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DIGITAL TREASURY DECISION SUPPORT FRAMEWORK FOR INSURANCE COMPANIES

Introduction. Digital transformation is changing treasury management in insurance companies, where liquidity decisions depend on large volumes of premium, claims, reserve and investment data. Traditional treasury practices based on periodic reporting and manual cash-flow planning are insufficient for timely risk detection and proactive financial management.

The purpose of the paper is to develop a conceptual Digital Treasury Decision Support Framework for insurance companies that integrates cash-flow monitoring, liquidity forecasting, risk indicators, digital dashboards and analytical support for managerial decisions.

Results. The study systematizes the differences between traditional and digital treasury and identifies the functional modules required for an integrated digital treasury environment: data collection, cash-flow analytics, liquidity forecasting, treasury risk alerts, digital dashboards and decision support. The proposed framework treats treasury not only as an operational cash-management function, but also as a digital decision-support system that links financial data, predictive analytics and risk-oriented control. The model enables continuous monitoring of insurance premiums, claims payments, reserves, investment assets and other financial indicators. It also supports early detection of potential liquidity gaps and deviations from target indicators.

Conclusion. The implementation of Digital Treasury in insurance companies can improve the speed and quality of treasury decisions, strengthen internal financial control and increase financial resilience. The proposed framework may be used as a methodological basis for digital transformation of treasury processes, development of corporate decision support systems and further quantitative assessment of treasury management efficiency in the insurance sector.

Keywords: Digital Treasury, Insurance Treasury, Treasury Analytics, Decision Support Framework, Liquidity Management, Cash Flow Forecasting, Financial Technology (FinTech), Risk Monitoring, Business Intelligence Systems, Digital Financial Management

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INTRODUCTION

Digital transformation of the financial sector is significantly changing approaches to financial resource management and managerial decision-making. Under current conditions, insurance companies operate in an environment characterized by growing volumes of financial data, increased regulatory requirements, higher liquidity risks, and the need to respond promptly to changes in market conditions. Traditional approaches to treasury management, based primarily on periodic reporting analysis and manual cash-flow planning, are increasingly insufficient for ensuring timely managerial decision-making.

The development of digital technologies, business analytics, Decision Support Systems (DSS), artificial intelligence (AI), and predictive analytics contributes to the formation of a new concept of Digital Treasury (DT). Unlike traditional models of financial flow management, DT provides for the use of integrated information systems to collect, process, analyze, and interpret financial data in real time. This makes it possible not only to control current liquidity, but also to forecast future financial risks and generate substantiated managerial decisions.

These processes are particularly important for insurance companies, whose activities involve management of significant volumes of insurance premiums, reserves, investment assets, and claims payments. The effectiveness of treasury management directly affects an insurer's ability to maintain an appropriate level of liquidity, fulfill its financial obligations, and ensure long-term financial resilience.

Despite the active development of digital financial technologies, most scientific research in insurance focuses on solvency, reserving, risk management, and corporate governance. At the same time, the issues of DT in insurance

companies, digital monitoring of cash flows, and the use of DSS in treasury activities remain insufficiently studied.

Therefore, there is a need to formulate a modern approach to the organization of DT in insurance companies based on the integration of digital monitoring, liquidity forecasting, risk-based analytics, and managerial decision support within a unified information environment.

The **PURPOSE** of the paper is to develop a conceptual Digital Treasury Decision Support Framework (DTDSF) for insurance companies that ensures the integration of digital cash-flow monitoring, liquidity forecasting, risk indicators, and analytical support for managerial decisions within treasury management.

To achieve this purpose the following research objectives were defined:

- to analyze contemporary approaches to the digital transformation of treasury functions in the financial sector;
- to examine the possibilities of using DSS in the activities of insurance companies;
- to identify the key elements of an insurer's DT;
- to formulate a conceptual DTDSF;
- to substantiate the advantages of using digital instruments for liquidity monitoring and forecasting in the process of treasury decision-making.

Issues of liquidity management in insurance companies are traditionally considered in the context of ensuring solvency, asset adequacy, the formation of insurance reserves, and financial risk management [1-8]. International standards Solvency II, IAIS, and IFRS 17 define general requirements for insurers' financial resilience and create a basis for the development of modern financial management systems [5-8].

A significant number of studies are devoted to risk-based

management of financial institutions. Cummins and Weiss [14], Eling and Schaper [15], and Eckles, Hoyt, and Miller [16] prove that effective management of financial resources is one of the key factors for ensuring the re-silience of the insurance sector. At the same time, these authors focus mainly on risks, capital, and reinsurance, whereas treasury processes remain a secondary object of research.

