



CONCEPTUAL FRAMEWORK FOR DIGITALIZATION OF DEPRECIATION POLICY

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ABSTRACT

The purpose of this article is to develop a conceptual framework for a common accounting and information space of depreciation policy. First, the authors consider the benefits of total digitalization of the organization and methodological support of depreciation policy process and make some assumptions related to the concept of enterprise's economic data protection. Since the scientific challenge is how to effectively monitor and quickly adjust depreciation policy, the authors have chosen methods to analyze the relations between business, government regulation, and economic data security. In the course of the research, a survey of 376 enterprises of Zaporizhia, Donetsk and Luhansk regions of Ukraine was conducted. In addition, the survey results





and monitoring of the beta version of depreciation policy's information portal were presented. To identify impact of the enterprise size on the availability of information about individual indicators, they are grouped according to the selected system of taxation (simplified and general). It was also concluded that the accounting indicators can be used to quickly adjust the depreciation policy at the state level.

Keywords: Depreciation Policy; Public Policy; Digitalization; Information; Accounting; Reporting; Data Security

1. INTRODUCTION

The process of economy digitalization is not a new area of research. However, the informatization of depreciation policy, as a process of interaction between enterprises and the state is a relatively new direction of accounting theory, as well as a new approach to the perception of depreciation.

In many countries, depreciation policy is usually considered at the micro level, mostly studying the state of implementation of depreciation policy in the enterprise. Fewer studies are conducted at the macro level and taking into account industry specifics by analyzing the technical feasibility of exchanging accounting information. One of the purposes of this article is to reveal the idea of effective interaction between state and enterprise in the implementation of depreciation policy and the formation of a conceptual framework of this economic phenomenon.

2. LITERATURE REVIEW

2.1. Review of the literature on digitalization

Digitalization is commonly understood as a transformation of digital technologies to optimize and automate business processes, increase productivity and improve communication with consumers. Currently, there are three areas of research related to this topic.

First area is a study of the digital products special characteristics depending on the focus of their application. Thus, the recent work by Goldfarb and Tucker (2019) contains an extensive study of the literature on the digital economy to identify its differences. They emphasize the reduction of costs associated with search, replication, transportation, tracking and verification.



In addition, researches by Bakos and Brynjolfsson (1999) study the effectiveness of grouping a large number of information products, taking into account different properties and uncertainties. In this context, Goldberg et al. (2001) analyzes the cost-effectiveness of mechanisms for digitizing economic processes.

At the same time, the research does not touch upon the consequences of digitalization of the interaction between suppliers and customers, enterprises and the state, does not highlight the digital aspect of "public policy". This article develops the direction in research of complex interaction processes of business and state subjects. The paper considers such a separate element as the depreciation policy from the point of view of efficiency of application with the use of digital technologies.

Second, there is a lot of literature on information asymmetry, some of which is closely related to our article. For example, Sobel and Takahashi (1983) and Cramton (1984) developed a model of interaction of business entities over time. The authors explore the nature of interaction, strategic behavior and timing of relationships between enterprises.

In this regard, Besanko and Winston (1990) compare the duration and effectiveness of the interaction, and Hörner and Samuelson (2011) conduct modeling and expand previous research. In our article, we will analyze the available results of long-term interaction of the state and enterprises in the implementation of depreciation policy. Consideration of the state from the angle of a partner unit, rather than a regulatory institution, made it possible to understand the organizational construction of the concept of digitalization of depreciation policy.

Third area of research is the justification of potentially necessary accounting data and the optimal organization of their collection and use. Richard, Lindholm and Hogan (1968) already emphasize the problems of using existing credentials and the need to form a specific information array. We confirmed this concept and expanded it based on the surveys of Ukraine's depreciation policy key stakeholders by adding an organizational mechanism for interaction and exchange of information. Important in the information approach Klenin (2004) assigns the relevance of accounting information, without requiring other characteristics and features that are put forward to the accounting information.



