IRIS - ALKONA
Institute of Researches and International Simposiums Alkona

Abstract Book

11th International Scientific Symposium "Economics, Business & Finance"

8th International Multidisciplinary Academic Conference (IMAC)

15 – 19 July 2025

JURMALA
LATVIA

ISSN 2500-9745 **ISSN 2592-866X**

11th International Scientific Symposium "Economics, Business & Finance"

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Time schedule of the conference
Preparation of the abstract and organization: April 2025 – November 2025
Conference: 15 - 19 July 2025

Conference website: http://irissymposium.wixsite.com/imac
Conference website: http://irissymposium.wixsite.com/economics

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Integrated Plenary Session

DIGITAL TRANSFORMATION OF SMES IN THE CONTEXT OF CYBERSECURITY

Dace Kadile
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It is evident that small and medium-sized enterprises (SMEs) are undergoing a perpetual process of adaptation to the digital environment. SMEs are increasingly making technological changes to their business in order to maintain competitiveness in the marketplace. However, the digital transformation of SMEs brings with it not only new opportunities but also new challenges, with cyber security being of particular importance. The objective of this study is to ascertain the most pertinent cybersecurity risks impacting SMEs during the process of digital transformation. The research is focused on three principal areas: firstly, legal analysis, secondly, literature review, and thirdly, sociological research. The results of the study indicate that the most significant cyber security risks are of an organisational, human and technological nature. The management of risk is predicated on the possession of the requisite skills to address threats, the integration of technological systems, and the utilisation of human resources that are endowed with the necessary expertise. A body of research in the field of sociology has indicated a tendency for human resources to be oriented towards continuous self-development, encompassing the cultivation of novel skills and competencies. The study concludes that SMEs are particularly vulnerable to cyber resilience. In addition, insufficient funding, human resources, and uncertainty about the interpretation of regulatory requirements in practice are among the main cybersecurity risks and threats for SMEs.

Keywords*:* cybersecurity, SMEs, economy, legal framework, risks.

Session 1
New Challenges in Economics: Digitalization and Green Economy

FORMATION OF AN INCLUSIVE ECONOMY IN THE CONTEXT OF DIGITALIZATION OF THE FINANCIAL MARKET

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At its core, an inclusive economy aims to create an economic system that benefits everyone and leaves no one behind. It goes beyond the traditional notion of GDP growth and focuses on improving the overall quality of life of all members of society. This perspective requires broadening the metrics used to assess economic success to include factors such as health, education, and social mobility.

One of the key components of developing an inclusive economy is called "financial inclusion" – providing people with the means to access, use and benefit from all financial services, such as bank accounts, credit, insurance, pension savings and investment products. McKinsey Global Institute's (MGI) estimates that to achieve approximate equality of opportunity for the world's population, additional resource growth from GDP would be needed at approximately 8 percent per year in the coming decades!

The MGI puts productivity growth at the heart of the solution. Globally, increasing productivity by about one percentage point a year, and upskilling 10 percent of the workforce to move into more productive sectors, could close up to two-thirds of the empowerment gap over the next decade. This upskilling depends on businesses creating more productive jobs and equipping workers with the skills to do them effectively (McKinssey&Company. 2024).

Our research in the field of labor productivity shows that despite the development of digital technologies and artificial intelligence, in the conditions of widespread slowdown in GDP growth, long-term inflationary processes, aggressive sanctions and customs policies, there is no possibility of sustainable growth in labor productivity (Baltgailis J., Simakhova A., Buka S. 2025). It seems that global structures see overcoming this slowdown in the universal introduction of digital currencies into the financial system, allowing state institutions, coupled with private digital giants, to take full control of transactions of the population and business, which, as stated: "Integrating economic inclusion into DEI (Diversity, Equity, and Inclusion) efforts enables broader societal changes that empower individuals and strengthen communities, ultimately contributing to a more just and resilient economy" (Oxford Review.2025).

In our opinion, the emerging system of economic blocs and countries, the contradictions between state institutions and private digital giants, the division of the financial sector into centralized and decentralized do not allow us to talk about the prospects for the formation of an inclusive economy in the near future.

Keywords: financial inclusion, productivity, GDP, digital giants, currency.

GREEN TRANSITION SUPPORT FOR LATVIAN COMPANIES FROM A REGULATORY PERSPECTIVE

Ilona Beizitere

Baiba Rivža

Latvia University of Life Sciences and Technologies

The European Green Deal (EGD) is a transformative strategy aimed at moving the EU economy towards climate neutrality and environmental sustainability. While the EGD provides a strategic vision and financial instruments to achieve green goals, its implementation poses significant challenges for businesses, including micro, small and medium-sized enterprises (SMEs).

