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Section 1. Accounting

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ACCRUAL ACCOUNTING CHANGE IN GREEK PUBLIC SECTOR: A REFORMATION FOR MODERNIZING AND HARMONIZING PUBLIC SECTOR ACCOUNTING

Abstract. In Greece, with Presidential Decree 54/2018 was legislated the introduction and application of the accrual accounting basis for all entities of the General Government from 1/1/2025 as thus there will be objective information of the financial position and performance of each entity and financial statements will be homogeneous. Employees of the General Government need to be trained in the new accounting framework either through seminars or university programs an addition and it is necessary to hire employees with knowledge of accrual accounting. Successful implementation requires cooperation among employees, a change in employee mentality and culture and an appropriate information system that will provide immediate and reliable accounting information.

Keywords: Accrual accounting basis, General Government, accounting reform, employees;
JEL Classifications: H83, P41, M48.

1. Introduction

The fiscal crisis of Greece that began in 2008 necessitated the adoption of new modern accounting measures for the entire Public Sector. In this context, Greece fulfilled its obligation to incorporate into national law the European Directive 2011/85 regarding the requirements for the fiscal frameworks of the member states of the European Union [16]. According to the Directive, the member states of the Union should have public accounting systems that comprehensively and systematically cover all sub-sectors of the General Government according to the European System of Accounts 2010 and contain the

necessary information for the production of data on an accrual basis, ensuring the transparency and accountability while being subject to internal control and independent auditing [20]. The incorporation of the European Directive 2011/85 by Greece resulted in the institutionalization of Law 4270/14, which defined the issuance of a Presidential Decree for the establishment of a new Accounting plan and the introduction of the accounting accrual basis in the entities of the General Government. In implementation of Law 4270/2014, Presidential Decree 54/2018 [21] was issued, the objective of which is the transition of all General Government entities to

a modernized accounting system based on the accrual basis, through which there will be effective fiscal management, transparency in financial transactions and direct knowledge of the financial data of the obligations and requirements of the State based on the standards of the European System of Accounts 2010.

The accounting policies for the preparation of the financial statements in accordance with Presidential Decree 54/2018 are based on internationally accepted accounting standards for the public sector, such as the International Public Sector Accounting Standards (IPSAS). With Presidential Decree 54/2018, the first step was taken for the efficient management of public resources through the establishment of the double-entry system and the application of the principles of the accrual basis accounting in a uniform manner, initially from 1/1/2019 in the bodies of the Central Administration and after 1/1/2025 to the bodies of the General Government. A single accounting plan was established for all entities of the General Government, which strengthens transparency in financial management, improving the quality of financial reporting data and overcoming the existing fragmentation. The provisions of Presidential Decree 54/2018 [21] and the accrual basis accounting, in the current time period, are applied by the General Government Accounting Directorate of the General Secretariat of Fiscal Policy of the Ministry of Finance for all the entities of the Central Administration and not by each entity individually. All entities and agencies that are part of the Central Administration are only involved in the execution of the budget, and not in the application of accrual accounting.

The General Government of Greece according to the rules and criteria of the European System of Accounts 2010 includes three sub-sectors: the Central Government, the Local Government Organizations and the Social Security Organizations. The entities that belong to each sub-sector are identified by the Register of General Government Bodies maintained under the responsibility of the Hellenic Statistical Authority. Each sub-sector of the General Govern-

ment applies its own accounting system, which is provided for by a corresponding Presidential Decree. More specifically, the entities of the Central Government, excluding the entities of the Central Administration, apply the Presidential Decree 205/1998 and the Presidential Decree 146/2003 the public health units. The entities of the Local Self-Government Organizations sub-sector apply Presidential Decree 315/1999 and the entities of the Social Security Organizations sub-sector apply Presidential Decree 80/1997. The entities of the Central Administration apply Presidential Decree 54/2018 from 1/1/2019.

The reformation of the fiscal legislative framework through the introduction of the accrual basis and the preparation of a new unified chart of accounts for all the entities of the General Government was imperative as there was a fragmentation of the charts of accounts. However, the introduction of the accrual basis to the General Government agencies is of major importance and is a long-term reform. The purpose of this paper is to examine the effects of the accrual basis accounting on the financial information of the entities, the level of preparedness of the employees of the Ministry of Finance and the difficulties arising from its application. Hence the paper aims to provide answers to the following research questions:

1. Is necessary the transition of the General Government entities to the accrual basis accounting under the framework of Presidential Decree 54/2018?
2. Are the employees of the financial services of the General Government entities ready to implement the new accounting framework?
3. What difficulties/obstacles arise from the implementation of the new accounting framework?

2. Literature review

2.1 Theoretical Framework

The development of International Public Sector Accounting Standards (IPSAS) provided an important tool for global standardization of public sector entities and governments accounting and became the international benchmark for accrual-based government financial information. According to the European Com-

mission report (2013) accrual accounting is the only generally accepted information system that provides a complete and reliable picture of the financial and economic position and performance of a government, by capturing in full the assets and liabilities as well as revenue and expenses of an entity [16]. Accrual basis accounting implementation in the public sectors around the globe has been proven far from uncomplicated and straightforward. One of its main drawbacks is that they do not consider public sector dynamics or the divergence between the government structures and their organization theories. Moreover, in many countries the use of budget-based accounting systems creates a conceptual (let alone technical) gap between the existing accounting system and the new accrual accounting. Additionally, several countries public sectors are currently under reform towards new public management trend, requiring a significant cultural change. All these reforms create additional high costs for their implementation but also a need for public servants' education, technologies etc. Finally, there are several other public entities specific characteristics (social, environmental, legal, tax) that complicate further a smooth public accounting convergence and harmonization.

Despite the abovementioned difficulties for its implementation, accrual accounting in the public sectors is expected to provide significant benefits for public-sector management and governance, regulators, investors, auditors and society. Effectiveness and efficiency in public administration is expected to improve, as IPSAS will inevitably modernize governmental accounting; decision making will be based on more reliable information regarding assets, liabilities and expenses [24, 191–193]. Transparency and accountability will increase as all necessary data will be provided in a credible and timely manner leading towards the fulfillment of the primary objective of public sector organizations, which is to deliver public policy and promote social welfare [19, 283–285]. Consequently, citizens' trust in governments will be restored [18, 251–252]. At the same time the implementation of new public management theory is con-

sidered a significant enhancement for the modernization of public governmental administration and is expected to accelerate the accrual accounting reform. The shift from old bureaucratic systems towards a "market oriented" public administration requires several reforms, technical, procedural and more importantly cultural. It necessitates 'innovations' that are about to increase efficiency by not just changing the process but also people's mindsets [15, 294–295]. These reforms are expected to advance the requirement for accrual accounting albeit taking into consideration that several managers engage in creative resistance to change [1, 595–598]. Consequently, governance quality is expected to raise as IPSAS adoption influences positively the level of accountability, government effectiveness, regulation quality, the rule of law and the level of corruption [3, 51–53].

On the other hand, as studies reveal there is frequently a mismatch between the needed accounting and performance measurement information for internal and external purposes assessed on the basis of the administrative system in place and required by law for decision-making and accountability [7, 10–11]. The combination of accrual accounting with the New Public Management reform is expected to reveal the financial condition and the financial performance of public sector entities [17, 36–38] around the world and decrease the information mismatch by improving governmental effectiveness and efficiency. Nevertheless, according to external users, the figures provided by the reported financials usually differ from the needed information for decision-making procedures. All the above in conjunction with the growing need for accountability towards public stakeholders, which is enhanced by the implementation of New Public Management theory, makes popular financial reporting imperative.

2.2 Literature Review of Public Sector Accounting in Greece

Public sector entities, in the vast majority of them, are characterized by a lack of modern financial, accounting and costing organization, as a consequence

of the inability of the Administrations and the State to know precisely the financial situation of the entities, including their property situation, operating costs, the obsolescence of the equipment and the condition in which it is found, as well as the effectiveness of the government subsidies received [6, 178–181]. Change management planning must adopt and implement management processes that support changes in human resources, facilities, operational processes, materials, equipment, software, external environment and anything else that can positively affect the day-to-day operation of an entity of the public in relation to the strengthening of administrative changes [10, 173–176]. The process of introducing and implementing accrual basis accounting in the General Government agencies is a multidimensional undertaking as it requires human and financial resources, proper planning, organization and coordination of specific implementation schedules.

The application of accrual basis accounting in financial management will bring about but also require changes in their structure and operation, while giving the opportunity to upgrade financial management [23, 90–93]. The process of transitioning to accrual accounting can face difficulties in the process followed at the beginning of its application and in its implementation methodology. It becomes clear that for the proper monitoring of all this activity, a reliable information system is required that will ensure reliable and documented financial information. In particular, the existing public accounting system must work in parallel with accrual accounting, and the existing infrastructure should not facilitate the application of accrual basis. The IT infrastructure should be suitable to support the new accounting system, so that there is a uniform recording and analysis of all accounting data in real time and with reliability.

The process of transition to accrual accounting is a time-consuming and complex process, in which a sufficient number of employees, of various specialties and departments, should take part. State employees who are required to implement the Presidential

Decree that provides for the application of accrual accounting should have the appropriate knowledge and skills [26, 35–37]. The training of employees in the new accounting system must be both theoretical and practical, but also continuous, so that they are able to correctly apply the provisions of the Decree. The determination but also the persistence, as well as the employment of people with the appropriate knowledge, abilities and skills who will be able to solve any problems that will reasonably arise and proceed with the adoption of the new accounting basis, are one of the conditions for the success of the accounting reform in Greece [2, 1118–1121]. In order for there to be uniformity in the final result, the cooperation of the employees of the financial services is required both within the agency and other agencies of the State, as well as with the Central Administration [9, 175–177]. The project of introducing accrual basis accounting in the General Government entities is expected to bump into the existing structures of the entities, in which the bureaucracy and the related civil service mentality of the staff, combined with the bureaucratic procedures, make it difficult to introduce financial, accounting and management changes in entities [8, 95–98].

The expansion and deepening of the accounting reform requires proper planning and organization, an increase in resources, cooperation between political power and public administration and strengthening of the support measures of the General Directorates of Financial Services and in general the Financial Services of the entities for the success of the project [11, 203–207]. At the same time, practical issues arise that must be addressed before the first application of the accrual basis. Such issues are the recording and valuation of all liabilities, claims, stocks as well as all assets of the State, as well as the creation of a Registry of Fixed Assets, to monitor all fixed assets of the State [4, 724–728]. Also, it is important to point out the advantage of using the fair value which is adopted and contributes to the presentation of the real value of the public assets [12, 93–95].

It follows that the successful implementation of accrual accounting relies on many factors, and therefore it is a long and very complicated process. To successfully implement the accrual basis requires more than five years of intensive effort and preparation at all the aforementioned levels [13, 272–274]. In Greece, since 2011 when the European Directive 2011/85 was issued until 2021, the accrual basis has not been applied for all the entities of the General Government, as it is still in a transition regime. For the successful outcome of the venture, political will is necessary, which must first embrace the need to implement the accrual basis and then pursue its implementation, providing all the required resources and means [8, 95–97]. Of course, politicians who will support such a long-term effort are called upon to invest existing resources and means, depriving them of the possibility of allocating these resources to other policies. It is worth emphasizing that the decade 2011–2021 was marked by the fiscal adjustment of Greece due to the high public debt in terms of the Gross Domestic Product as well as by the health crisis of covid-19 [7, 10–12]. Moreover, throughout this period the management consultants involved did not understand the practical difficulties of implementation due to the lack of specialized staff, inadequate IT systems and the lack of public administration information about the procedures [8, 105–109]. This reform must be based on pragmatic parameters relating to IT, accounting and reporting standards, accounting training for employees and citizens' information needs.

2.3 Previous research on the transition to accrual accounting in Greece

Chytis et al. [6] studied the level of acceptance and preparation of Local Government Organizations regarding the adoption of IPSAS in Greece and concluded that participants who are not familiar with IPSAS accept the need to implement it, although municipalities in Greece are not prepared for the accounting transition to IPSAS [6, 166–167]. It was established that in Greece the existing reforms enacted are at an early stage and there are delays in

their implementation. The main reason was found to be the lack of experienced and specialized staff who can manage the transition to IPSAS and implement them. Therefore, it is necessary to train staff in IPSAS. In addition, the existing information systems of the municipalities should be replaced by a modern system, which will be common to all municipalities. It also found that there is a need to change the mindset of both employees and elected officials about the impact of implementing the standards on transaction transparency and accountability.

Cohen and Karatzimas [8] studied the accounting standard setting process in Greece and assessed the quality of government financial statements that were prepared under the modified cash basis of accounting, an intermediate basis before accrual basis accounting [8, 95–97]. Their findings showed that the standard-setting process was not effectively monitored by the country's politicians and lenders. The financial information provided by the modified cash basis was not characterized by a high level of quality and the information was moderately necessary. For Cohen and Karatzimas [9] the process of changing the accounting basis at the government level is influenced by various factors, such as politicians, consultants, citizens, who each play a different role [9, 175–177]. Public finance accounting numbers affect relationships with lenders, creditors and investors. The management consultants involved sought to promote the latest developments in IFRS and IPSAS, but did not understand the practical difficulties of implementation due to the lack of specialized staff, inadequate IT systems and the lack of public administration information about the procedures. Stamatidis [25] examined the attitudes of employees in the financial services and accounting departments of public hospitals in Greece regarding the implementation of accrual accounting (IPSAS) by the Hellenic National Health System [25, 90–93]. His findings showed that the rate of adoption was satisfactory, but the rate of adoption of the accrual accounting system was not deemed sufficient.