Contemporary approaches to corporate governance and risk management in the financial sector are reflected in COSO and OECD documents [9, 10]. These approaches provide for the integration of financial control, risk management, and strategic management into a unified decision-making system (DMS). However, the digital transformation of treasury functions in insurance companies is covered only fragmentarily in these documents.

Another research area is related to the digitalization of financial management. Professional studies by Deloitte, KPMG, and PwC [11-13] indicate the active development of the DT concept, which involves automated cash-flow monitoring, predictive analytics, dashboards, and digital systems supporting managerial decisions. However, the overwhelming majority of these studies focus on banks, multinational corporations, and investment companies.

In a broader context of financial and credit support, Kuznietsova, Kozmuk, and Levchenko emphasize the need to diversify financing sources and use new instruments, including securitization, venture, comprehensive, and operating leasing [19]. This is consistent with the logic of DT, in which financial flows, financing sources, and risk control are integrated within a unified digital environment.

DSS in the financial sector have become increasingly relevant in recent scientific literature. Their main purpose is to integrate financial indicators, risk indicators, and analytical algorithms into a unified information environment to support managerial decisions. Such systems improve the speed and quality of financial information analysis under conditions of high uncertainty.

Practical aspects of using DSS to assess financial risks are considered in Domashenko's research [18], where the feasibility of using integral risk indicators, scoring models, and digital monitoring for financial decision-making is substantiated. The results confirm the effectiveness of digital risk assessment tools in the financial sector and create prerequisites for their adaptation to the activities of insurance companies.

Issues of internal audit in insurance companies and the improvement of the reliability of management procedures were studied by Dryha [17]. The author substantiates a model of regulatory transformation of internal audit in insurance companies, which strengthens the role of control procedures in financial management and risk management. At the same time, the digital aspects of insurance treasury functioning remained outside the scope of that study.

The specificity of the insurance sector lies in the need to manage insurance premiums, claims payments, reserves, and investment assets simultaneously. This creates a complex system of financial flows that requires specialized digital instruments for liquidity monitoring and forecasting. Nevertheless, the issue of DT in insurance companies has not yet received sufficient attention in the scientific literature.

The analysis of sources leads to the conclusion that most studies focus on solvency, reserving, risk management, corporate governance, and digitalization of the financial

sector in general [5-16]. At the same time, the use of digital DSS specifically in insurance treasury activities remains insufficiently studied.

The literature analysis shows the absence of comprehensive studies devoted to DT in insurance companies as a system supporting managerial decisions. Existing scholarly works separately address liquidity, risk management, solvency, corporate governance, or digital transformation of the financial sector, but they do not form a unified concept of an insurer's DT.

Thus, the research gap lies in the absence of an integrated DTDSF for insurance companies that would combine digital monitoring of cash flows, liquidity forecasting, risk indicators, analytical dashboards, and decision support mechanisms within a unified digital environment of treasury management.

Closing this research gap constitutes the scientific novelty of the present study and determines the need to develop a conceptual model of DT for insurance companies.

RESEARCH METHODS

The theoretical and methodological basis of the study consists of scientific works by Ukrainian and foreign scholars on treasury management, liquidity management, digital transformation of the financial sector, risk management, and DSS in finance. The information base of the study includes international standards and recommendations such as Solvency II, IAIS, and IFRS 17, COSO and OECD documents, regulatory legal acts of the National Bank of Ukraine, and professional studies by Deloitte, KPMG, and PwC on the development of DT and financial analytics.

Particular attention is paid to the analysis of contemporary approaches to building DSS in the financial sector and the possibility of adapting them to the activities of insurance companies. To substantiate the concept of DT, the results of previous studies in the field of digital monitoring of financial risks, scoring models, and integral systems for assessing financial stability were used.

The study applies a set of general scientific and special methods of scientific cognition. The methods of analysis and synthesis were used to systematize scientific approaches to liquidity management, DT, and DSS. The comparative method was applied to study the features of traditional and digital treasury in the financial sector. The systems approach made it possible to consider DT as a complex system that integrates financial flows, risk indicators, analytical tools, and mechanisms supporting managerial decisions.

The method of structural and functional modeling was used to develop the conceptual DTDSF. This method made it possible to identify the key elements of DT, the relationships among them, and their role in the process of managing the liquidity of an insurance company. The method of logical generalization was applied to formulate the author's concept of DT as an instrument for supporting managerial decisions.

Unlike traditional studies that focus mainly on assessing insurers' liquidity or solvency, this study uses a process-oriented approach according to which treasury is considered as a digital DMS. This approach provides for the integration of data collection modules, cash-flow analysis, liquidity forecasting, risk alert generation, analytical dashboards, and decision support within a unified digital environment.