The study examines the perceptions of Latvian entrepreneurs regarding the EGD's anticipated impact on business performance and the types of support required for successful adaptation. A mixed-methods approach was employed, comprising desk research on European Union (EU) and Latvian policy frameworks, as well as a survey conducted among existing and prospective entrepreneurs. Compared to other EU countries, Latvian SMEs exhibit lower levels of engagement with green practices, partly due to the fragmented implementation of policies and limited access to tailored support. Survey results indicate that entrepreneurs primarily associate the EGD with rising operational costs rather than competitiveness gains. Moreover, current financial instruments and state aid often fail to align with the real challenges faced by SMEs. Factor analysis revealed four principal dimensions shaping entrepreneurial attitudes: growth and expansion potential, cost management pressures, risks of decline, and uncertainty linked to regulatory ambiguity.

The study emphasizes the need for a more cohesive policy framework that integrates financial assistance, advisory services, and regulatory clarity. The findings offer practical recommendations for policymakers, financial institutions, and support agencies to ensure that the green transition becomes an inclusive and economically sustainable process for Latvian businesses.

CHALLENGES IN THE LATVIAN AGRICULTURAL SECTOR LABOR MARKET IN RELATION TO VOCATIONAL EDUCATION

Iveta Leitlante

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Latvia University of Life Sciences and Technologies, Latvia

Employers within the agricultural sector are confronted with an annual deficit of workforce availability. Vocational education programs aim to provide training for professions critical to the industry; however, issues such as skill shortages, extended training durations, and insufficient funding hinder the ability to attract young talent sustainably. This shortage of labor and skills is a common issue across numerous economic sectors within European Member States.

MACHINE LEARNING APPROACH IN DETERMINING FACTORS AFFECTING HUMAN WELLBEING

Nuray TEZCAN

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Sustainable development concept, which previously covered mostly environmental issues, has expanded over time to include economic and social issues. In this context, social, economic, and environmental dimensions are considered as components of the sustainable development, and it has been addressed that these dimensions should move together in the same direction as much as they can. Accordingly, countries focused on understanding which factors affect sustainable development and its dimensions.

Within this context, the aim of the research is to determine the factors affecting human wellbeing that is dimension of the sustainable development using machine learning (ML) approach. ML methods have been frequently used to determine the relationships between the variables or to make predictions recently. ML also investigates how computers can learn (or improve their performance) based on data and the goal of ML is to generalize a detectable pattern or to create an unknown rule from given examples.

In this study, high and upper-middle income countries were included to ensure homogeneity in the sample. After removing missing values and outliers, 81 countries were determined, and 1782 observations were analyzed for the period 2000 - 2021. Human wellbeing scores obtained from Sustainable Society Index released by TH Köln University were used as target variable while GDP per capita, total natural resources rents, land area, population density, population, urban population and governance were employed as explanatory variables. K-Nearest Neigbour (k-NN) regression, support vector machine (SVM) regression and random forest (RF) regression methods were conducted as machine learning methods.

According to the results obtained, it has been seen that governance, total natural resources rents and population density variables were determined as the three most important variables and random forest regression has the best performance score as method in explaining target variable human wellbeing.

Keywords: Human wellbeing, machine learning, sustainable society index, random forest regression.

MODEL OF OPTIMAL VACCINATION PLANNING DURING PANDEMICS

Mustafa Akan

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Vaccination and limiting the contact rate of the members of the population are the two methods to limit the human and economics losses. Both methods cost money. The objective of the governments is to minimize to total cost over a certain horizon with the requirement that at the end of the horizon number of infected persons will be minimized.

An optimal control technique is utilized to model the problem.

The result is that emphasis should be placed on limiting the contact rate of members of the population. Vaccination rate will depend on the impact of limiting the contact rate.

Session 2
New Challenges in Economics and Business: Digitalization and Technological Development

ISSN 2500-9745
11th International Scientific Symposium "Economics, Business & Finance" 15 – 19 July 2025
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DEVELOPING AN AUTOMATED STOCK ANALYSIS TOOL BASED ON BENJAMIN GRAHAM'S PRINCIPLES OF FUNDAMENTAL ANALYSIS USING WRDS FINANCIAL DATA

Jürgen Brunnhuber

Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany

In an increasingly data-driven financial environment, investors face the challenge of making well-founded investment decisions based on extensive and often unstructured corporate data. Benjamin Graham's fundamental analysis provides a proven methodology for identifying undervalued stocks, but it typically requires time-consuming manual evaluation of financial reports.

The aim of this thesis is to develop an automated analysis tool that extracts relevant financial statement data from the Wharton Research Data Services (WRDS) via an API, calculates fundamental key figures, and evaluates stocks according to the principles of Benjamin Graham. The focus lies on the systematic implementation of fundamental analysis for defensive investors. Essential metrics such as the price-to-earnings ratio (P/E), price-to-book ratio (P/B), and debt ratio are automatically calculated and interpreted.