3. Methodology

3.1 Questionnaire Survey

The methodological data collection tool for investigating the issue of the introduction of the accrual basis in the entities of the General Government of Greece was the questionnaire. The questionnaire was based on the previous literature review on topics related to the present work, the purpose and the research questions of the research [22, 88–96]. The questions were to the point, short and comprehensive in order to avoid the fatigue of the respondents, they had a sequence between them, as each question followed the previous one and prepared for the next one. Before writing the final questionnaire, a pilot study was first carried out on the reliability and validity of the questionnaire by distributing eight questionnaires to employees. The main purpose of this questionnaire was to identify the shortcomings and weaknesses that make it difficult to complete the questionnaire, any ambiguities, difficulties and problems that existed and to determine the time period for completing the questionnaire [14, 68–76]. Then followed the writing of the definitive questionnaire and finally the implementation of the research.

The questionnaire in its final form contained closed-ended questions. Closed-ended questions provided participants with predetermined response options. In the present research, these questions were structured and numbered based on a Likert scale with numerical elements from 1 to 5, with the respondents expressing the extent to which they agree with each statement (1 = Not at all, 2 = A little, 3 = Not at all more or less, 4 = Very, 5 = Very Much). The questionnaire was divided into four main axes, which were based on the research questions and were formulated in the form of a question, in an affirmative way. The first axis includes questions 1–25, which are related to the necessity of introducing the accrual basis in the entities of the General Government in the light of Presidential Decree 54/2018. The second axis is based on questions 26–37 which investigate the necessity of training the employees of the financial ser-

vices of the entities, the necessity of hiring staff and the support from an external partner. The next set of questions 38–50 deals with the difficulties that appear or will appear during the implementation of the new accounting framework. The last axis of questions 51–55 contained questions of a demographic nature, such as gender, educational level, age, years of service and the administrative position of the participants (position of responsibility) and its aim is to describe the profile of the participants.

Data were gathered through a questionnaire and responders took 10–15 minutes of an average for its completion. The participants were informed about the right to privacy and voluntary participation, the anonymity and confidentiality. It is also important to explain why the completion of the research will help to improve some aspects of his or her job life and, in general, it should address the feeling of altruism of the recipient of the questionnaire. The survey lasted around one and half months from the end of September to the mid of November 2022.

After the questionnaires were collected, they were checked for completeness and accuracy of their answers, numbered and coded so that they were in a suitable format for analysis. All questionnaires were completed and no questionnaire was found to have the same answers to all questions. Quantitative coded data were entered into Excel sheets and analyzed through the statistical program SPSS for Windows v.27.0. (Statistical Package for the Social Sciences). In the descriptive section of the results, means and standard deviations are presented for each question in the questionnaire.

3.2 Sampling

The population of the research was the employees of the General Secretariat of Fiscal Policy of the Ministry of Finance. This General Secretariat was chosen as its task is to plan the country's fiscal strategy through the reliable recording of fiscal data and figures during the preparation of the Medium-Term Fiscal Strategy Framework and the Budget of the General Government and the preparation of a

methodology for the conversion of cash data of the bodies of the General Government on an accrual basis when categorizing the international and European standards, on the basis of which the objectives of the Budget and the Medium-term Framework of Fiscal Strategy are calculated. Therefore, its employees deal with accrual basis accounting in the General Government and are responsible for the implementation of Presidential Decree 54/2018. The General Secretariat is divided into four General Directorates (layers) from which the sample was extracted using the simple random sampling method. More specifically, the four Directorates-General are the Directorate-General for Fiscal Policy and Budget, the Directorate-General for Treasury and Financial Rules, the Directorate-General for Financial Audits and the Directorate-General for Audits of Co-financed Programmes. The stratified sampling method was deemed appropriate as the population of the four General Directorates is uneven in terms of knowledge and application of the accrual basis under the context of Presidential Decree 54/2018. More specifically, between the General Directorates (layers) there is a large dispersion in relation to the subject under study, while within the General Directorates there is a smaller dispersion. Of the four General Directorates, the employees of the General Directorate of Treasury and Fiscal Rules know quite well and in depth the accrual basis accounting and the provisions of Presidential Decree 54/2018, while on the other hand, the employees of the General Directorate of Controls of Co-financed Programs know to a lesser extent the accounting of the accrual basis and the provisions of Presidential Decree 54/2018. From each General Directorate were selected 20 employees by simple random sampling.

4. Results

4.1 Reliability of the questionnaire

To conduct the reliability check in this questionnaire, the method used is the analysis of Cronbach's α (alpha) reliability index. This method was used, both for all the questions of the questionnaire and for each

thematic section of questions separately. This ratio is an estimate of the percentage of common variation between the observed and the actual value. The values it receives are limited to the range from 0 to 1. According to this index, for α values greater than 0.70 the research is characterized by reliability. Furthermore, for values of α above 0.80 the research is characterized by even greater reliability. Regarding the reliability analysis of the questionnaire of the present research, all questions except questions 51–55 concerning demographic characteristics were included. The results of the reliability test showed that for all the questions of the questionnaire the value of the α index is equal to 0.862, which means that the questionnaire as a whole is characterized by a high degree of reliability. In particular, for each section of questions, it was found that the questions of the first research question (1–25) are characterized by a high degree of reliability as the value of the α index is equal to 0.816. Relatively lower than the questions of the first research question, but with significant reliability, the questions of the second research question (26–37) have as the index value is equal to 0.730, as well as the questions of the third research question (38–50) where the index value equals 0.762. Consequently, in all the above cases the questionnaire questions appear to be quite consistent in terms of the variables they measure and thus there is a significant degree of reliability.

4.2 Demographic Data

The research sample consists of 80 employees of the Ministry of Finance, of which 46 were men, a percentage of 57.5% and the remaining 34 were women, a percentage of 42.5%. Their age ranged from 31 to 65 years old, the majority belonged to the age category of 41–50 years old (62.5%) and the minority to the age category of 61–65 years old (12.5%). Regarding their work experience, more than half ($n = 46$) had from nine years up to sixteen years experience, followed by those who had 17–24 years ($n = 14$), followed by those who had 25–32 years ($n = 8$), followed by those who had 33–40 years ($n =$

= 7) and those from one year up to eight years ($n = 5$). The 15% of the participants had a bachelor's degree, 75% a master's degree and the rest 10% a doctoral diploma. As for their level of the job position, the largest part of participants were employees without a management position (90%) and the 10% head of department.

4.3 Necessity of transition of General Government entities to accrual basis accounting under Presidential Decree 54/2018

Participants overwhelmingly believe that the introduction and implementation of accrual basis accounting in General Government entities is necessary as there will be homogeneity in the financial statements of General Government entities ($M = 4.51$, $SD = .42$). The preparation of the statement of financial position ($M = 4.58$, $SD = .34$), the statement of financial performance ($M = 4.42$, $SD = .53$) and the statement of changes in net worth ($M = 4.4$, $SD = .59$) under the new accounting framework will provide more reliable information than under the existing accounting framework, as these financial statements are based on the accrual basis. On the other hand, the cash flow statement ($M = 1.98$, $SD = 1.32$), the financial reporting statement ($M = 2.43$, $SD = 1.14$), the budget/statement statement ($M = 2.29$, $SD = 1.09$) and the explanatory notes to the financial statements ($M = 2.41$, $SD = 1.21$), it is believed that to a lesser extent they will improve the financial information they provide, since their preparation is not based on accounting accrual basis.

With the new accounting framework of accrual accounting non-current assets ($M = 4.51$, $SD = .42$), long-term liabilities ($M = 4.48$, $SD = 0.49$), current assets ($M = 4.36$, $SD = .57$), accrued income and expenses ($M = 4.34$, $SD = 0.65$) and current liabilities ($M = 4.32$, $SD = .59$) of entities will be depicted more objectively in relation to the existing accounting framework. Significantly, but to a lesser extent, participants believe that the entity's net worth ($M = 3.89$, $SD = 1.09$) and net profit or loss for the period ($M = 3.75$, $SD = 1.19$). The budget of the General

Government entities does not seem to be affected by the change in the accounting framework, as it was and continues to be based on the cash basis and is a good indicator of the quality of the financial management of the entities' operation ($M = 3.97$, $SD = .91$).

These views of the participants resulted in them considering that the new accounting framework will help the General Government entities to provide a reliable picture of their operation ($M = 4.58$, $SD = .41$), improve their financial position ($M = 4.48$, $SD = .52$) and provide the resources for appropriate management decision-making ($M = 4.34$, $SD = .49$). However, they believe to a lesser extent that there will be appropriate management of available resources ($M = 3.78$, $SD = 1.23$) and appear neutral about the existence of detailed control of expenses ($M = 3.02$, $SD = 1.09$). On the other hand, a common belief among employees is that the implementation of accrual accounting will facilitate the understanding of public finances by a range of stakeholders as they will be harmonized with a commonly accepted accounting framework ($M = 4.57$, $SD = .33$). However, a difference of opinion was found among the participants regarding the comparability of accounting information, as they consider to a high degree that it will be strengthened between the entities of the General Government ($M = 4.39$, $SD = .42$) but also between Greece and the rest of the countries that have adopted accrual accounting ($M = 4.43$, $SD = .55$), but not between General Government entities and private sector enterprises ($M = 2.21$, $SD = 1.25$).

4.4. Readiness of the employees of the financial services of the General Government entities to implement the new accounting framework

Participants believe to a small extent that employees in the financial services of the General Government entities are able to implement the new accounting framework ($M = 4.44$, $SD = .51$). This is due to the fact that employees have not been informed and trained regarding the operation of the new accounting framework under Presidential De-

cree 54/2018 ($M = 4.32$, $SD = .61$). In this context, the organization of educational programs related to accrual basis accounting is deemed necessary. More specifically, employees showed a greater preference for training in accrual accounting either through studies at a university institution ($M = 4.71$, $SD = .28$) or through seminars at a university institution ($M = 4.63$, $SD = .32$). To a lesser extent, but significantly, they want seminars from the National Center for Public Administration of Greece ($M = 4.14$, $SD = .81$) and from specialized staff of the Board of Chartered Accountants of Greece ($M = 4.02$, $SD = .94$). They showed a lower preference for the organization of training programs by specialized personnel in the accounting accrual basis of the Ministry of Finance ($M = 3.58$, $SD = 1.08$).

Participants, in addition to training, which they consider necessary for the implementation of accrual accounting, consider it extremely useful to hire specialized personnel for the autonomous support of accrual accounting ($M = 4.69$, $SD = .28$). At the same time, support from an external partner for the introduction and support of the new accounting system is also considered very useful ($M = 4.32$, $SD = .56$). Equally useful is the creation of a website that would contain all the laws, presidential decrees and circulars for the new accounting framework ($M = 4.29$, $SD = .66$). However, to a small extent they find it useful to create an electronic platform in which questions will be submitted by employees and these will be resolved by a competent team ($M = 3.23$, $SD = 1.26$). Also, it is not considered useful to create a special department in each entity that will exclusively monitor the implementation of the new accounting framework ($M = 2.95$, $SD = 1.34$).

4.5 Difficulties/obstacles arising from the implementation of the new accounting framework

The modernization of the entire accounting framework of all the entities of the General Government does not seem to be an easy process, as it is a multidimensional undertaking which runs into some obstacles. The employees believe that the existing ac-

counting information systems (IT) of all entities of the General Government respond to a small degree to the need for reliable accounting information ($M = 4.54$, $SD = .39$). For this reason, they consider that it is necessary to modernize the information systems so that there is immediate and reliable information ($M = 4.46$, $SD = .51$). At the same time, the existing logistical infrastructure of the entities is considered to be unable to support the operation of the new accounting framework under the provisions of Presidential Decree 54/2018 ($M = 4.19$, $SD = .83$).

Entities' information systems and infrastructure do not appear to be the only obstacles. An obstacle to the transition to accrual accounting is also the human resources of the entities. Participants believe to a very large extent that the attitude and culture of civil servants can be an obstacle to public sector accounting reform ($M = 4.47$, $SD = .48$). Similarly, to a very high degree it is believed that the transition to accrual accounting will make the daily work of finance employees more difficult in the short term ($M = 4.44$, $SD = .53$) and to a lesser extent that it will make it easier in the long term ($M = 3.91$, $SD = 1.07$). A similar degree of convergence of the participants' opinions ($M = 3.87$, $SD = 1.09$) also appears in the ability of employees to collaborate with colleagues to deal with problems arising from the implementation of the new accounting framework.