2.2. Depreciation policy

Keating et al. (1999) considered depreciation policy in the context proposed by the state of the highest metrological depreciation output. We worked with representatives that were used for all depreciation support optimization messages and not for policy purposes. At the same time, they claimed that the reliability changed to the depreciation products that were necessary spent on R&D. However, other researchers have found that this applies to research and is not cost-effective (Mead 2007; Okubo, 2006; Sliker 2007; Fixler 2009). In this article, we as well focused on the organizational component of the depreciation policy implementation.

The purpose of this article is to develop a conceptual framework for a common accounting and information space of depreciation policy.

3. METHODS OF RESEARCH

3.1. Measures to assess the reality of the depreciation policy implementation

Since the scientific problem is how to assess the effectiveness of depreciation policy and what impact the processes of digitalization of the economy have on its formation, first, it is necessary to choose what indicators we should use to assess the effectiveness of depreciation policy. The main indicator of the effectiveness of depreciation policy is the fact of renewal of fixed assets at the expense of own financing sources, increasing the efficiency of financial and economic activities. The production structure of the labor means, performance indicators of the enterprise and its financial statements are directly dependent on the strategic direction of depreciation policy. Scholars in assessing the effectiveness of depreciation policy use mostly the same indicators:

- 1) Determination of the optimal production, age and cost structures of fixed assets;
- 2) Forecasting the useful life of fixed assets;
- 3) Forecasting future economic benefits from the use of fixed assets;
- 4) The choice and optimal combination of permitted depreciation methods;
- 5) Valuation of fixed assets from the standpoint of depreciable value and liquidation value;
- 6) The choice of the most effective forms of reproduction of fixed assets and capitalization of depreciation.

In the course of the research, a survey of 376 enterprises of Zaporizhia, Donetsk and Luhansk regions of Ukraine was conducted according to the listed indicators. To identify



impact of the enterprise size on the availability of information about individual indicators, they are grouped according to the selected system of taxation (simplified and general).

We used these indicators exclusively for compiling questionnaires when testing the software product to ensure the digitalization of depreciation policy.

3.2. Measures to monitor the effectiveness of depreciation policy

The beta version of the investment portal of the Melitopol city was used as a monitoring system, as part of the work on which the instrument of depreciation policy was modeled. The developed software environment brought together authorities, entrepreneurs and representatives of fiscal structures. We understand that large-scale implementation of the monitoring system requires time, money and other resources, but in turn ensures the achievement of expected results.

4. RESULTS OF THE RESEARCH

First, we investigated what information is needed to conduct a depreciation policy in accordance with the specified criteria for its effectiveness. Then we determined the availability of such information in the standard forms of statistical and financial reporting of enterprises.

At the same time, we conducted a survey on these indicators of the selected group of enterprises. This allowed us to specify the direction of the study of the effectiveness of depreciation policy and focus on the most important part of fixed assets in the development of the framework (see Figure 1).

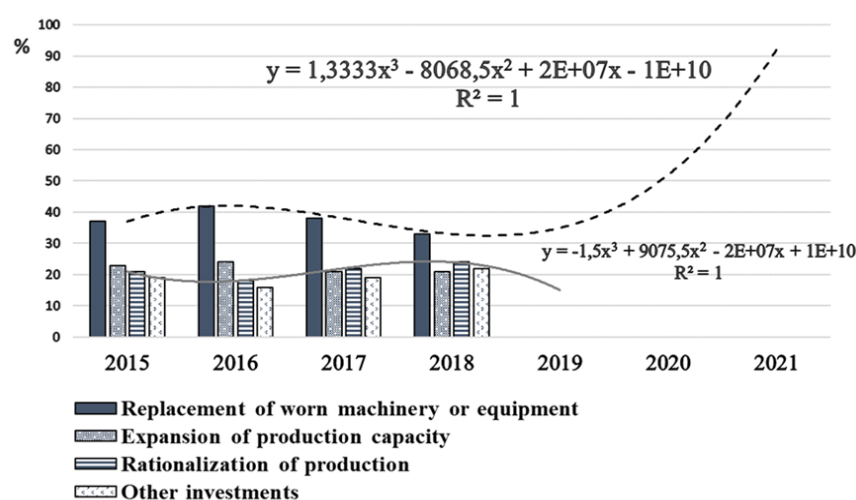


Figure 1: Modeling the dynamics and structure of investments to specify the terms of the conceptual framework reference for digitalization of depreciation policy

