційна інформація та численні інші розробки, що є результатом процесу цифровізації, становлять важливу структуру для будь-якої галузі, а для авіаційної промисловості - особливо. Ця особлива актуальність випливає насамперед із визначальної характеристики авіаційної галузі - здатності швидко розвиватися, а також підтримується такими важливими складовими*

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управління, як структура витрат, безпека та інтенсивність конкуренції, які відіграють однаково важливу роль як для внутрішньої авіаційної галузі, так і для глобальних авіаційних гігантів. У епоху масштабної цифровізації авіаційна IT-галузь стикається з низкою викликів, пов'язаних із поєднанням нових каналів розповсюдження, соціальних мереж, великих даних, хмарних технологій тощо. Одним із головних викликів сьогодення є необхідність вирішення проблеми безпеки, коли програмні компоненти розподілені та працюють у гібридних хмарах, постачальники яких можуть бути незалежними один від одного. Складність полягає не лише у визначенні та вираженні бажаного рівня безпеки у програмному забезпеченні, але й у тому, як хмарні сервіси впливають на забезпечення безпеки в авіаційній галузі. Однак ефективна цифровізація не починається із запровадження новітніх технологій, а з трансформації організацій для використання потенціалу цифрових рішень.

Ключові слова: інновації, інформація, цифровізація, цифрові інструменти, управління, підприємство, авіаційна галузь, впровадження новітніх технологій, ефективність, вдосконалення управління, забезпечення діяльності підприємств..

Introduction. This approach involves the development of new business models for aviation enterprises, changing the boundaries of activity with the help of digital technologies and rethinking the entire management system of the airline. In addition, for the implementation of the digitalization process, an important aspect is the education and training of personnel. It is imperative that every employee understands the goals and benefits of digitization while simultaneously creating an appropriate organizational culture. Therefore, it is necessary to provide for the acquisition of certain knowledge and skills necessary for the improvement of this process and the provision of new interdisciplinary qualifications.

Digitalization is transforming industries across the globe, and the aviation sector is no exception. The integration of digital technologies into aviation operations has significantly enhanced the competitiveness of aviation enterprises, enabling them to streamline operations, improve customer service, and reduce costs. This text explores the positive impact of digitalization on the competitiveness of aviation enterprises worldwide.

Digitalization enables aviation enterprises to harness real-time data through Internet of Things (IoT) devices and sensors embedded in aircraft. This data can be used to monitor the health of aircraft systems continuously and perform predictive maintenance. By identifying potential issues before they become critical, airlines can minimize downtime, avoid costly repairs, and ensure the safety and reliability of their fleets. This proactive approach to maintenance not only enhances operational efficiency but also reduces operational costs.

Literature and researches review. A significant contribution to the formation of the basic provisions and concepts of the use of the latest technologies in the aviation industry belongs to both domestic and foreign scientists, who in turn implemented approaches to the use of digitalization tools in the competitive environment of aviation enterprises. Digital technologies, such as advanced analytics and artificial intelligence (AI), are used to optimize flight operations [4-7]. For instance, AI can analyze weather patterns, air traffic, and other variables to recommend the most efficient flight paths [8-12]. This optimization leads to reduced fuel consumption, lower emissions, and shorter flight times, all of which contribute to cost savings and improved environmental performance [1-3]. Additionally, digitalization allows for more precise scheduling and resource allocation, further enhancing operational efficiency [13-16].

Results, analysis and discussion. Digitalization allows aviation enterprises to offer personalized services to their customers. By analyzing big data, airlines can understand

passenger preferences and behaviors, enabling them to tailor services and offers to individual needs. This personalized approach can include customized in-flight entertainment, targeted promotions, and personalized communication. Enhancing the passenger experience helps airlines build loyalty and attract repeat customers, thereby improving their competitive edge.