Participants consider that the initial recognition ($M = 4.44$, $SD = .46$) and to a lesser, but significant extent, the subsequent valuation of the entities' financial data ($M = 4.03$, $SD = .86$) presents a great difficulty. An obstacle may also arise from the matching of the accounts of the existing sectoral accounting schemes applied (Presidential Decree 80/1997, 205/1998, 315/1999, 146/2003) to the single accounting scheme provided for by Presidential Decree 54/2018 ($M = 4.19$, $SD = .76$). Finally, it seems that the covid-19 pandemic negatively affected the transition schedule from 1/1/2023 of all General Government entities to the new accounting framework of Presidential Decree 54/2018 ($M = 4.48$, $SD =$

= .44). All this had the effect of leading the participants to consider to a high degree that the goal of transitioning to the new accounting framework is not an easy goal for all General Government agencies ($M = 4.09$, $SD = .86$).

5. Conclusions

From the citation of the above, we find that it was necessary to switch to the accrual accounting basis of the entities of the General Government in the light of Presidential Decree 54/2018 as this way the financial situation of the state will be depicted reasonably and correctly. Financial statements will be homogeneous, provide comprehensive information to users about the resources of cash received in a given period and how it was spent, and it will be possible to correlate income and expenses to determine the financial result on the one hand on the one hand economic use and on the other hand the cost of providing products or services. The findings concur with Cohen et al. [10], Newberry [19] and Vegge-land [26] who established that accrual basis accounting transactions are presented in a uniform manner and accounting information is made reliable for decision making. The financial decisions of stakeholders are strengthened as the information is considered neutral, objective, verifiable and understandable. Comparability and understanding of financial statements will be improved with accrual accounting as reliable information will be provided. Comparisons can be made between organizations in terms of their asset status and efficiency both nationally between General Government entities and internationally between entities in different countries. The information that will emerge from the financial statements will provide feedback, have predictive value and enable macroeconomic forecasts and comparisons about the effects of fiscal policy. Finding consistent with Jones [18] and Domingues et al. [15].

But despite the necessity of transitioning to accrual accounting, the transition is not an easy process, since the common belief of the participants is that the appropriate human resources are required.

They unanimously agree that training employees in accrual accounting is essential. The finding concurs with Newberry [19] and Christensen [12] who found out that employee training in accrual accounting is a prerequisite for changing the accounting framework in public entities. Participants prefer the training to be carried out primarily by a university institution. In addition, it was found that the hiring of specialized staff and support from an external partner to support the implementation of accrual accounting will be very useful. Belief according to Rossi et al. [24] and Chytis et al. [6]. At the same time, it would be very useful to create a website that would contain all the legal framework for the new accounting framework.

Difficulty in introducing and implementing accrual accounting can also come from the mentality and culture of employees who may resist the changes. A prerequisite for the smooth transition and application of the accrual basis in a single framework is the existence of an appropriate information system. The participants' opinions also converged on the difficulty of the initial recognition and the subsequent valuation of the entities' financial data. Findings consistent with Chytis et al. [6], Cohen and Karatzimas [9] and Stamatiadis [25]. Obstacles may also arise from the matching of the accounts of the four existing sectoral accounting schemes applied with the accounts of the new accounting scheme provided for in the provisions of Presidential Decree 54/2018. Finally, it is universally accepted among participants that the covid-19 pandemic has adversely affected the transition to accrual accounting from 1/1/2023, creating delays in discussions, communications, procedures and other formal actions. The result of all this was the issuance of Law 4964/2022, which extended the implementation of the provisions of Presidential Decree 54/2018 from 1/1/2025.

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Section 2. Management

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PROSPECTS FOR THE DEVELOPMENT OF AGRICULTURAL ENTREPRENEURSHIP

Abstract. The article considers the analysis of the main performance indicators of the functioning and development of agricultural entrepreneurship and an assessment of the prospects for its growth. Methodological approaches to forecasting trends and prospects for the development of agricultural entrepreneurship have been further refined, allowing in the future to provide for the formation of strategic directions for their support and stimulation.

Keywords: agricultural entrepreneurship, agricultural products, agricultural enterprises, farms, perspective, development, forecast.

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ПЕРСПЕКТИВЫ РАЗВИТИЯ АГРАРНОГО ПРЕДПРИНИМАТЕЛЬСТВА

Аннотация. В статье рассмотрен анализ основных результативных показателей функционирования и развития аграрного предпринимательства и оценка перспектив его

развития. Получили дальнейшее развитие методические подходы к прогнозированию тенденций и перспектив развития аграрного предпринимательства, позволяющие в перспективе предусматривать формирование стратегических направлений их поддержки и стимулирования.

Ключевые слова: аграрное предпринимательство, аграрная продукция, сельскохозяйственные предприятия, фермерские хозяйства, перспектива, развитие, прогноз.

Хмельницкая область относится к ряду тех областей, которые не имеют больших запасов разного рода полезных ископаемых, но на ее территории около 2062 млн. га посевных площадей, большая часть из которых – черноземы. Именно поэтому Хмельницкую область можно отнести к ряду аграрных областей, основным источником дохода которых является сельское хозяйство.

Развитие предпринимательства в аграрном секторе на основе обоснованного сочетания имеющихся ресурсов, особенностей функционирования рыночной экономики, юридических норм и закономерностей развития социально-экономических систем – важная предпосылка решения проблемы выхода экономики Украины из кризисного состояния. Благодаря аграрному предпринимательству в сельской местности создаются рабочие места, привлекаются инвестиционно-инновационные ресурсы, формируются добавленная стоимость и налоговые поступления в бюджеты разных уровней, что положительно влияет на развитие сельских территорий и решение проблемы продовольственной безопасности. В то же время, несмотря на то, что предпринимательская среда на селе и система её организации практически сформированы, существует ряд нерешенных моментов: проблема безработицы и низкая покупательная способность населения; недостаточное использование ресурсного потенциала сельских территорий; ограниченный доступ сельскохозяйственных товаропроизводителей к источникам финансирования; низкий уровень привлечения субъектов хозяйствования к организации

в интегрированные аграрные формирования [1, 21].

В этом отношении, мы видим необходимыми, построить исследования, оценив общие структурные и функциональные особенности развития аграрного предпринимательства, и осуществить соответствующий прогноз их развития.

Аграрный сектор обеспечивает продовольственную безопасность области и продовольственную независимость страны. Сельскохозяйственную деятельность в регионе осуществляют 1680 субъектов хозяйствования, в том числе 1138 фермерских хозяйств. Площадь пашни в возделывании по всем категориям хозяйств составляет 1254 тыс. гектаров. В сельскохозяйственных предприятиях занято около 27 тысяч человек.

За период с 2015 по 2020 годы валовое производство сельскохозяйственной продукции выросло на 17,4% и составило 34979,2 млн. грн. и за последние 5 лет темпы его производства не снижались ниже стопроцентной отметки. При этом прирост достигнут в области растениеводства (+25,4%), а в животноводстве зафиксировано незначительное снижение (–8,8%).

Доля Хмельницкой области в производстве основных сельскохозяйственных культур Украины в 2020 году составила: зерновых культур – 6,1% (в 2015 году – 4,6%), сахарной свеклы – 10,5% (11,0%), подсолнечника – 3,4% (0,9%), картофеля – 6,1% (5,1%), овощей – 2,3% (2,0%), плодов и ягод – 10,0% (9,5%).

В 2020 году доля области в производстве основных продуктов животноводства Украины составляла: мяса – 2,5% (в 2015 – 2,8%),

молока – 7,0% (5,5%), яиц – 6,0% (9,8%), шерсти – 0,3% (0,3%). В структуре общего поголовья сельскохозяйственных животных доля области в 2020 году составляла: крупного рогатого скота – 7,6%, свиней – 5,5%, овец и коз – 2,9%, птицы – 3,3 процента [2].

Основными производителями сельскохозяйственной продукции являются сельскохозяйственные предприятия. Удельный вес производимой ими продукции составляет более 60%, из них десятая часть продукции производится фермерскими хозяйствами. В последние годы наблюдается тенденция роста доли агропредприятий в производстве продукции сельского хозяйства [3, 27].

Динамика фактических показателей развития сельскохозяйственного аграрного предпринимательства дает основания для вывода о постепенном выходе из кризисного положения, в котором оказались сельскохозяйственные товаропроизводители с началом военной оккупации и отражение прогнозных данных с незначительным наращиванием количества аграрных предприятий. Рынки оказались благоприятными в плане приобретения предпринимателями дополнительных выгод. В целом динамика стоимостного опосредования эффективности развития аграрных предприятий в ракурсе реализации продукции, безусловно, положительна.

Вопрос эффективности функционирования и развития аграрного предпринимательства всегда был актуален в науке и практике Украины, поскольку они являются одними из основных, обеспечивающих продовольственную безопасность страны. Учитывая это, эффективное функционирование и развитие аграрного предпринимательства в значительной степени зависит от большого количества рыночных факторов, результаты которых оказывают непосредственное влияние, как на показатели

современного состояния его развития, так и тенденции в перспективе [4, 46].

Несмотря на существование широкого спектра факторов, что непосредственно формируют условия роста уровня производства аграрной продукции, среди которых основное место занимают уровень потребления продуктов питания и уровень доходов населения, удовлетворить спрос потребителей существенно зависят от прогнозных показателей его развития.

Так, для определения потенциала аграрного предпринимательства региона нами проведена прогнозная оценка изменения структуры сельскохозяйственных предприятий до 2025 года, что предусматривает следующее поведение долей количества организационно-правовых форм в структуре сельскохозяйственных предприятий: увеличение количества сельскохозяйственных предприятий с 1519 г. в 2015 г. до 1900 г. в 2025 г.; медленный рост фермерских хозяйств (с 1027 в 2015 г. до 1280 в 2025 г.)

Такой тренд оказал положительное влияние и на показатели наращивания валовой продукции сельского хозяйства.

По данным прогнозирования до 2025 года, валовая продукция сельского хозяйства с 29,8 млн. грн. вырастет до 42,0 млн. грн., что позволяет констатировать положительную динамику как развития аграрного предпринимательства, так и соответствующего уровня обеспечения аграрной продукцией. Следует признать, что потенциал развития предпринимательства тормозится как относительно низким уровнем предпринимательской активности сельского населения, так и практически полным отсутствием инфраструктуры поддержки малого агробизнеса, ограниченной доступностью кредитных ресурсов, отсутствием на рынке технико-технологических инноваций для малых форм хозяйствования, высоким уровнем локализации рынков продукции, что сужает возможности роста объемов производства.

К числу приоритетных задач развития аграрного предпринимательства региона можно отнести направления, которые нацелены непосредственно на государственную поддержку семейных фермерских хозяйств как способных обеспечить рост численности поголовья и общего объема производства мяса.

Важность активизации аграрного предпринимательства подтверждается утверждением его в качестве ведущего инструмента для решения социально-экономических задач, таких как: создание дополнительных рабочих мест, снижение

уровня безработицы; преодоление бедности; формирование среднего класса; становление конкурентной рыночной среды и т.д. [5, 21].

При таких условиях государством должна быть усилена аграрная политика содействия развитию мелкотоварного производства в сельском хозяйстве, особое внимание должно быть уделено стимулированию реализации предпринимательского потенциала владельцев земельных участков путем приобретения ими статуса товаропроизводителя сельскохозяйственной продукции в форме, в частности, семейного фермерского хозяйства.

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THE MAIN CHALLENGES OF HUMAN RESOURCES IN MODERN BUSINESS

Abstract. The purpose of the research is to investigate the main challenges that exist in modern business in terms of human resources management. To consider the recommendations developed in this direction.

This article discusses changes in management, as well as research by the International Research Center for Creative Leadership, which describes the main challenges in terms of human resource management. Also discussed are the main recommendations that will help managers in effective management of human resources.

Conclusion – Based on the reviewed articles, literature and studies, we concluded that the constant growth and development of modern business is accompanied by new challenges of human resources management, which are caused by changes in people's needs, desire for career growth, competition, and motivation. Environmental changes, as well as leaders' attitudes, management form and feedback have a great influence on the above.

Keywords: human resources, development, leadership, management.

Introduction

Human capital is one of the most important resources for economic and social progress in the world. Therefore, with the passage of time, proper management of human resources becomes more important. The concept of human resource management originated in the 80s of the 20th century, and today HRM (Human Resource Management) has become an important part of business success [1].

According to scientists, the most valuable asset that business organizations have is human resources, and its proper management helps the organization to achieve its goals and success. Human resource management is an art in itself that involves keeping in view the changes brought about by modern trends. In order to respond to these challenges, it is necessary to take into account the changes caused by innovation, technology, demographics and globalization, because the listed ones have a direct impact on the systematization of work content and processes.

Based on this, it is necessary for business organizations to adjust human resources planning and management over time, because environmental conditions, such as: competition at the local and international level, customer demand, new technologies, government interventions, etc. It undergoes constant change [2].

Management changes. Economic and social development is accompanied by the growth of businesses, along with its strategies, structure and internal processes. Not all employees may be able to adapt to these new changes in time. Many companies experience a decrease in the productivity of human resources due to these changes [3].

That is why the organization needs to look at change management as a discipline so that the organization can train individuals, equip them with the proper inventory or techniques that will significantly help them to respond easily to change management.