Source: developed by the authors



Questionnaires of accounting experts and experts from the state regulation sector helped us to understand at what stages of information processing the problem of its insufficiency arises. At the same time, we found out the optimal level of regulatory policy intervention in the economic independence of enterprise in the development of depreciation policy.

These conclusions were based solely on expert opinion, as there are currently no facts of such operational interaction (see Figure 2).

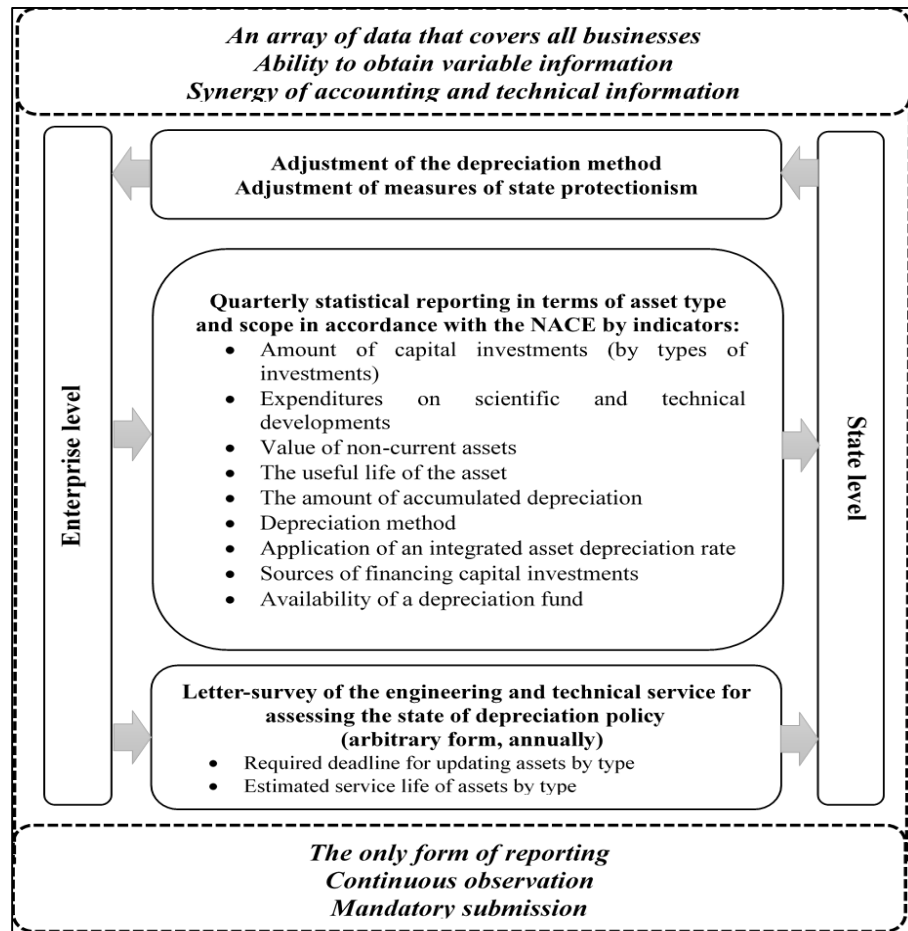


Figure 2: Depreciation policy accounting and information support system
Source: developed by the authors

To optimize the exchange of information in the implementation of depreciation policy, it was suggested to develop a conceptual framework.

At the same time, it solved the problem of setting a technical task for the development of a software product for the digitalization of the information exchange process and the formation of an array of data for the operational regulation of depreciation policy (see Figure 3).