Digitalization simplifies the check-in and boarding processes, reducing wait times and enhancing convenience for passengers. Mobile check-in, biometric verification, and automated boarding gates are examples of digital innovations that speed up these processes. By providing a smoother and more efficient airport experience, airlines can improve customer satisfaction and differentiate themselves from competitors [1, 7, 8].

Automation, powered by digital technologies, helps aviation enterprises reduce operational costs. Automated systems can handle various tasks, from customer service chatbots to baggage handling and flight scheduling. By reducing the reliance on manual labor, airlines can lower labor costs and increase productivity [2, 9, 18]. Moreover, automation minimizes human error, leading to more reliable operations.

Digitalization opens up new revenue streams for aviation enterprises. For example, airlines can monetize data insights by offering targeted advertising and personalized travel packages. Additionally, digital platforms enable ancillary revenue opportunities, such as selling seat upgrades, extra baggage, and travel insurance [3,5, 10]. By leveraging digital channels, airlines can enhance their revenue generation capabilities and improve profitability.

The adoption of digital technologies fosters a culture of innovation within aviation enterprises. Companies that embrace digitalization are more agile and better equipped to respond to market changes and emerging trends. This adaptability allows them to stay ahead of competitors and capture new market opportunities. Furthermore, digitalization facilitates collaboration with technology partners and startups, driving continuous innovation and keeping airlines at the forefront of industry developments.

Digital platforms enable aviation enterprises to expand their global reach and connectivity. Online booking systems, mobile apps, and social media channels allow airlines to engage with customers worldwide and provide seamless travel experiences. This global connectivity enhances brand visibility and helps airlines tap into international markets, thereby increasing their competitive advantage on a global scale.

Digitalization has a profound positive impact on the competitiveness of aviation enterprises worldwide. By enhancing operational efficiency, improving customer experience, reducing costs, and enabling new revenue streams, digital technologies empower airlines to achieve a competitive edge in a highly dynamic industry. Embracing digital transformation is essential for aviation enterprises to thrive in the digital age and maintain their position as industry leaders.

The aviation industry plays a critically important role in the global economy by providing fast and safe transportation of passengers and cargo. However, as the scale of operations expands, this industry faces new challenges such as the need to enhance efficiency, safety, environmental sustainability, and passenger comfort [4, 13]. Innovative information technologies (IT) play a key role in addressing these challenges by optimizing processes and improving service quality.

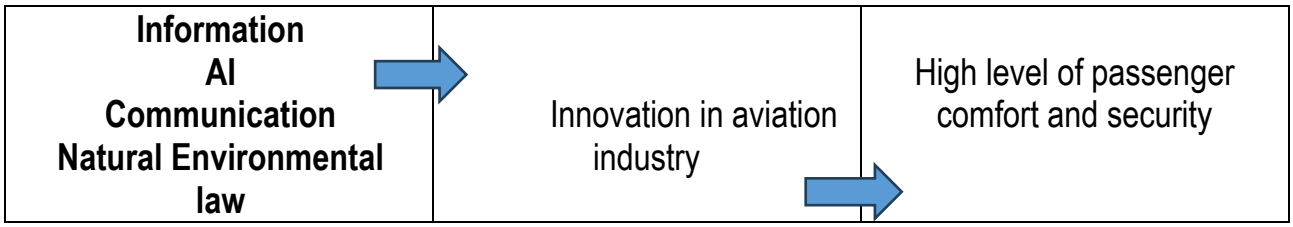

Figure 1 – Components of the system of innovative solutions in the aviation industry in a competitive environment

Source: summarized by the author for [11, 14, 17]

Air travel is in a period of great change. With the rapid pace of innovation, airlines and airplane makers are working hard to keep up. For the most part, the airlines and the companies that make their planes are not all that well equipped to react quickly to change. A new plane takes more than a decade to put into service and its designed to keep flying for several subsequent decades. Usually, a major industry-wide overhaul to passenger experience happens once every decade or two. We are currently in such a generational shift. Innovations such as new composite-bodied airliners liked the Boeing 787 and the Airbus A350, as well as technologies like satellite-based internet and geared turbofan engines, come to mind. But that doesn't mean the industry is fresh out of cool stuff. In fact, the pace of development and innovation is only quickening in its pace. Like the automotive industry, airplane makers and the people who fly their planes understand the need to unpeg the development of aircraft hardware and software [6,18].