Also, it is important for business owners to keep in touch and communicate with their employees.

Regular meetings and communication between managers and employees will shed more light on future possible changes that are expected inside or outside the organization, so individuals will be more willing to easily deal with new changes.

It is known that the management of human resources in the company, in each of its departments, is headed by a leader, who has the greatest influence on the motivation and quality of work of his subordinates, that is why it is important to consider the main challenges that leaders face in the wake of development.

Leadership Development Challenges. It is worth noting that leadership development is a process that is carried out to transfer knowledge, skills, attitudes and visions to managerial personnel who have a leadership role and support them to conduct their work more successfully and professionally.

Leadership development is essential for the following reasons:

- Reduction of employees' morale, loyalty and desire for career growth;
- The role of leadership is crucial for the company to take social and public responsibility;
- Leadership is essential for organizations to cope with the complexity of the operating environment and the ever-increasing size and complexity of organizations;
- Difficulties in management and working team relations, etc. [4].

As a result of one of the studies conducted by the International Research Center for Creative Leadership, 6 main leadership challenges around the world were identified, these are:

Refinement efficiency. This leadership challenge is about developing relevant skills such as time management, prioritization, strategic thinking, decision-making, and speed of execution – increasing efficiency in the execution of work.

1. Inspiring others – This is the challenge of inspiring, or motivating, team members so that they are satisfied with their work and work productively.

2. Developing employees – this is the planning, training and effective teaching of the development of others.

3. Team leadership – creating, developing and managing a team. The challenges of a leader are how to instill pride in team members, ensure their support, collaborate effectively and learn about the capabilities of team members.

4. Guiding change – managing, mobilizing, understanding and leading change is not easy for any leader. It requires knowing how to minimize future possible negative consequences and how the leader can deal with team members' reactions to changes.

Stakeholder management is a final challenge that deals with managing relationships, politics and image in the work environment. It involves obtaining managerial support, managing, influencing others, and obtaining benefits from other departments, groups, or individuals [5].

Here, researchers offer recommendations on how leaders should respond to these key challenges. The first is – setting goals for the work team. The leader must be proactive in setting goals, time and work deadlines must be strictly calculated so as not to interrupt the process of completing this or that work. Setting goals gives the leader a possible picture of the future, where the possible risks and consequences are outlined, and this helps him to make some targeted calculations, to reduce risks and get more benefits.

The next recommendation is to delegate more. Every leader needs help to achieve a common, overarching goal, so it's good if he allows his team members to take on more of themselves. Of course, in this process, the leader assigns tasks and tasks to the team members according to their abilities, and reserves the main work, which concerns the final results and summaries, for himself.

The third recommendation is for the leader to set priorities. He should single out the essential tasks that are most important and devote the most energy to them, and delegate the rest of the tasks to team members.

The final recommendation is to strengthen team equity and collaboration. In modern business, the protection of the rights of employees is more and more strictly controlled. Not only within the framework of the law, but also within the team, in relationships, it is necessary for the leader to be able to achieve a high degree of security and respect for each employee. In such an environment, employees are more productive and motivated. A leader should celebrate every small success with the team and make them feel that everyone in his team and also he is equal to each other [6].

Most companies in modern business need to attract talented employees, for which they need more than just insurance and an average salary. A potential employer needs more career growth prospects, development and salary increase. Therefore, it is called one of the main challenges of human resources.

In the ranks of employees, it is necessary to inspire fellow workers that they are necessary for the company, that their activities are directly related to the company's ultimate goals, and that their success is crucial in obtaining positive results [7].

In addition to the satisfaction of the individual employee, business companies, especially those competing globally, find it difficult to manage human resources. Because it is difficult to correctly direct a certain group of people to one goal, when you

do not know the internal psychological background, readiness, and maximum capabilities of individual employees. The mentioned appears after performing certain work. An attentive head of a small-scale company manages to correctly distribute employees according to experience and capabilities, however, with the increase in scale, this is a great difficulty [8].

Conclusion. As the reviewed articles and studies show, today's human resource challenges are quite complex. Therefore, there is a need for companies to continuously monitor productivity and performance, which is a shared responsibility of both managers and the HR department. Finally, the aforementioned will be held responsible if the goals and objectives are not fulfilled accordingly. Which ultimately indicates the weakness and ineffectiveness of the work team.

Companies in modern business, in addition to economic instability, markets, competition growth, or control of other environmental factors, have to strictly control internal human resources, constant development and constant adaptation to innovations, which requires great effort and high responsibility of each employee.

In modern business, it is necessary that the company's human resources management model is constantly based on modern achievements and international management principles, which is the basis for achieving greater success.

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CONTEMPORARY CHALLENGES OF EXTREME MANAGEMENT FROM THE POINT OF VIEW OF DECISION MAKING

Abstract. In the extreme and unpredictable course of events, the usage of new methods and approaches to management decisions becomes crucial, and the permanent use of extreme management (extreme management) approaches becomes an urgent necessity – ensuring the company's advance readiness for expected changes, and immediate response to emerging extreme conditions. For this purpose, several important principles of quick decision-making and effective management of the organization have been elaborated in the paper, the use of which will improve the management of the company under extreme management conditions. Specific methods of extreme decision-making, recommendations for holding a meeting, and quantitative-probabilistic methodology of risk assessment are elaborated.

Keywords: Extreme management, management decision, management triad, risk, intuition, systematic creative thinking.

Introduction

In extreme situations other than current needs, successful business process management requires fast and efficient solutions. In the context of intensified competition and the global political and economic crisis, only such business organizations will prevail and maintain their activities, ready for new environmental challenges, clearly confirmed by the events during the Covid-19 pandemic [1]. Thus, the adoption of a quick and targeted management decision, which should ensure the management of a business process in unpredictable conditions, is a very urgent task.

Results and discussion: Extreme management is a special type of management that should be used mainly in non-standard situations of business process management when environmental conditions are not clearly defined, change rapidly, and are unpredictable in emergency situations and crises [2]. According to our clarification, extreme management

is a type of business management through which it is possible to quickly make non-standard emergency management decisions in conditions of increased risk, which are characterized by uncertainty and high-speed unpredictable dynamic changes [3].

Management decisions in risk management are made in conditions characterized by chaos, randomness, external uncertainty, and constant changes, with the urgency of making management decisions and their implementation [4]. In this case, the decisive role belongs directly to the strategic manager (CEO) of the organization and, in certain cases, to senior management [5].

It is impossible to offer a model approach and/or standard practical recommendations to the company's management in extreme management conditions. To implement extreme management, top management must be characterized by systemic and creative thinking.

The main goals of the company should be formulated in the form of a management triad: 1) profit, 2) creating a customer base, and 3) creating personnel [6].

From this point of view, strategic extreme management implies not only the management of material and technical resources and finances of the organization but, above all, the formation of a vision, mission, and goals of personnel activities, analysis of the macro and microeconomic environment, development of appropriate strategies, ongoing monitoring, and feedback.

Although it is believed that the main goal of the company is to make a profit, with a modern strategic approach, user/customer creation should be one of the main goals (Peter Drucker). Creating customers means creating new services and products that should attract customers, and “creating” personnel leads to the formation of a unified team that will be ready for creative and independent actions in a rapidly changing, unpredictable situation.

In extreme management, a special role belongs to the leader – the extreme manager. An effective extreme manager must possess certain qualities that may not be vital under normal conditions, but are crucial in extreme conditions. First, an extreme manager must be charismatic, which allows him to rally the team and incline it to solve complex problems.

An extreme situation means the risk of developing work in an undesirable direction, so an extreme leader must always be ready to work in conditions of increased risk. Therefore, on the one hand, he must master both rational and intuitive methods of risk assessment. If the organization does not have this type of extreme manager, in addition to the above skills, the company may fail in extreme conditions.

For business success, especially in extreme conditions, it is necessary to make quick decisions that are associated with certain risks.

Thus, the decision maker is faced with a dilemma – on the one hand, the decision must be made quickly, and on the other hand, making the best de-

cision can be associated with a huge investment of time. To overcome the dilemma, it is convenient to rely on a compromise option [7].

Perfectionism is one of the main obstacles to making quick and effective decisions because it is based on the extremely risky all-or-nothing requirement. According to this approach, the extreme manager must anticipate any contingencies and have a well-designed scenario for all cases before taking action. Considering all possible outcomes leads to paralysis of action – the endless improvement of the plan of action, which will lead to inaction, which will cause great damage to the company. Especially when you consider that one of the fundamental conditions for a successful business is the speed of decision-making. A quick decision does not have to be adventurous [8]. To avoid this situation, it is helpful to ask yourself the following question: which solution would be more convenient in terms of the company’s main priorities? Obviously, at this time, criteria should be presented that can be used to evaluate the usefulness of the solution. Such criteria can be gross income, net profit, the loyalty of partners and/or customers, loyalty of personnel to the company, ethical standards and social responsibility of the company, speed of obtaining results or sustainability over a long period, and much more.

Intuition works by comparing different examples – patterns. The brain studies the situation quickly evaluates your life experience and makes the best decision based on the given context. Experience shows that this automatic process is faster than rational thinking, which means that intuition is an important decision-making tool when time is short and traditional data is not available. Research has shown that combining intuition with analytical thinking helps managers make better, faster, and more accurate decisions. Managers trust their intuitive choices more than decisions based on intelligence alone. Thus, the manager must critically evaluate his intuitive abilities and not exceed his capabilities.

- Design creative constraints. According to Parkinson’s law, if we have a month to prepare

a presentation, it will take the whole month, but if we had only a week, we would finish the same presentation faster. In other words, managers often spend a disproportionate amount of time and effort. This tendency can be overcome with creative restraints. The manager must set a deadline and a time when he must make a decision.

- Other approaches to decision making. The best solution is to make a decision with the active involvement of all participants in the management process, such as the consensus method, voting methods, brainstorming, the Delphi method, scripting method, the Carnegie model, incremental model, the dustbin model, the Vroom decision model, and Yeaton. In general, under extreme conditions, a strategic manager is very tempted to use the so-called authoritarian model, when the leader chooses alternatives without agreeing with others [9].
- One of the fundamental possibilities for making a decision is to hold a meeting, which is of particular importance in conditions of extreme control.
- In the modern era, which is characterized by the rapid development of science and technology, and the increasing pace of economic development, any activity, including holding a decision-making meeting, requires special attention and focus on purpose and opportunities.

Methods of Quantitative-Probabilistic Risk Assessment. An extreme situation usually means the presence of a risk of a different nature and severity. So the extreme manager can make better decisions in risky circumstances, which is the principle of conscious risk. For this, it becomes necessary to assess the expected risk associated with making a decision [10].

The quantitative-probabilistic technique developed in the framework of this article will be useful for risk assessment in extreme conditions [11].

To assess the risk and make an appropriate decision, it is recommended to use a methodology that includes the following steps:

- Formulate the question in terms of risk management;
- Determine the success factors, the success of which ensures the success of the project – A_1, A_2, \dots, A_n , where n is the number of success factors; Determine the probability of occurrence of the mentioned success factors (P_1, P_2, P_3, \dots);
- For the success of the project, it is necessary that all these factors come together, which probably means a combination of the factors mentioned. Therefore, for our success $S = A_1 \& A_2 \& \dots \& A_n$.
- Calculate the probability of project success $P(S) = P(A_1 \& A_2 \& \dots \& A_n) = P_1 \times P_2 \times P_3 \times \dots \times P_n$;
- Calculate the risk of project implementation $P(R) = 1 - P(S)$
- Make a decision on the expediency of the project implementation by comparing the probability of success and risk and the cost of risk (material, financial, time, etc.).

Conclusion: In contrast to classical management, in extreme management, the main prerequisites for making management decisions are chaos, randomness, unpredictability, and constant changes in the external and internal environment of the organization. Uncertainty and unexpectedness arise in the process of development and implementation of the organization's development plans and programs. A sharp reduction of deadlines for making and implementing administrative decisions.

Decision-making under conditions of extreme management ultimately relies on a fundamentally new style of organizational management and thinking – this is systemic creative thinking, not limited to ready-made templates and standard practical recommendations.

Because extreme management is based on extreme actions, extreme management decisions are related to a high degree of risk. Therefore, its meth-

ods should include more creative and less traditional tools. Only with systematic creative thinking, it is possible to quickly make non-standard decisions in the shortest possible time using new tools and methods and organization effective management in constantly changing circumstances.

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Section 3. Regional economy

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GEORGIA AND THE CAPACITY TO COPE WITH COMPETITION AND MARKET FORCES IN THE EUROPEAN UNION: EVOLUTION IN THE PRISM OF, “COPENHAGEN CRITERIA”

Abstract. The aim of the paper is to determine the compatibility of Georgia with the economic sub-criterion of the “Copenhagen criteria”, such as the capacity to cope with competitive pressure and market forces within the Union. In this regard, a comparative analysis of the relevant economic indicators of Georgia and the candidate countries for EU membership and determination of the main directions for ensuring these criteria.

Based on the 2021 evaluations of the European Commission in the direction of meeting the economic criteria for joining the European Union by the candidate countries and the comparative analysis of the official statistical data of Georgia, an opinion is expressed that Georgia as a whole meets the economic criteria set for the candidate countries, while the pace of progress is low and it is necessary to take more effective measures.