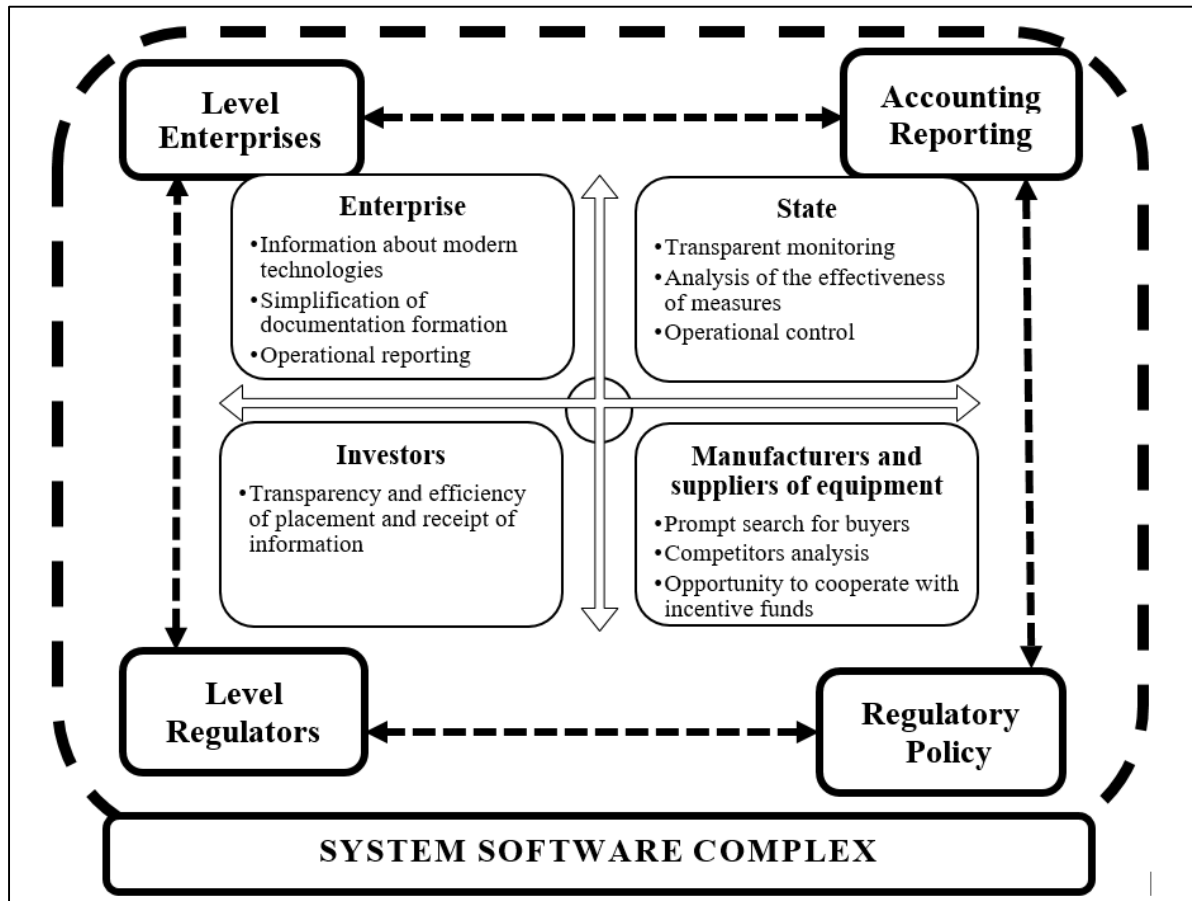


Figure 3: Conceptual framework for digitalization of depreciation policy
Source: developed by the authors

The developed conceptual framework of depreciation policy was tested in the regional project "Investment map of Melitopol", which was initiated by Melitopol City Council of Zaporizhia region in cooperation with NGOs and producers in the region to establish a systematic dialogue between government and business. The study of the economic background and information content was conducted with the assistance of the public organization "Innovation and socio-economic initiatives".