The result of applying these methods is the formulation

of a conceptual DTDSF for insurance companies, aimed at improving the efficiency of liquidity management, timely detection of financial risks, and support for treasury decisions based on digital analytics and forecasting tools.

RESULTS

The study showed that traditional approaches to treasury management in insurance companies are gradually losing effectiveness under the conditions of digital transformation of the financial sector. The growth of financial operations, the need for operational liquidity management, the increasing number of financial data sources, and higher requirements for decision-making speed determine the need to transition to DT management models.

Unlike the traditional approach, which is based primarily on retrospective analysis of financial statements and manual cash-flow planning, DT uses integrated information systems, predictive analytics, and decision support mechanisms. This makes it possible to ensure continuous monitoring of the financial condition of an insurance company and respond in a timely manner to potential liquidity risks.

As a result of the study, the main differences between traditional and digital treasury in insurance companies were identified (Table 1).

As shown in Table 1, DT ensures a transition from a reactive management model to a proactive DMS, which makes it possible to detect potential financial threats in a timely manner and minimize risks of liquidity loss.

Based on the analysis, a conceptual DTDSF for insurance companies is proposed. The proposed approach considers treasury not only as a cash management function, but also as a digital system supporting managerial decisions that ensures the integration of financial data, analytical tools, and risk forecasting mechanisms.

The structure of the proposed model includes six inter-related functional modules: data collection, cash-flow analytics, liquidity forecasting, risk alert generation, digital analytical dashboards, and decision support. The functional purpose of these modules is presented in Table 2.

The proposed model makes it possible to integrate financial monitoring, risk analysis, and decision support processes within a unified digital environment. A distinctive feature of the approach is the use of an early warning mechanism for liquidity risks, which ensures timely notification of management about potential financial imbalances and deviations from target indicators.

To summarize the research results and visualize the proposed approach, a conceptual DTDSF for insurance companies was developed (Figure 1). The proposed model reflects the logic of DT functioning as an integrated system supporting managerial decisions and combining the processes of financial data collection, analytical information processing, liquidity forecasting, automated risk monitoring, and the generation of recommendations for management.

Unlike traditional treasury management models, which are primarily oriented toward controlling current financial operations, the proposed approach provides a continuous cycle of digital analysis and decision support. A distinctive feature of the model is the use of mechanisms for early detection of liquidity risks and the generation of warning signals for management based on the analysis of financial flows and forecast indicators.

The proposed concept makes it possible to integrate information on insurance premiums, claims payments, reserves, investment assets, and other financial indicators of an insurance company within a unified digital environment.

Table 1 – Comparative characteristics of traditional and digital treasury in insurance companies (developed by the author)

Criterion	Traditional Treasury	Digital Treasury
Data sources	Separate information systems	Unified digital environment
Information processing	Predominantly manual	Automated
Liquidity monitoring	Periodic	Real-time
Cash-flow forecasting	Based on historical data	Predictive analytics
Risk analysis	After an event occurs	Early risk detection
Managerial decisions	Reactive approach	Proactive approach
Reporting	Static	Interactive digital dashboards
Decision-making speed	Medium	High

Table 2 – Functional modules of the DTDSF (developed by the author)

Module	Core functions	Expected outcome
Data Collection	Collection of financial data from internal and external sources	Formation of a unified database
Cash Flow Analytics	Analysis of cash-flow movements	Control over financial resources
Liquidity Forecasting	Forecasting liquidity and funding needs	Prevention of liquidity shortages
Treasury Risk Alerts	Automatic risk detection	Early notification of management
Digital Dashboards	Visualization of key indicators	Improved quality of control
Decision Support Module	Generation of recommendations for management	Support for managerial decisions

This creates prerequisites for improving the timeliness of managerial decisions, enhancing liquidity control, and increasing the efficiency of treasury management under the digital transformation of the financial sector.

Based on these principles, a conceptual model of DT functioning in an insurance company was formed (Fig. 1).

As shown in Fig. 1, the central element of the proposed model is the integration of financial data and analytical tools within a unified digital environment. Unlike traditional treasury, the system provides a continuous cycle of monitoring, analysis, forecasting, and support for managerial decisions. A distinctive feature of the model is the Treasury Risk Alerts unit, which makes it possible to generate warning signals regarding potential liquidity risks and deviations from target financial indicators.

Testing of selected elements of the proposed approach was conducted within the practical application of DSS for assessing financial risks in the financial sector of Ukraine. In particular, during 2015-2025, risk-based models for assessing and monitoring financial stability were used in decision-making on the placement of temporarily free funds by selected financial market participants, including insurance companies and professional participants in the financial sector. The results of practical application confirmed the possibility of timely detection of potential financial risks and improvement of the quality of managerial decisions regarding the allocation of financial resources.