Keywords: Economy of Georgia, Accession criteria, Copenhagen criteria, Economic criteria.

“Copenhagen criteria”. As it is known, for the membership of the European Union, countries must meet the political, economic and institutional criteria (“Copenhagen criteria”). The economic criteria to be eligible to join the EU are: the existence of a functioning market economy and the capacity to cope with competitive pressure and market forces within the Union. We discussed the existence of a functioning market economy in the previous work [3, 20–22], as for the capacity to cope with competitive pressure and market forces within the Union, It includes the following issues: a sufficient amount of

human capital, education, research, innovation, and future developments in this field; a sufficient amount and quality of physical capital and infrastructure; changes in the sector and enterprise structure in the economy, including the role of SMEs; a sufficient degree and pace of economic integration with the Union, and price competitiveness [2].

“Georgia and Copenhagen criteria”. **Competitiveness in the European Union. A sufficient amount of human capital, education, research, innovation, and future developments in this field.** Over the past 20 years, Georgia has continuously im-

proved its competitiveness (albeit at a slow pace) to keep up with the EU and to withstand market forces. However, the lack of entrepreneurial and technological knowledge, unmet investment needs in human and physical capital, and low costs appear to be obstacles in this way. There is a positive dynamic in the improvement of energy and transport infrastructure, in the use of digital communications. The reforms implemented during the past period have created a solid foundation in the field of education. Georgia became a part of the Bologna process in May 2005 and successfully implements measures to harmonize higher education with European standards. The country has established a policy focused on adapting training programs to business requirements. However, entering the labor market remains a challenge. The market continues to indicate a lack of relevant practical skills in the workforce. The problem remains, in most cases, the inconsistency between the education documents and the acquired knowledge.

A sufficient amount and quality of physical capital and infrastructure. As for the amount of physical capital and infrastructure, it should be noted that the share of total capital formation in GDP has decreased by 2020 (to 23.9%) compared to 2015 (26.3%). The main problem is the scarcity of new technologies, insufficient level of investment and low access to finance. By 2020, the volume of direct foreign investments reached the lowest level since 2005 (0.6 billion US dollars), by 2021 it experienced a significant increase (1.2 billion US dollars), although it still did not reach the pre-pandemic level [4, 94]. In addition, it should be noted that the growth rate of investment inflow from the European Union is low. In the last decade, the conditions for the entry of foreign investments have somewhat deteriorated. This was facilitated by the suspension of a number of ongoing large projects and the exit of the investor already in the post-launch phase. Accordingly, the share of direct foreign investment in GDP has significantly deteriorated to 1.2% (somewhat better than Turkey's – 0.6% and almost the same as North Macedonia's 1.9%) [1, 30; 60;].

Changes in the sector and enterprise structure in the economy, including the role of SMEs. The sectoral structure of the economy is stable. According to the data of 2020, the processing industry has a high share in the total output of 20.0%, the share of the industry as a whole – 25%, the share of agriculture, forestry and fish farming – 7.3%, construction – 12.7%, wholesale and retail trade – 12.0%, healthcare and social services 4.7% [8, 24]. It has not undergone significant changes during the pandemic. Worth bearing in mind that small and medium-sized businesses play an active role in the country's economy, both in terms of income and employment. In particular, according to available official data, by 2020, the share of large businesses in the production of products was 40.3%, medium-sized businesses – 27.1%, and small businesses – 32.5%. 48.2%, 29.7% and 22.1% in fixed capital, and 37.2%, 21.7% and 41.2% in employees [5, 39; 96; 110].

A sufficient degree and pace of economic integration with the Union, and price competitiveness. Although Georgia has positive dynamics in the direction of trade development with EU countries, the EU is still not its main partner. The main reason is technological backwardness of Georgia and low competitiveness of products. After the association agreement, higher rates of development were expected in this direction, but this did not happen. Since 2013, the share of Russia in foreign trade has been increasing, which indicates orientation towards a less competitive market and contains a number of threats.

By 2020, the share of the EU in exports has slightly decreased compared to the pre-pandemic period (22%), however, by 2021 this decrease is significant, and the share of the EU in exports is only 16.9%. The main partners are the countries of the Black Sea Economic Community Organization (55.3%), as well as the CIS (47.6%). The EU's share in imports is 23%. In terms of foreign direct investments, the European Union is the main partner of Georgia (about 350 million US dollars). Before the pandemic, its share was 32% (2019), 2020–57%, 2021–28.5% [9].

As can be seen from the comparative analysis of the main economic parameters of Georgia and the EU membership candidate countries, the main economic indicators of Georgia are generally compatible with the corresponding indicators of the EU membership candidate countries. However, despite the positive dy-

namics, individual indicators are still negative. In particular, the economy of Georgia is still less competitive for the EU market, despite the economic reforms and changes implemented over the last 20 years, the level and degree of integration of the country's economy with the EU economy is lower than expected.

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Section 4. Finance, money circulation and credit

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A SUMMARY OF THE RESEARCH ON THE INFLUENCING FACTORS OF TRADE CREDIT FINANCING

Abstract. Starting from the concept and characteristics of trade credit financing, this paper summarizes the main factors affecting trade credit financing based on existing research conclusions and theories. The factors affecting trade credit can be divided into external factors and internal factors. The external factors include monetary policy, external audit, analyst coverage, financial marketization, market competition and industry prospects, etc. Internal factors include the nature and market position of the enterprise, enterprise scale, enterprise financial status, reputation level, corporate governance and internal control, etc. This article may provide some implications to corporate managers, capital market investors, policy makers, and other firm stakeholders.

Keywords: trade credit; financial market; influencing factors; literature review.

1. Introduction

According to the research of Hu and Cui [16], Trade credit financing is an indirect credit behavior formed between enterprises due to the separation of funds and goods in time and space in the process of commodity transactions. That is, the lending activities provided by enterprises in the form of commodities when buying and selling commodities, act as the most common creditor-debtor relationship in economic activities. From the financial point of view, trade credit is equivalent to a short-term financing given by the seller to the buyer. Trade credit is widely used in the business activities of enterprises because of its simple procedures, easy access and low cost. In this article, I review the existing theoretical and empirical research to summarize its influencing factors.

The existing literature has studied the possible influencing factors of trade credit financing from multiple perspectives, and empirically analyzed the influ-

encing mechanism of different factors on trade credit financing. On the basis of the existing research, this paper sorts out the external and internal factors that have a direct impact on trade credit financing, and expounds the influencing mechanism, the correlation and degree of different factors' impact on trade credit financing, hoping to provide some reference for related research.

The structure of the remaining paper is organized as follows: Section 2 expounds the theoretical research related to trade credit financing. Section 3 and Section 4 respectively summarize the external factors and internal factors that affect trade credit financing. Finally, Section 5 makes a summary and provides some suggestions.

2. Theoretical Research on Trade Credit Financing

From 1960s, the academic circles began to discuss the application of trade credit financing. Deferred

payment and increasing accounts receivable are the ways for large companies to provide credit financing to small companies. As a supplement to direct financing and indirect financing, trade credit financing has its own unique features, and relevant research is abundant. Through review the previous research literature, the theoretical theories obtained in this paper include: operating motivation theory, credit rationing theory, financing comparative advantage theory, trade credit redistribution theory.

1. Operating motivation theory

According to the theory of operating motivation, companies can use the time difference to divide the time of commodity trading and currency trading. If the transaction is carried out in advance, the seller's buying and selling expenses can be effectively reduced and the income can be increased, thus increasing the income of sellers. However, due to the delay of the transaction, there is uncertainty risk in the future. Therefore, when choosing trade credit, the company should adopt different credit strategies for different customers, so as to obtain the indirect price difference and realize the best profit of the company.

2. Credit rationing theory

In trade credit, the credit rationing theory holds that if banks do not provide loans to companies, then companies can only obtain trade credit instead of bank loans for short-term financing. Therefore, "credit discrimination" is an important reason for trade credit because of the financing requirements of companies [1]. (Hu et al. [9]) Because banks and other financial institutions discriminate against large enterprises and small enterprises, small and medium-sized enterprises can't get loans from financial organizations like banks. In order to meet their own capital needs, small and medium-sized enterprises have adopted trade credit instead of bank loans. Trade credit financing is an important way to supplement the working capital demand of small and medium-sized enterprises in the process of economic development (Yu et al. 2010).

3. Financing comparative advantage theory

According to the financing comparative advantage theory, compared with bank loans, trade credit is more convenient and efficient. Especially, compared with bank credit, the advantage of trade credit is that its financing cost is lower than that of bank credit, and it is more convenient to obtain. A survey by Ge et al. (2007) shows that trade credit plays an important role in trade and product sales. Through trade credit financing, enterprises can establish a corporate image with good financial status and good product quality to the outside world. It improves the sales volume of products, and it is easier to establish a long-term and stable cooperative relationship with customers, thus improving the firm value and the producers production efficiency.

4. Trade credit redistribution theory

According to the theory of trade credit redistribution, after a company can obtain a large number of bank loans, the company can redistribute the bank loans to make loans to the companies that need loans through trade contract, thus realizing the redistribution of financing. Ge et al. (2007) found that compared with large enterprises, small and medium-sized enterprises pay more attention to trade credit, and it is more common to solve financing needs through trade credit.

In the process of financial industry development, the capital restriction and credit difference suffered by small and medium-sized enterprises will also be reduced. There will be more opportunities for small and medium-sized enterprises to obtain bank credit, thus improving the trade credit level of the company. Besides, small and medium-sized enterprises provide more trade credit than large enterprises, which shows that the differences in enterprises characteristic have great differences in the redistribution of their trade credit.

3. The External Factors Affecting Trade Credit Financing

To some extent, the level of enterprise's financing constraints is influenced by external factors such as external environment. At the same time, while obtaining funds through trade credit, enterprise's decision

makers will make new decisions on the use of trade credit due to the change of external environment. These external factors that affect the use of trade credit include monetary policy, external auditing, Financial intermediaries including Analyst analyst tracking and institutional investors, Financial Marketization Process and Credit level given by external agency, etc.

1. Monetary policy

Zhang and Deng [12] found that with the tightening of monetary policy, the credit limit of banks will be compressed, resulting in many small and medium-sized enterprises gradually shifting from conventional financing means to trade credit financing. Zhang et al. [1] found that the increase of economic policy uncertainty will significantly improve the trade credit financing that enterprises obtain.

Usually, the influence of monetary policy on trade credit financing is realized by controlling the supply and demand of money. With the tightening of monetary policy, the credit limit of banks will be compressed, reducing the source of capital supply. Under such circumstances, small and medium-sized enterprises are more likely to face the shortage of funds than large enterprises. Therefore, compared with the relatively relaxed monetary policy, companies are more inclined to use trade credit financing to solve their own funding needs when the monetary policy is tightening.

2. External auditing

According to the research of Zhang [3], after the non-standard audit opinions were issued to enterprises, the level of trade credit financing in the next year dropped significantly. It mainly because the non-standard audit opinions would cause the upstream suppliers to worry about the honesty and solvency of enterprises and then make distrust decisions such as refusing to provide trade credit and reducing the credit sales quota and collecting accounts in advance. Therefore, it would reduce the level of trade credit financing of enterprises.

3. Financial intermediaries including analyst-and institutional investors

4. Huang et al. [13] found that analyst coverage promoted the trade credit financing of enterprises, and it played an important role in alleviating the information asymmetry of enterprises, which in turn affected suppliers' trade credit supply decisions. In addition, the improvement of institutional investors' shareholding ratio and legal environment is conducive to promoting the influence of analyst tracking on trade credit financing. Therefore, there is a complementary relationship between analyst tracking and institutional investors' shareholding and legal environment. Financial Marketization Process.

Financial crisis is an important aspect of macro-economic development, which directly affects the trade credit of enterprises. If there is an economic crisis, the company will reduce the credit supply, especially when the company is increasingly dependent on bank loans. Besides, in provinces and cities with a high degree of financial marketization, business reputation is generally used to promote the company's marketing. The better the financial market, the larger the scale of enterprise development, and the more credit funds it can obtain. With the continuous development of the financial market, the role of financial products and credit lines of financial institutions in promoting the redistribution of corporate credit will be further strengthened.

5. Credit level given by external agency

Long-standing companies, which have a considerable reputation level in the capital market, often have an advantage in trade and are easier to obtain trade credit (Zheng Chaoyu et al. [1]). The credit rating of the company is closely related to the business credit of the enterprise. When trading with suppliers, if payment or advance payment can be made according to the agreement, the company will be rated as a company with high reputation by external reputation rating agencies, which can win the trust of suppliers, thus the supplier's trade credit policy towards the company will be more relaxed. Therefore, compared with companies with low credit rating, companies with good credit rating are more likely to obtain trade credit financing.

4. The Internal Factors Affecting Trade Credit Financing

There are not only external factors but also internal factors that affect the trade credit financing of enterprises. The main internal related factors that affect the level of commercial trade credit financing of enterprises include the nature and scale market position of enterprises, enterprise scale, enterprise financial status, reputation level, audit opinions, corporate governance and internal control, etc. The nature and scale of enterprise.