The result of this cooperation was a beta version of the interactive map of the region as part of the digitalization of depreciation policy. Such a software product was offered to companies and is currently being tested. For Ukraine, this form of interaction between state regulators and enterprises that are interested in technical re-equipment and ready for open cooperation is new. Discussion of such a concept is currently carried out in the methodological, technical and user areas.



5. CONCLUSIONS

The authors reviewed the literature on the digitalization of the economy and the implementation of depreciation policy. Different approaches to the principles of organization of interaction between the state and business entities allow us to make some assumptions related to the concept of digitalization of depreciation policy. First, depreciation policy cannot be separated from the general trends of digitalization of society. Second, depreciation policy at the macroeconomic level cannot be effective solely through the components of the depreciation methodology, such as depreciation methods, useful lives, asset values. A simplified understanding of depreciation policy as an accounting operation with a fixed algorithm is no longer relevant or effective.

The authors also described the trends of digitalization of the economy, creating a general structure for the disclosure of its interaction with.

Since the scientific problem is how to assess the effectiveness of depreciation policy and what impact on its formation have the processes of digitalization of the economy, the authors chose which indicators should be analyzed when assessing the effectiveness of depreciation policy. Performance evaluation indicators, which are most popular in various scientific studies, were presented.

As the selected indicators are not present in the standard statistical and financial reports of Ukrainian enterprises, the authors transferred them to the created questionnaire (questionnaire form). This form was used in the creation of the beta version of the software complex of the investment portal of the city of Melitopol, which has in its components exactly those instruments of depreciation policy that can be used in the scale of national digitalization of depreciation policy.

To set the technical task of such a complex, a conceptual framework of a single accounting and information space of depreciation policy has been developed. The technical task outlines the functionality of the software package, requirements for users and generators of information, terms, forms and methods of filling the information environment, organizational mechanisms of interaction of the participants of the proposed space.

The main conclusion of the research results is that in the information society the efficiency of economic processes increasingly depends not on the methodological tools, but on



the organization of data exchange. Operational analysis and feedback also play an important role in shaping an effective depreciation policy.

REFERENCES

Abdelkader, B., Sofiane, M., & Zaineb, S. (2018). Taxation Effect on Depreciation: Evidence from the Algerian Tax System. **European Journal of Business and Management**, 10(9), Available: <https://www.iiste.org/Journals/index.php/EJBM/article/view/41483>. DOI: 0.7176/EJBM.

American Petroleum Institute. Available: <https://www.api.org/news-policy-and-issues/natural-gas-solutions/what-is-natural-gas>. Access: 16 July 2020.

Angulo-Guerrero, M. J.-M.-G. (2017). How Economic Freedom Affects Opportunity and Necessity Entrepreneurship in the OECD Countries. **Journal of Business Research**, 73, 30–37. DOI: 10.1016/j.jbusres.2016.11.017.

Approved By The Order Of The Ministry Of Finance Of Ukraine Of April 27, No. 92. (2000). **Regulation (standard) of Accounting 7** «Fixed assets». Available at: <http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=z0288-00>. Access: 22 July 2020.

Arumägi, E., & Kalamees, T. (2020). Cost and Energy Reduction of a New nZEB Wooden Building. **Energies**, 13, 3570.

Auerbach, A. (2018). Measuring the Effects of Corporate Tax Cuts. **The Journal of Economic Perspectives**, 32(4), 97-120. Available at: www.jstor.org/stable/26513498. Access: 9 July 2020.

Bakos, Y., & Brynjolfsson, E. (1999). Bundling information goods: pricing, profits, and efficiency. **Management Science** 45(12), 1613-1630.

Bellido, J. M. & Romero, B. P. (2015). ESCO formation as enabling factor for smart cities development in European Union (UE).: Spain case analysis. **Independent Journal of Management & Production**, 6(4), 866-884. DOI: 10.14807/ijmp.v6i4.325.