The scientific novelty of the obtained results lies in the development of a conceptual DTDSF for insurance companies, which, unlike existing approaches, integrates digital mo-

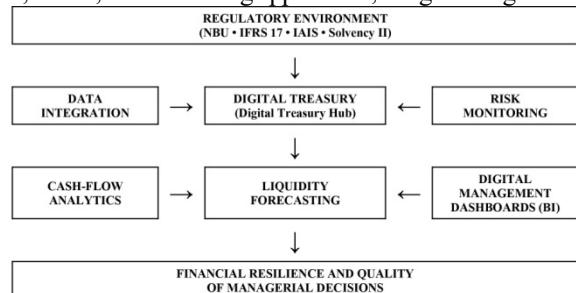


Fig. 1. Conceptual DTDSF for Insurance Companies (developed by the author)

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monitoring of cash flows, liquidity forecasting, risk-based analytics, and mechanisms supporting managerial decisions within a unified digital environment of treasury management.

The practical significance of the study lies in the possibility of using the proposed model by insurance companies during the digital transformation of treasury processes, the implementation of DSS, the development of internal financial control, and the construction of risk-based mechanisms for liquidity management. The proposed approach may be used as a methodological basis for creating corporate DT systems and improving the management of insurers' financial flows.

CONCLUSIONS

The study confirmed that digitalization of the financial sector determines the need to transform traditional approaches to treasury management in insurance companies. Under the conditions of growing volumes of financial data, increasing requirements for the timeliness of managerial decisions, and higher liquidity risks, the use of digital analytical and decision support tools becomes particularly important.

The study found that the DT concept makes it possible to move from reactive management of financial flows to a proactive model based on continuous monitoring, forecasting, and risk-based analytics. The integration of digital technologies into treasury processes creates prerequisites for increasing the transparency of financial operations, timely detection of potential liquidity threats, and improvement of the financial control system.

The proposed approach to organizing DT expands the functional role of an insurance company's treasury and transforms it from an instrument of operational cash management into an important element of strategic financial management. The use of digital monitoring, cash-flow analytics, and forecasting mechanisms contributes to the improvement of the substantiation of managerial decisions and the strengthening of an insurer's financial resilience.

Further research should be related to the development of quantitative indicators for assessing the efficiency of DT, the introduction of AI technologies for liquidity forecasting, and the formation of industry standards for DT management in insurance companies.

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ЦИФРОВЕ КАЗНАЧЕЙСТВО ЯК СИСТЕМА ПІДТРИМКИ ПРИЙНЯТТЯ РІШЕНЬ У СТРАХОВИХ КОМПАНІЯХ

Вступ. Цифрова трансформація змінює казначейське управління у страхових компаніях, де рішення стосовно ліквідності залежать від значних обсягів даних про страхові премії, виплати, резерви та інвестиційні активи. Традиційні казначейські практики, засновані на періодичній звітності та ручному плануванні грошових потоків, є недостатніми для своєчасного виявлення ризиків і проактивного фінансового управління.

Мета статті – розроблення концептуальної моделі Digital Treasury Decision Support Framework для страхових компаній, яка інтегрує моніторинг грошових потоків, прогнозування ліквідності, ризик-індикатори, цифрові панелі та аналітичну підтримку управлінських рішень.

Результати. У дослідженні систематизовано відмінності між традиційним і цифровим казначейством та визначено функціональні модулі, необхідні для інтегрованого цифрового казначейського середовища: збір даних, аналітика грошових потоків, прогнозування ліквідності, казначейські ризик-сигнали, цифрові панелі та підтримка прийняття рішень. Запропонована модель розглядає казначейство не лише як операційну функцію управління коштами, а як цифрову систему підтримки рішень, що поєднує фінансові дані, прогнозну аналітику та ризик-орієнтований контроль. Модель забезпечує безперервний моніторинг страхових премій, виплат, резервів, інвестиційних активів та інших фінансових показників, а також раннє виявлення потенційних дефіцитів ліквідності та відхилень від цільових індикаторів.

Висновки. Впровадження Digital Treasury у страхових компаніях може підвищити швидкість і якість казначейських рішень, посилити внутрішній фінансовий контроль і фінансову стійкість. Запропонована модель може бути методологічною основою цифрової трансформації казначейських процесів, розвитку корпоративних систем підтримки рішень та оцінювання ефективності казначейського управління у страховому секторі.

Ключові слова: цифрове казначейство, Digital Treasury, страхова компанія, ліквідність, грошові потоки, Decision Support System, цифровий моніторинг, прогнозування ліквідності, фінансові ризики, цифрова трансформація