The dependence of large enterprises and small enterprises on trade credit is different, and its characteristic is that small enterprises are increasingly dependent on trade credit financing. In addition, in China's small and medium-sized enterprises, business credit and bank credit are obviously complementary. Among the enterprises in China, there are some differences in the distribution of business credit. Among them, compared with large enterprises, small and medium-sized enterprises have significant differences in capital management and operation experience. Managers of large enterprises have more management experience, while managers of small and medium-sized enterprises are relatively lacking. Strengthening the management level and capital operation ability of SMEs in China is an important way to strengthen the trade credit business of SMEs in China (Wei Gang [4]).

Wei Gang [4] found that compared with small companies, because of their stronger bargaining power, large companies are usually in a favorable position when conducting cooperative transactions, so they can get more trade credit financing. On the whole, the higher the market share of the company, the more outstanding its performance in trade credit financing is due to its own scale and many other advantages.

1. Enterprise financial situation

There is an obvious inverse ratio between the financial position and liabilities of an enterprise and the company's total liabilities. When the company's operation is in good condition, adopting trade credit has obvious advantages (Candida Bussoli et al. [14]). When the company's operation is in poor condition,

using trade credit to raise funds does not have any superiority. Reasons

2. Corporate governance and internal control

First, share pledge may influence trade credit financing. Compared with companies without controlling shareholders' equity pledge, companies with controlling shareholders' equity pledge get lower trade credit financing, since suppliers can perceive the pledge risk. Furthermore, the above relationship only exists in companies with low audit quality and internal control quality; However, it does not significantly exist in companies with high audit quality and high internal control quality (Pan Lin et al., [13]). Second, corporate internal control quality also matters. Compared with enterprises with low internal control quality, enterprises with high internal control quality can obtain more trade credit financing. In the period of tight monetary policy, although the trade credit financing obtained by enterprises has dropped significantly, companies with higher internal control quality can obtain more trade credit financing (Zheng Junlin et al. [3]).

5. Conclusion and Evaluation

This review is mainly carried out from two angles, namely, the theoretical research of trade credit financing and the factors affecting trade credit financing. The theoretical research of trade credit mainly includes business motivation theory, credit rationing theory, financing comparative advantage theory and redistribution theory. From the research of factors affecting trade credit financing, it can be divided into external factors and internal factors. The external factors that affect the use of trade credit financing include monetary policy, external auditing, Financial intermediaries including Analyst analyst tracking and institutional investors, Financial Marketization Process and Credit level given by external agency The main internal related factors that affect the level of trade credit financing of enterprises include the nature and scale of enterprises, enterprise financial status, corporate governance and internal control, etc.

Nowadays, due to the impact of the COVID-19 epidemic in 2020, the economic development of the en-

tire country has been seriously impacted, which poses a more serious threat to enterprises that have difficulty operating on their own. As trade credit financing is be-

coming increasingly important, this article may provide some implications to corporate managers, capital market investors, policy makers, and other firm stakeholders.

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MONEY LAUNDERING AND TERRORISM FINANCING RISK ASSESSMENT OF BANKING AND FINANCIAL SECTOR OF GEORGIA

Abstract. The banking sector dominates the economy of Georgia. The assets of commercial banks are voluminous, and the services offered to their clients are diverse. Herewith, the bank accounts are the main source of money laundering in Georgia. Within the certain period, the commercial banks had a certain deficiencies in client risk assessment and risk management processes. Thus, the process of verification of beneficiary owner was also considered as weakness, especially in relation to non-resident clients. Though systematic thematic onsite inspections, the growth of sanctions, intensive communication, new guidelines on risk identification and identification/verification of beneficiary owner facilitated the growth of compliance level of banking sector in terms of combating money laundering and terrorism financing. At this point of time the compliance level of banking sector with legislation of anti money laundering and anti terrorism financing is high.

Keywords: financing system, money laundering, terrorism financing, Risk Assessment.

Commercial banks allocate significant resources to establish effective compliance system. The awareness level of MLRO towards revealing and preventing money laundering and terrorism financing is high in the banking sector. Consequently, despite deficiencies mentioned above, the risk management is carried out adequately in the banking sector. Comprehensive Risk based supervision applies to banking sector. Given these circumstances, the level of money laundering risk in banking sector was assessed as Medium, while the terrorism financing risk as Medium Low.

The development of the non-bank financial sector is driven by the availability of products and services and a broad network of services, and in some cases, by low fees, speed of service and remote delivery channels as well.

Currency exchange offices are exchanging large amounts of cash, and their compliance control systems are relatively less developed. However, supervision of offices by the national bank of Georgia has substan-

tially increased in recent years. Moreover, offices do not carry out cash transfer operations and transactions related to money market instruments. Given these circumstances, the risk of money laundering related to the activities of offices was assessed as Medium-Low and the risk of terrorist financing as Low.

In recent years, compliance control systems for microfinance organizations have improved significantly. The NBG communicates closely with the sector and promotes implementation of effective internal control policies and procedures by individual organizations. In addition, through new supervisory activities, manuals, workshops and trainings, the NBG assists microfinance organizations to develop internal control mechanisms needed to better assess and manage risks.

The activities of microfinance organizations mainly consist of issuing small loans to resident clients. A certain number of clients also carry out international money transfers. In recent years, the sector's compliance culture has substantially improved as a

result of the national bank of Georgia comprehensive risk-based supervision. Given these circumstances, the risk of money laundering related to the activities of microfinance organizations was assessed as Medium-Low and the risk of terrorist financing as Low.

The payment service providers sector is growing. Most of the services are provided by remote channels. Internet payments make it difficult to determine the geographic area of the transaction. However, in recent years, supervisory approaches have been significantly tightened, leading to a reduction of the sector's inherent risks and the improvement of compliance control systems. Given these circumstances, the risk of money laundering related to the activities of payment service providers was assessed as Medium and the risk of terrorist financing as Medium-Low.

The size of insurance market in Georgia is small. Insurance companies have not offered investment type products of life insurance to date. Their clients are mostly residents and the number of high risk clients is very small. There is also full-fledged risk-based supervision of the insurance sector. No facts of misusing insurance products for money laundering were identified. Given these circumstances, the risk of money laundering and financing of terrorism in the insurance sector was assessed as Low.

During the year 2021, in light of the identified sectoral threats and weaknesses, on-site inspections focused on the following topics:

For commercial banks:

- The process of classification of clients (including those identified/verified by remote channels) per risk, risk revaluation, and the adequacy of implementation of appropriate preventive measures;
- The process of identifying and verifying beneficial owners of clients with complex ownership structures;
- Knowledge of the bank about clients related to free industrial zones, offshore and high-risk jurisdictions, as well as transactions related to such zones and the parties involved;

- Efficiency of the risk management process associated with internet acquisition;
- Efficiency of the cash flow origination process;
- Efficiency of the process of detecting suspicious/ unusual transactions (including of the process of detecting the use of fictitious companies/transit companies, measures taken to implement UN resolutions (on TF/Proliferation), software adequacy, and bank awareness of transactions by non-profit and charitable legal entities).

For microfinance institutions:

- The process of classification of clients per risk, risk revaluation and the implementation of appropriate preventive measures.
- Knowledge of the institution about international transactions (including offshore and high-risk jurisdictions).
- Efficiency of the process of detecting suspicious/unusual transactions (including measures taken to implement UN resolutions (on TF/Proliferation), and software adequacy).
- Efficiency of the cash flow origination process;
- Verification of the accuracy of filling out reporting forms.

In order to determine compliance with the legislation of Georgia on facilitating the prevention of money laundering and terrorism financing, 39 representatives of the financial sector were inspected in 2021. Furthermore, to correct the deficiencies identified during the inspections, the Money Laundering Inspection and Supervision Department of the National Bank of Georgia conducted remote follow-up inspections of 41 entities under supervision in 2021.

The total amount of fines imposed for violating the legislation of Georgia on facilitating the prevention of money laundering and terrorism financing amounted to GEL 1.709.900. In addition to the fines imposed following on-site inspections, various different corrective measures were applied to the representatives

of the financial sector during 2021; moreover, a number of recommendations were developed over the year based on the results of the on-site inspections.

It is important to note that, Commercial banks were first asked to provide organizational and group risk assessment documents in 2020. In 2021, the Money Laundering Inspection and Supervision Department shared its recommendations based on those documents with commercial banks. The goal was for the banks to improve the perception of risks in their own organizations and to better plan measures to mitigate those risks. In 2021, for the first time, a Commercial Bank Compliance Control System Supervision Questionnaire was distributed and a relevant analysis was prepared. To help financial institutions submit the relevant information, in 2021 the NBG developed a Regulation on Commercial Banks Filling out their Anti-money Laundering and Counter-Terrorism Financing Compliance Control System Supervision Questionnaire [3].

In 2021, the analysis of reports submitted to FMS and additional information obtained from the obliged entities, as well as the data received from open sources and foreign colleagues indicates that the major part of suspicious attempts suspected by financial monitoring service of Georgia were cybercrime in nature, conducted in order to legalize funds obtained via different ways. In these cases, traditionally, criminals were using bank accounts or quick money transfers to move funds. Also, various e-wallets are used for similar purposes. The cases related to obtaining customers' confidential banking information through social engineering and fake websites continued in 2021.

Similar to the previous years, in 2021, the use of legal entities established in Georgia, having similar

names to the legitimate international more or less famous legal entities established abroad, was occurring. This method is used to disorientate foreign traders – victims of fraud, attention during the international transaction. However, it should be noted that the number of such cases showed a decreasing trend during 2021 year.

In 2021, the use of Georgian bank accounts for the transit purposes by both legal and physical entities continued. The bank accounts were used for depositing and then transferring funds in third countries, the turnover frequently amounted equivalent of several million GEL. Per usual, the activities of such legal companies are not in the economical connection with Georgia.

In 2021, the number of transactions conducted by call centers was still high. Those companies are formed mainly to establish contact with potential customers abroad and offer to purchase different kind of products, to make investment, currency binary options trading etc. In some cases of a fraudulent call center, after transferring money, customer (victim) doesn't receive agreed service or receives of a low quality ("boiler Room Scam") or loses the funds made for the investment ("investment Scam").

In 2021, based on the analysis of reports received from the obliged entities and other information obtained, Financial monitoring service of Georgia disseminated according to AML/CFT law to the respective agencies of the Chief Prosecutor's Office of Georgia, the State Security Service of Georgia, the Ministry of Internal affairs of Georgia and Revenue Service of Georgia 84 cases (including 10 cases of potential terrorism financing, and 1 case on possible avoidance of sanctions imposed on one of the countries).

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Section 5. Economic security

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OPPORTUNITIES AND PROSPECTS FOR “GREEN” EXPORT OF CONSUMER GOODS

Abstract. The article discusses the process of implementing the foreign trade policy of the Republic of Uzbekistan and foreign countries, in particular the European Union in modern conditions. This process is significantly affected by the slowdown in export growth rates in industry and the need to increase sales of high-tech goods to ensure sustainable growth of the national economy and its competitiveness in the world. The European “Green Deal” requires the introduction of green technologies into domestic production involved in the creation of export goods. The article clarifies the concept of “green” export and considers it in economic and customs aspects.

Keywords: finished product exports, the European “Green Deal”, “green” exports, economic security, “green” technologies, the European Union, foreign trade policy, industrial goods exports, “Green Customs”, circular economy.

I. Introduction

In the period of globalization of the world economy, the active integration of countries into the trading space in order to develop national economies is accompanied by economic and political processes. The adoption of the Development Strategy of the new Uzbekistan for 2022–2026 is of particular importance for our country. Moreover, this document sets a number of tasks to further increase the export potential of the republic and bring the volume of exports of the republic in 2026 to 30 billion US dollars. At the same time, the goal was set to increase the share of finished products and semi-finished products in the export structure by 3.3 times, to expand exports of finished products to European countries within the GSP+ system [1].

In the context of global development, the foreign trade policy of the Republic of Uzbekistan is based on the implementation of its effective participation in the international division of labor. A significant potential for the integration of our country into international production processes lies in the trade and economic cooperation between our country and foreign countries, despite the strong export positions of its participants.

Currently, about 67% (USD11 229.0 million in 2021) of exports go to foreign countries and 33% (USD5433.8 million in 2021) to the CIS countries. Of the countries of the European Union (hereinafter referred to as the EU), the important trading partners of the Republic of Uzbekistan are Belgium, Bulgaria, Germany, Greece, Cyprus, France, the Czech Republic and Estonia [2].

II. Literature review

For our country, the reorientation of exports to the EU from the commodity groups of the extractive industry to the commodity groups of the manufacturing industry, produced, including with the use of "green" technologies is of particular importance. This circumstance is determined by the terms of the European "Green Deal", which involves the transition to a "clean" circular economy, the restoration of biodiversity and the reduction of environmental pollution [3].

Today, the EU positions itself as a leader in international climate policy, defining the environment as one of the important principles of relations with third countries in international trade. It is proposed to make the Paris Agreement the basis of international trade agreements. This will entail an increase in the EU requirements for products imported into its territory, as well as a reduction in volumes or refusal to import certain types of raw materials, goods manufactured using "non-ecological" technologies.