Bernardo, H., & Oliveira, F. (2018). Estimation of Energy Savings Potential in Higher Education Buildings Supported by Energy Performance Benchmarking: A Case Study. **Environments**, 5, 85.

Besanko, D., & Winston, W. L. (1990). **Optimal price skimming by a monopolist facing rational consumers**. DOI: 10.1287/mnsc.36.5.555.

Bhatt, A. H., & Tao, L. (2020). Economic Perspectives of Biogas Production via Anaerobic Digestion. **Bioengineering**, 7, 74.

Bickauske, D., Simanaviciene, Z., Jakubavicius, A., Vilys, M. & Mykhalchyshyna, L. (2020). Analysis and Perspectives of the Level of Enterprises Digitalization (Lithuanian Manufacturing Sector Case). **Independent Journal of Management & Production**, 11(9), 2291-2307.

Board, S., & Skrzypacz, A. (2016). Revenue management with forward-looking buyers. **Journal of Political Economy**, 124(5), 1046-1087



- Bostic, R. W., Avery, B. R., Calem, S., & Canner, G. B. (1999). Trends in Home Purchase Lending: Consolidation and the Community Reinvestment Act. **The Board's Division of Research and Statistics**, 46-49.
- Bulow, J. I. (1982). Durable-goods monopolists. **Journal of Political Economy**, 90(2), 314-332
- Chang, Y., & Chen, J. (2011). A Consistent Estimate of Land Price, Structure Price, and Depreciation Factor. Available at SSRN: <https://ssrn.com/abstract=2296217> or DOI: 10.2139/ssrn.2296217),28.
- Chu, W., Chai, S., Chen, X., & Du, M. (2020). Does the Impact of Carbon Price Determinants Change with the Different Quantiles of Carbon Prices? Evidence from China ETS Pilots. **Sustainability**, 12, 5581.
- Coase, R. H. (1972). Durability and monopoly. **Journal of Law and Economics**, 15(1), 143-49.
- Cramton, P. C. (1984). Bargaining with incomplete information: an infinite-horizon model with two-sided uncertainty. **The Review of Economic Studies**, 54(2), 175-192.
- Cunningham, T. (2015). **Most moviegoers would pay 10-20 to watch new releases at home**. <https://www.thewrap.com/most-moviegoers-would-pay-10-20-to-watch-new-releases-at-home/>. Access: 02 October 2020.
- Dagiliūtė, R. (2008). **Analysis of Changes in Eco-efficiency of Production and Consumption in Lithuania during the 1990–2006 Year Period**. Ph.D. thesis. Kaunas: Vytauto Didžiojo Universitetas.
- Deforge, A. (2018). Art and photography within the blockchain. <https://medium.com/blockstreethq/digitalart-and-photography-within-the-blockchain-bb744c934260>. Access: 12 Nov 2019.
- European Commission**. Available at: <https://ec.europa.eu/eurostat>. Access: 10 July 2020.
- Figaj, R., Źołądek, M., & Goryl, W. (2020). Dynamic Simulation and Energy Economic Analysis of a Household Hybrid Ground-Solar-Wind System Using TRNSYS Software. **Energies**, 13, 3523.
- Franki, V. V. (2015). Energy Security, Policy and Technology in South East Europe: Presenting and Applying an Energy Security Index to Croatia. **Energy**, 90, 494-507 DOI: 10.1016/j.energy.2015.07.087
- Fraumeni, B. M. (1997). The Measurement of Depreciation in the U.S. National Income and Product Accounts. **Survey of Current Business**, 77(7), 7-23. Retrieved from: https://apps.bea.gov/scb/account_articles/national/0797fr/maintext.htm#fn3. Access: 10 September 2020.
- Galindo-Rueda, F., Appelt, S. & González-Cabral, A. (2018). Indicators of R&D Tax Support. **Issues in Science and Technology**, 34(4), 85-88. DOI: 10.2307/26597994
- Giriūnienė, G., Černius, G., Giriūnas, L. & Jakunskienė, E. (2019). Research on the Relation between Conceptions of the State's Economic and Financial Security: Theoretical Aspect. **Journal of Security and Sustainability Issues**, 8(4), 609-616.