An industry once bound by the limits of flying metal is heading towards a future where software is growing in importance. Currently, the industry is working on many potentially game-changing innovations that could find their way into common airline use over the next couple of decades.

It is no secret that the automotive and healthcare industries have raced ahead in the digital sweepstakes, trailed by the airline industry, which has faltered, rather than flown, off the blocks. A sense of urgency now pervades the latter. According to recent research by Frost & Sullivan, digital transformation programs in the airline industry could generate an incremental value of $5-$10 for every passenger, annually [6, 12, 16]. Such extraordinary value generation would derive mainly from improved productivity, cost savings, and new ancillary revenue streams.

Airlines, of course, realize this. Digitization is already fostering innovative business models, while rapidly transforming core and non-core functions. Meanwhile, partnerships with technology solutions providers are driving overall corporate strategies—essentially, the vision of being among the most preferred airlines, improving customer satisfaction, and supporting sustainable profits.

Modern Information Technologies in the Aviation Industry:

The Internet of Things (IoT) is one of the key technologies transforming the aviation industry. Through IoT, aviation companies can collect and analyze vast amounts of real-time data. For instance, sensors onboard aircraft can monitor engine conditions, fuel consumption, weather conditions, and other parameters, enabling timely detection of potential issues and preventive maintenance.

Big data and analytics are another important direction in innovative information processes. Using big data, airlines can analyze passenger behavior, preferences, booking history, and other factors to improve service

quality. Additionally, big data analytics helps optimize flight routes, reduce fuel costs, and enhance fleet management efficiency.

Artificial intelligence (AI) and machine learning (ML) are used to automate many processes in the aviation industry. For example, AI-based systems can analyze data from various sources to predict flight delays, manage schedules, and optimize resources. Furthermore, AI can enhance safety by detecting suspicious activities or objects at airports.

Blockchain technology holds great potential for increasing transparency and security in the aviation industry. It can be used to track the origin and movement of aviation parts, ensure the security of transactions, and facilitate data exchange between different participants in the aviation ecosystem.

Innovative information technologies significantly improve flight management. Using IoT, big data, and AI allows real-time monitoring of aircraft conditions, weather forecasting, and route optimization. This helps reduce fuel costs, enhance flight safety, and minimize environmental impact.

Innovative technologies are also used to improve passenger service. Using big data and AI allows for personalized service, offering passengers individualized deals and discounts, and improving schedule management and passenger information. Additionally, automating processes such as check-in and security control reduces wait times and enhances passenger comfort.

Innovative information technologies play a crucial role in aircraft maintenance and repair. Using IoT and analytics enables timely detection and resolution of potential issues, reducing the risk of breakdowns and increasing flight safety. Furthermore, blockchain can be used to track the origin and movement of aviation parts, enhancing transparency and security of processes.

Conclusions. Although innovative information technologies have great potential for improving the aviation industry's operations, several challenges need to be addressed. These include high implementation costs, the need for highly skilled professionals, and data security and privacy concerns.

Despite the challenges, the prospects for using innovative information technologies in the aviation industry are very promising. Further development of IoT, big data, AI, and blockchain will allow for even greater improvements in efficiency, safety, and comfort in aviation. Additionally, new technologies such as quantum computing and 5G open new opportunities for innovation in this field.

Innovative information processes play a key role in the development of the aviation indusry. The use of advanced technologies such as IoT, big data, AI, and blockchain enhances efficiency, safety, and comfort while reducing environmental impact. Despite existing challenges, the prospects for implementing innovative information technologies in aviation are very promising, opening new opportunities for the industry's further development.

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