In preparing this article, the goal was to identify the main problems and determine the prospects for the development of exports to the EU countries in the context of sustainable development.

In the scientific literature, "green" exports are understood as goods that are competitive on the world market and meet the requirements of "environmental" cleanliness (the intensity of CO₂ emissions during export) [4]. A number of researchers analyze the impact of "green" industrial policy on the competitiveness of "green" exports [5].

The results of studying samples of historical and philosophical thought testify to the differentiation of factors in the development of "green" exports depending on the level of development and implementation of environmentally friendly technologies, type of product, industry, type of region and its geographical location. Studies of the business strategy of "green" exports in developing countries allow us to conclude that organizational resources, enterprise capabilities and significant pressure from stakeholders on the export market and business financial performance are positive [6].

The results of the analysis of sources indicate the attention of the scientific community to the problem of introducing "green" technologies [7; 8], the principles of "green" logistics [9].

According to the Organization for Economic Cooperation and Development (OECD), green technologies involve economic growth while preserving the environment. All these are the principles of a "green" economy characterized by low carbon, resource efficiency and social inclusiveness.

R. Fyuks proposes to carry out the ecological transformation of the capitalism of the EU countries on the basis of their consolidation and intensification of investments in "green" technologies [10]. Y. Scheffi and E. Blanco explore the conditions for the introduction of this type of technology in private production [11]. The balance of commercial and "green" interests is achieved by controlling the supply chain of raw materials, semi-finished products, applied technologies, etc.

From an economic point of view, exports are goods produced and exported from the territory of the country for sale in a foreign country. However, in the legislation of the Republic of Uzbekistan, when determining exports, emphasis is placed on the export of goods outside the customs territory without the obligation to re-import them [12].

III. Analysis and results

To achieve the goal of the study, we will consider the production of goods using zero environmental impact technologies as one of the stages of export. This is justified by the tightening of international standards (in the EU countries) for imported products, according to which the supplier is required to indicate the technologies used for the production, storage and movement of goods.

In customs, export is a procedure applied to goods exported from the territory of the Republic of Uzbekistan for permanent residence outside it. Logistics involves the delivery of goods when exported from one country to another. The adoption of the European "Green pact" will update the use of

“green” technologies at each stage of export implementation. We understand “green” export as a process based on environmentally friendly technologies for the production of goods, their customs clearance and logistics for the purpose of export and sale in a foreign country. That is, this process will consist of the following 5 stages: EU market selection – Production according to EU requirements – Customs clearance – Delivery / logistics – Payment.

In accordance with the legal documents of the Republic of Uzbekistan, export includes the export and customs clearance of goods. The stage of production is not taken into account in its definition. In our opinion, in the conditions when importing countries (the EU) of goods impose high environmental requirements on the technologies used by manufacturers, it is especially important to take into account the stage of production of goods in the export model, focusing on the use of “green” technologies.

The level of development of “green” exports is a synergistic effect of the use of environmental technologies at its identified stages. The degree of development and implementation of “green” technologies in production, logistics and customs clearance is different. In logistics, “green” transformations are assessed as effective and sufficiently developed [13]. “Green” technologies in customs are: electronic declaration system; introduction of artificial intelligence; modern inspection and screening complexes, etc.

The main factors for the introduction of “green” technologies in customs practice are the level of development of such technologies and funding from the state budget. According to experts (participants

in foreign economic activity, customs specialists) [14], “green” technologies in the customs service are quite effective. In terms of importance in the triad of “green” exports, the manufacturing sector occupies a special place due to the creation of an export object, the existence of contradictions between profit maximization and environmental protection, the tightening of international requirements for product quality and production technologies, etc. For the greening of industries, experts [15] propose measures that provide short-term benefits (increased energy efficiency, appropriate management of natural resources, voluntary sustainability standards, the introduction of eco-labels, etc.) in order to develop strategic solutions for “green” industrial policy. The proposed model covers the entire life cycle of the exported product and promotes the use of a systematic approach in the development of measures to stimulate “green” exports.

As known, at the session of the WCO Council “Green Customs” was adopted as one of the priorities of the Strategic Plan, and therefore, in order to raise awareness of the role of customs in protecting the environment and hear the expectations of customs from a number of stakeholders in June in 2022, the WCO organized the Global Conference on Green Customs. The discussion platforms discussed the concept of the circular economy and its implications for customs. New trends in trade related to the circular economy (recycling, reuse, repair and recovery of goods) were considered, as well as key challenges of the transition to a circular economy, including the lack of data to track and monitor the ecological footprint of trade [16].

Table 1. – Dynamics of export of goods from the Republic of Uzbekistan to the EU countries in 2017–2021*

| Indicators | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------|-------|-------|-------|-------|-------|
| Volume, mln. USD | 472.3 | 650.1 | 635.2 | 452.3 | 637.3 |
| Growth rate, % | – | 37.6 | –2.3 | –28.8 | 40.9 |

* compiled by the author according to [2]

The main socio-economic factors in the development of “green” technologies are the insignificant

demand from society for “green” goods, the predominance of resource-intensive industries that re-

quire large investments for rebirth. Let's analyze the indicators of export of goods from the Republic of Uzbekistan to the EU countries (Table 1).

Analysis of Table 1 shows that in 2019–2020 the volume of exports of goods from the Republic of Uzbekistan, respectively, decreased in 2019 by –2.3% and in 2020 by –28.8%. In general, the decrease in the value of exports in 2019–2020 was due primarily to quarantine conditions undertaken by importing countries during the COVID-19 pandemic. Applying the principles of sustainable development, it is time to determine the prospects for the development of "green" exports of the Republic of Uzbekistan. One of the supplied goods of a high level of environmental friendliness is mineral fuel, cotton knitwear, since many enterprises in these industries work with foreign investment and are export-oriented; they are highly motivated to introduce "green" technologies into production.

European countries are developing "green" nanotechnologies in order to create more efficient solar and practical fuel cells, environmentally friendly batteries. "Green" nanotechnologies are also widely demanded in society in the field of water treatment [17].

A promising domestic export product is electric vehicles. The use of electric vehicles also seems to be relevant for the global economy. However, the production of batteries for this mode of transport is energy and carbon intensive. According to research, the cost and production volume of lithium batteries will continue to increase. Rechargeable batteries account for half of the global use of lithium and 40% of cobalt; however, most of it is used in consumer electronics and only a small part in electric vehicle batteries. The situation may change due to the growth of

sales of electric vehicles in Europe. In the period up to 2030, their production volumes will increase by 25 times, and the demand for lithium and cobalt will increase sharply [18]. Assessment of the competitive advantages of the Republic of Uzbekistan in the production and export of batteries for electric vehicles, battery charging infrastructure elements, etc. should be of interest to experts in this field.

IV. Conclusion and discussions

In the course of this study, the main problems in the development of "green" exports of the Republic of Uzbekistan to the EU countries were identified:

1. Insufficient investment in "green" technologies, which makes it difficult to re-equip small and medium-sized enterprises. Today, "green" export is the prerogative of big business.
2. Low demand from domestic consumers for environmentally friendly products.
3. Lack of a business-friendly information and business platform.
4. Uncomfortable conditions for businesses engaged in "green" exports. A "horizontal industrial policy" is needed.
5. The main target is small and medium enterprises, not large companies. "Green" export is a fairly young direction of foreign economic activity, so there is a need for analysis, identification of external and internal threats, development prospects.

In the EU countries, a "cyclical economy" and waste-free production have been developed and are being implemented. In order to achieve the priority of "green" exports in the sphere of foreign trade of our country in the long term, the national economy requires a restructuring of all areas: cultural, technological, educational, economic, etc.

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Section 6. Logistics

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IMPROVING AND SPEEDING UP THE RELOADING PROCESS

Abstract. The article discusses the theoretical, technological, and practical aspects of improving cargo transfer operations in seaports in the Russian Federation. Based on an analysis of international and domestic practices, a site-level engineering solution is proposed to increase productivity and sustainability in logistics processes. The focus of the study is on the process of loading bulk cargo in big bags into containers at the Novorossiysk port. The paper justifies the effectiveness of using roller forks for loaders as an alternative to standard metal forks, which can damage containers and slow down operations. A technological map for the reloading process without fork prongs is presented, and the principles for integrating the solution with the digital terminal management system are explained. The environmental, energy, and organizational benefits of implementation are also evaluated. It has been shown that the modernization of port equipment contributes to the creation of a sustainable, safe, and resource-efficient model of port logistics, without the need for significant capital investment in infrastructure.

Keywords: port logistics, reloading, big bags, roller forks, engineering solution, loading and unloading operations, process optimization, pallet-free technology, TMS, digital port model, energy efficiency, industrial safety, sustainable development.

I. Introduction

With the constant increase in maritime traffic and the growing complexity of logistics chains, the efficiency of port operations has become a crucial factor in the competitiveness of terminals. This is particularly true for the Novorossiysk port, which handles a significant portion of export flows consisting of bulk cargoes transported in big bags and universal soft containers for various bulk materials, such as mineral fertilizers, grains, coal, pea, sulfur, and others.

One area of port logistics that requires special attention is the reloading operation – the transfer of cargo from one transportation unit or container

to another, for example, during transitions between sea, rail, and road modes. This process often involves downtime, duplication of operations, and loss of valuable time.

In modern ports, berthing time, container handling speed, and minimizing delays are all important factors in determining competitiveness. Research has shown that the operational efficiency of port terminals greatly influences their ability to handle overloads and peak volumes [9].

However, in Russian ports and ports in the CIS (Commonwealth of Independent States), the issues of accelerating reloading processes have not been thoroughly explored. There is a lack of data and

models that are tailored to specific conditions, such as climate, infrastructure, regulations, and available technologies.

Therefore, finding engineering solutions that can accelerate reloading while ensuring safety without the use of pallets is a top priority for developers of port equipment and terminal operators.

II. Theoretical foundations of the organization of the re-fitting process

The theoretical foundations of the reloading process organization in port logistics are based on the idea of reloading as a process of transferring cargo from one transportation unit to another, such as from a container to a wagon, car, or package, in order to connect different modes of transportation, optimize the logistics chain, and reduce overall delivery costs. In practical terms, reloading is interpreted as the direct transfer of cargo between transportation units during multimodal transportation. This interpretation is widely used in industry practice, as well as in the reference materials and explanatory documents of shipping companies and freight forwarders, which describe typical cases and technical limitations related to reloading, such as requirements for location, safety, and packaging [3].

In the Russian context, the background of this issue is the growth in container turnover. According to the Association of Commercial Seaports of the Russian Federation, the container turnover of Russian ports reached 5.63 million TEUs in 2021, an increase of 6.2% from 2020. This increase objectively creates an increased demand for technological areas where containers are reloaded and stored, especially during peak periods of ship arrivals and train formation [1].

Review and training materials on RFID technology until 2021 revealed the typical architecture of the system, including an accounting computer, a reader, and antennas. These materials showed how automated recognition of storage units can reduce matching errors and speed up confirmation of stages, without the need for operator involvement. This theoretically shortens the cycle of overloading and improves the observability of the process for dispatchers [4].

To illustrate the link between technological configuration and its effect on reloading, a comparative table is provided, summarizing open materials from suppliers and engineering consultants.

Table 1 – Technological tools applicable to the reloading site and their theoretical roles

| Technology / solution | The key function in the reloading area | Performance Commentary |
|--|---|--|
| Automated Stacking Cranes (ASC/ARMG) | Automated container movement between storage positions and the transfer point | Regulates flow, reduces the number of idle and collision, increases storage density and slot availability, creating a temporary buffer for reset operations. |
| RMG/RTG and rich-stackers | Flexible handling of storage units in cramped spaces | Combined RTG and richstacker schemes continue to be relevant, with limited CAPEX (capital expenditure) and flexible cargo nomenclature. |
| RFID identification of containers/containers | Contactless identification and automatic confirmation of the operation stages | Minimizes manual data entry, speeds up approval/release processes and compliance monitoring, and improves traceability for TMS/ERP systems. |

Source: author's development

From an engineering perspective, the efficiency of reloading operations is determined not only by digital control tools, but also by the physical parameters of the equipment involved in the process – the shape, strength, speed, and accuracy of the loading units. Local technological improvements, such as modifications to attachments, can ensure a significant increase in productivity without the need for constructing new berths or introducing expensive robotic systems. In this work, we focus on the development and testing of a mechanical solution at the site level – roller forks for the loader – which accelerate the reloading cycle for big bags, reduce damage to containers, and eliminate the need for pallets.

III. Analysis of the current state of reloading processes in ports of the Russian Federation and abroad

For an objective assessment of the state and dynamics of reloading processes, it is important to compare real indicators of container turnover in the largest ports of the world and in Russia, which reflect the level of technological maturity, automation, and organization of terminal operations. These data

allow us to determine benchmarks and identify the relationship between transfer rate and the scale of container flow, degree of digitalization, and level of mechanized systems implementation. Table 2 presents key indicators of container turnover at the end of 2021, based on statistics from UNCTAD, the Association of Seaports of Russia, and official reports from port operators. These indicators form an empirical basis for analyzing operations' effectiveness and developing models for accelerated reloading.