Goldberg, A. V., Hartline, J. D. & Wright, A. (2001). Competitive auctions and digital goods. **Proceedings of the twelfth annual ACM-SIAM symposium on discrete algorithms, society for industrial and applied mathematics**, 735–744.

Goldfarb, A., & Tucker C. (2019). Digital economics. **Journal of Economic Literature**, 57(1), 3-43.

Gul, F., Sonnenschein, H. & Wilson, R. (1986). Foundations of dynamic monopoly and the coase conjecture. **Journal of Economic Theory**, 39(1), 155-190.

Heathcote, J. & Davis, M. (2003). Housing and the business cycle. **Board of Governors of the Federal Reserve System and Georgetown University USA**, Dept. of Economics, 22-33.

Hipp, L. (2016). Insecure times? Workers' Perceived Job and Labor Market Security in 23 OECD Countries. **Social Science Research** 60, 2, 1–14, Doi: 10.1016/j.ssresearch.2016.04.004.

Hörner, J. & Samuelson, L. (2011). Managing strategic buyers. **Journal of Political Economy**, 119(3), 379-425.

House, C. L. & Shapiro, M. D. (2008). House Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation. **The American Economic Review**, 98(3), 737-768.

Huang, K. W. & Sundararajan, A. (2011). Pricing digital goods: discontinuous costs and shared infrastructure. **Information Systems Research**, 22(4), 721-738.

Hulten, C. R. & Wykoff, F. C. (1981). The measurement of economic depreciation. **Depreciation, Inflation, and the Taxation of Income from Capital**, 81-125.

Jackson, S. B., Liu, X. K. & Cecchinia, M. (2009). Economic consequences of firms' depreciation method choice: Evidence from capital investments. **Journal of Accounting and Economics**, 48(1), 54-68.

Johnstone, C. P. (2013). A techno-Economic Analysis of Tidal Energy Technology. **Renewable Energy**, 49, 101–106.

<http://www.sciencedirect.com/science/article/pii/S0960148112000651>. Access: 12 September 2020.

Keating, A. S. & Zimmerman, J. L. (1999). Depreciation Policy Changes: Tax, Earnings Management, and Investment Opportunity Incentives. Available at SSRN: <https://ssrn.com/abstract=161526> or <http://dx.doi.org/10.2139/ssrn.161526>. Access: 12 September 2020.

Keatinga, S. A., & Zimmerman, J. L. (1999). Depreciation-policy changes: tax, earnings management, and investment opportunity incentives. **Journal of Accounting and Economics**, 28(3), 359-389.

Klenin, A. (2006). Before the impact of reform of state amortization policy in Ukraine in the reproduction of capital industry. **Journal of Economic Sciences of Ukraine**, 2, 109–112 (in Ukr.).

Lindholm, R. W., & Hogan, W. T. (1968). Depreciation Policies and Resultant Problems. **The Journal of Finance** 23(4), 710. DOI: 10.2307/2978959.



- Mas-Colell, A., Whinston, M. D. & Green, J. R. (1995). **Microeconomic theory**. Oxford University Press, New York.
- Mcafee, R. P. & Te Velde, V. (2006). Dynamic pricing in the airline industry. **Handbook on economics and information systems**. Elsevier, Amsterdam.
- Mcafee, R. P. & Wiseman, T. (2008). Capacity choice counters the coase conjecture. **The Review of Economic Studies**, 75(1), 317-332.
- Melton, M., Hudson, A. & Ladislaw, S. (2015). Report. **Center for Strategic and International Studies (CSIS)**. DOI: 10.2307/resrep23569.
- Menezes, F. M., Góes, M. F., Kalid, R. A., Tanimoto, A. H. & Andrade, J. C. (2017). Economic feasibility of an energy efficiency project for a steam distribution system in a chemical industry. **Independent Journal of Management & Production**, 8(4), 1381-1399. DOI: 10.14807/ijmp.v8i4.672.
- Morkūnas, M., Volkov, A., Bilan, Y. & Raišienė, A. G. (2018). The Role of Government in Forming Agricultural Policy: Economic Resilience Measuring Index Exploited. **Administratie Si Management Public**, 111-31.
- Presidential Decree No. 169/2001 of March 7, (2001). **About the concept of depreciation policy**. Available at: <http://zakon4.rada.gov.ua/laws/show/169/2001>.
- Rodrigues, P.C.C., & Semenyshena, N. (2019). Editorial Introduction. **Independent Journal of Management & Production**, 10(7), 911-914. DOI: <http://dx.doi.org/10.14807/ijmp.v10i7.775>.
- Rodrigues, P.C.C. & Semenyshena, N. (2020). Special Edition (Integration System of Education, Science and Production) Introduction. **Independent Journal of Management & Production**, 11(8), 801-806. DOI: <http://dx.doi.org/10.14807/ijmp.v10i7.775>.
- Rodrigues, P.C.Ch., Simanaviciene, Z. & Semenyshena, N. (2020). Editorial Volume 11, Issue 9. **Independent Journal of Management & Production**, 11(9), 2542-2547. DOI: <http://dx.doi.org/10.14807/ijmp.v11i9.1424>.
- Rudnichenko, Y., Dzhereliuk, I., Mykhalchyshyna, L., Savina S., Pokotylova, V., & Havlovska, N. (2020). Safe Interaction Management of State Institutions and Business Entities Based on the Concepts of Evolutionary Economics: Modeling and Scenario Forecasting of Processes. **TEM Journal. Technology, Education, Management, Informatics**, 2, 233-241.
- Sasson, B.-Y., & Lustgarten, S. (1994). Economic Depreciation, Accounting Depreciation, and Their Relation to Current Cost Accounting. **Journal of Accounting, Auditing and Finance**, 9(1), 41-60.
- Semenyshena, N., Sysiuk, S., Shevchuk, K., Petruk, I. & Benko, I. (2020). Institutionalism in Accounting: a Requirement of the Times or a Mechanism of Social Pressure? **Independent Journal of Management & Production**, 11(9), 2516-2541. DOI: <http://dx.doi.org/10.14807/ijmp.v11i9.1440>.
- Serebryansky, D. M. (2006). **Taxation of the profit of enterprises and its influence on investment activity in market conditions**. Dis. ... Candidate econ Sciences: special 08.04.01., 254 p.



Simanavičius, A., Subonyte, J., & Simanavičienė, Ž. (2019). Perception of Economic Security. **Visuomenės Saugumas Ir Viešoji Tvarka : Mokslinių Straipsnių Rinkinys**, (22), 158-71.

Sobel J., & Takahashi, I. (1983). A multistage model of bargaining. **The Review of Economic Studies**, 50(3), 411-426.

Sokolovskaya, A. M., Efimenko, T. I., & Lunina, I. O. (2006). **System of tax privileges in Ukraine in the context of European experience: monograph**. Kyiv: NDFI.

Stamm, G., Missaggia, A., Santos, B. M., Silveira, F., Rodrigues, P. C. C., & Molinar, F. (2019). Order of emergency orders in a company of distribution of electrical energy. **Independent Journal of Management & Production**, 10(4), 1250-1270.
DOI: 10.14807/ijmp.v10i4.968.

Wachs, M., & Kumagai, T. (1973). Physical Accessibility as a Social Indicator. **Socio-Economic Planning Sciences**, 7(5), 437-456.

Zhuk, V., Trachova, D., Semenysheva, N., Ionin, Y., & Zhuk, N. (2020). Problems of Amortization Methodology in Accounting Policy (on the Example of Institutional Sectors of the Ukrainian Economy). **Public Policy and Administration**, 19(4), 142–154. DOI: 10.13165/VPA-20-19-4-10.