To visually represent the level of technological development in global container terminals, we have an example from Yangshan (Shanghai, China). This is one of the largest and most modern deep-water ports in the world, and it is a benchmark for integrating robotic crane systems, automated guided vehicles (AGVs), and intelligent digital control platforms. The complex demonstrates the optimal use of space to speed up container transfer and reloading, as well as implementing the principles of the "smart port" concept. This concept combines mechanization, automation, and digital dispatch of processes to optimize operations.

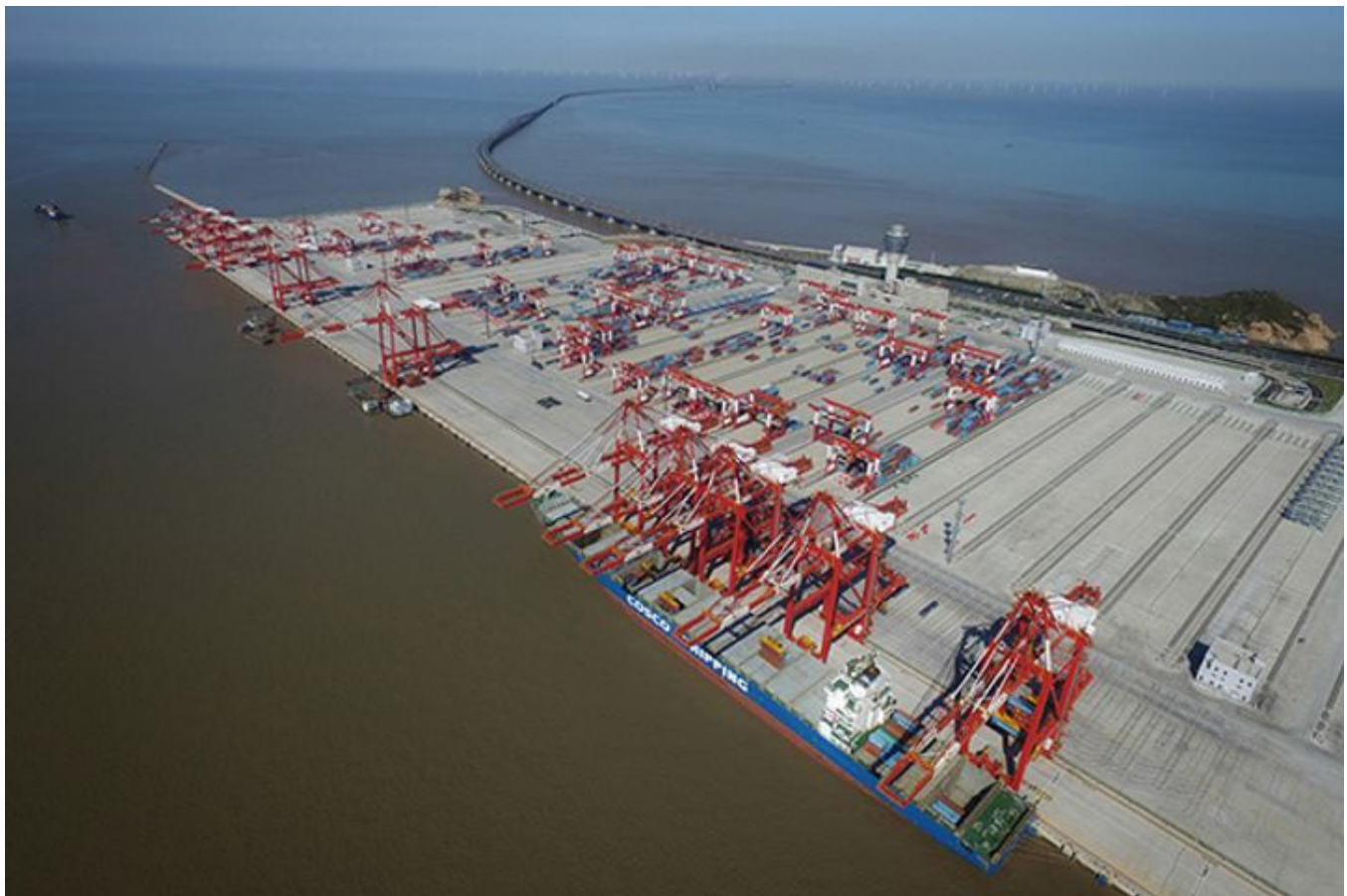
Table 2 – Key guidelines for container turnover and context for assessing the rate of reloading

| Port / System | 2021, million TEU | Commentary on the organization and impact on the reshuffle |
|--|-------------------|---|
| Shanghai | >47,0 | The leader in volume and automation (Yangshan, ASC/AGV), stable yard operation at large tidal windows reduces repetitions of permutations before overloading [13] |
| Singapore (PSA) | 37,2 | Deep automation (AGV, ARMG, introduction of new DTQCS), emphasis on end-to-end identification and planning of «gate – yard – quay» slots [12] |
| Rotterdam | 15,3 | Using Maasvlakte II as a «buffer» to equalize peak yard loads, which reduces conflicts during overloading [11] |
| Los Angeles | 10,68 | A record year against the background of overloading of ground infrastructure; reloading requires close synchronization with export / import [6] |
| Long Beach | 9,38 | Historical maximum; official data emphasize the impact of import and turnover of «empty» on intra-terminal operations [10] |
| Ports of the Russian Federation (collectively) | 5,63 | Increased demand for retargeting during the restructuring of destinations; strengthening the role of the Far East and Novorossiysk [1] |

| Port / System | 2021, million TEU | Commentary on the organization and impact on the reshuffle |
|--|-------------------|---|
| VMTP (Vladivostok) | 0,757 | Growth of +13% YoY; expansion of warehouse space and IT tracking services [7] |
| NUTEP (Novorossiysk) | 0,546 | Growth of +12% YoY; bet on equipment upgrades and yard storage density [2] |
| Global Ports (consolidation of the Russian Federation) | 1,576 | Growth +2.8% YoY; multidirectional dynamics across basins [8] |

Source: author's development based on existing research.

Figure 1 – Yangshan Automated Section (Shanghai, China) [14]



IV. Site-level engineering solution: roller forks for used vehicles as a driver of replaceable performance

The development and implementation of engineering solutions at the loader attachment level can be an effective tool for optimizing intra-port operations without the need for significant capital invest-

ments in infrastructure. This is particularly relevant when it comes to upgrading standard metal forks on a loader by installing roller forks. This design is designed for accurate and fast handling of soft containers such as big bags (BBs).

In export flows at the Novorossiysk hub, a significant proportion of cargo is transported in big

bags, including NPK, nitroammophoska, coal, and grain. The typical operation involves transferring cargo from wagons to trucks and then into containers. Using standard steel forks can lead to damage to the containers, spills, and irregular cycles, including downtime for changing bags, the use of pallets, and fumigation. This increases the weight of “dead” containers and can lead to higher costs and longer shift cycles.

The use of non-damaging pallets reduces these risks, but it also increases direct costs. Therefore, it is important to consider the trade-offs between efficiency and cost-effectiveness when deciding on the best approach for handling cargo in big bags.

The use of roller forks, which have wide, plastic rollers and rounded edges, allows you to carefully wrap them for second-hand use. They can be used without pallets and safely stacked in two tiers, stabilizing the rolling operation. This mechanical improvement reduces damage to containers, even out the cycle time, and provides a “smooth” flow at the

site level, without the need for expensive automation.

Technological map:

- 1) Inspection of the rollers/edges.
- 2) Positioning under the b/w slings at an angle of less than 10°.
- 3) Smooth approach to $\frac{2}{3}$ bag length.
- 4) Lifting with center of mass retention.
- 5) Packing in a container (bottom row), then the upper 2nd tier.
- 6) Roll-out with controlled slope.
- 7) Visual integrity monitoring.
- 8) Fixing/sealing doors.
- 9) Marking the fact in the TMS.
- 10) Cleaning the workplace.

Critical points: Bag slip, misalignment, and sling snagging are mitigated by speed limits, rounded radii, and control stops.

To clarify, the key changes in operation parameters during the transition to roller forks are summarized in Table 3.

Table 3 – Comparative indicators of the container loading production process before and after the introduction of roller forks

| Indicator | Up to (steel forks) | After (roller forks) |
|--|---------------------|----------------------|
| Container loading time, min | ~60 | ~20 |
| Productivity per forklift per shift, cont. | ~10 | ~25–30 |
| Palletization/fumigation requirement | Required | Not required |
| Big bag damage rate, % | Higher (up to 5–7%) | Below ($\leq 2\%$) |

Source: *production practice, author's calculations based on equipment testing data at the Novorossiysk port.*

As can be seen from Table 3, the introduction of roller fork lifts not only increases shift productivity by almost three times, but also stabilizes the process. This directly affects the performance of PCS/TMS and the overall energy efficiency of the terminal.

At the level of digital port platforms (PCS and TMS), the use of roller forklifts reduces the variation in the duration of container loading operations. This leads to more accurate calculation of ship arrival and departure times, as well as improved synchronization with land transport and mooring windows. In

the digital port model, this solution helps to smooth out “bottlenecks” and increase the efficiency of schedules in simulation modeling.

From an energy perspective, uneven power consumption has been reduced. From an environmental perspective, the use of pallets has been eliminated and fumigation has been recorded, as well as a decrease in packaging damage. All of these indicators are included directly in the sustainability reports of marine logistics companies.

V. Environmental and energy assessment of the solution

The introduction of roller forks into the rewinding process has a positive impact not only on production efficiency, but also on environmental and energy parameters at the port terminal. The engineering modernization at the attachment level allows for a significant reduction in the overall environmental impact of operations, without the need for additional capital construction or infrastructure changes.

1. Reducing material consumption and waste

By eliminating the use of wooden pallets when handling large bags, we can reduce the consumption of raw wood materials and the generation of waste associated with the repair and disposal of pallets. Considering the average weight of a pallet at 18–22 kg and its standard service life up to 10 cycles, annual wood savings during processing 10,000 containers would be about 180–200 tons, corresponding to the preservation of approximately 300 coniferous trees.

Additionally, reducing damage to containers to less than 2% will minimize the amount of polyethylene and polypropylene waste generated previously as a result of burst bags and product spills.

2. Elimination of fumigation processes.

Pallet-free operations eliminate the need for the fumigation of cargo and containers. This eliminates the use of toxic chemicals such as methyl bromide, which are used to disinfect wooden surfaces. This reduces risks to the health of workers and prevents the release of harmful substances into the air. This is especially important in ports located in urban areas and near coastal ecosystems.

3. Energy Efficiency of the Process

By reducing the loading cycle time from 60 minutes to 20 minutes, we can significantly reduce the overall operating time of the loading equipment, and consequently, the fuel or electricity consumed per operation. Assuming an average diesel fuel consumption of 4 liters per hour, the savings per container amount to approximately 2.7 liters, equivalent to reducing CO₂ emissions by 7–8 kilograms. For

a yearly volume of 10,000 containers, this translates to up to 70–80 tons of CO₂ prevented from entering the atmosphere.

Moreover, electric loaders help stabilize the energy profile of internal power grids by reducing peak loads, which also contributes to extending battery life.

4. Improving Industrial Safety and Ergonomics

The use of roller forks reduces the likelihood of sudden jerks and snags when lifting and moving loads, which helps to prevent accidents and personal injuries. This is because the even weight distribution and smoother movement reduce vibration and noise, improving working conditions for operators. By modernizing the equipment in this way, we are ensuring compliance with industrial safety standards such as ISO 45001.

VI. Conclusion

The study confirmed that improving port operations' efficiency is possible not only through large-scale digital or infrastructure solutions but also through local engineering improvements based on an analysis of real production processes. For example, we can consider the improvement of equipment for reloading – the replacement of standard metal forklifts with roller ones, which ensures careful handling of soft containers and a stable technological cycle.

This engineering solution has made it possible to create a more stable and secure loading system, reduce unproductive downtime, eliminate the need for pallets, and reduce the risk of cargo damage. It demonstrates that optimizing even one link in the logistics chain can significantly improve the efficiency of the entire terminal and the reliability of planning, as well as the rhythm of operations.

The mechanical enhancement seamlessly integrates into the digital port management architecture, complementing TMS (Transport and Management System) and ERP (Enterprise Resource Planning) systems and increasing the accuracy of operational data. This approach forms the basis for a unified engi-

neering and information circuit, where physical and digital solutions interact at the process level, rather than just at the indicator level.

In addition to its technological impact, the modernization of equipment also has significant environmental and energy benefits. The use of wooden pallets and fumigation chemicals is eliminated, reducing the load on power systems and improving industrial safety. The solution aligns with modern principles of sustainability and the requirements for environ-

mental responsibility in transport and logistics companies.

Thus, the results indicate that the development of port logistics requires a combination of engineering thinking and digital analytics. These solutions form a new level of technological culture in Russian ports and set the direction for future research in mechatronics, ergonomics, and digital modeling of port operations.

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