The study follows an empirical-analytical approach with a quantitative research design. Following a comprehensive review of literature on fundamental analysis and WRDS, a Python-based program is developed to retrieve relevant financial data. Based on this, an algorithm is implemented to perform automated stock evaluations and generate investment recommendations. The tool's functionality is tested and evaluated using selected publicly traded companies.

The objective is to bridge the gap between traditional fundamental analysis and modern technological methods, providing investors with an efficient, objective, and data-driven foundation for decision-making.

GERMANY'S AUTOMOTIVE INDUSTRY AT THE CROSSROADS: HISTORICAL LESSONS FROM CHINA'S QING DYNASTY SELF-STRENGTHENING MOVEMENT AND JAPAN'S MEIJI RESTORATION

Hak Yeung

Shenzhen Technology University, China

Modern industrial transitions often mirror the challenges of historical modernisation efforts. The world-leading German automotive industry is one of the most important industries in Germany contributing to employment, income, tax generation and wealth of nation. However, the industry is at the crossroads, facing unprecedented challenges from the need to transition to low-emissions whilst facing intense competitions from Tesla and Chinese electric vehicle manufacturers. This paper adopts a historical comparative research approach, analysing the China's Self-Strengthening Movement of the Qing Dynasty (1861–1895) and Japan's Meiji Restoration (1868–1912). While the Qing Dynasty struggled to modernize in a fragmented political landscape, Japan's centralized leadership and comprehensive reforms positioned it as a global industrial power. To deepen the analysis, we incorporate a path dependency perspective, examining how prior decisions and institutional lock-ins influence the ability to implement transformative change. Drawing lessons from these contrasting experiences, we propose policies to guide the German automotive sector's EV transition.

ARTIFICIAL-INTELLIGENCE-DRIVEN DATA QUALITY ASSURANCE IN DIGITAL FINANCE: A SYSTEMATIC REVIEW

Daniel Mitrofanovs

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The purpose of this work is to chart and critically assess how artificial-intelligence (AI) and machine-learning (ML) techniques are currently deployed to monitor and improve data quality across digital-finance applications. To fulfil this aim, conducted a structured Scopus search spanning 23 January - 27 February 2025, combining three keyword blocks that captured data-quality concepts, digital financial services and AI/ML methods. From 1 238 initial records, multistage screening and snowballing yielded a final corpus of 133 peer-reviewed studies, which was examined by means of content coding and bibliometric analysis. The review reveals four dominant research streams: anomaly and outlier detection using autoencoders, Isolation Forest and graph embeddings; missing-value imputation together with reconstruction of count variables; automated cleansing and deduplication of high-frequency transaction flows; and hybrid rule-based–deep-learning pipelines that merge domain heuristics with neural ensembles. Despite rapid methodological progress, three stubborn challenges persist: the lack of openly shareable, labelled financial benchmarks; scarce evidence on the economic impact: total cost of ownership and return on data-quality investment deployed solutions; and limited model explainability, which slows regulatory adoption. Taking together, these insights motivate a future research agenda centred on open, industry-grade datasets, cost-sensitive evaluation metrics and explainable-AI modules that can foster trust among regulators and practitioners alike.

Keywords: Artificial Intelligence, Data Quality, Digital Finance, Anomaly Detection

USING AI-POWERED CHATBOTS FOR TRANSFORMING CUSTOMER SERVICE IN E-COMMERCE: SYSTEMATIC LITERATURE REVIEW

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This study addresses how Artificial Intelligence (AI)-powered chatbots are revolutionizing customer service in the e-commerce sector, promising to improve customer satisfaction, engagement, and business productivity. Based on the systematic literature review of the peer-reviewed literature that is published between 2021 and 2024, the article reviews the essential factors influencing the chatbots effectiveness, including trust, anthropomorphic design, and personalized communication. PRISMA-directed methodology is used to select five high-quality studies and analyzed using common themes. The results demonstrate that chatbots are an essential part of providing instant, emotionally intelligent, data-driven service experiences. In particular, it provides better access, a high level of personalization, and business performance. Nevertheless, the limitations of the study also include erosion of trust due to generic answers, the inability to work with complicated queries, and the continuation of privacy issues. The research ends with a statement that hybrid human-AI service models are necessary, and that future longitudinal and cross-industry studies should thus be realized to evaluate the long-term effects. The insights would help improve the prospects of the sustainable transformation of customer engagement strategies under AI in e-commerce.

Keywords: E-commerce, customer service, AI chatbots, personalization, digital transformation, hybrid service models

DIRECT INVESTMENTS FROM THE UNITED ARAB EMIRATES IN LATVIA: STRUCTURAL ANALYSIS

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Analysis of foreign direct investments (FDI) gets extremely topical under growing geopolitical risks and restructuring of economies for emerging new era. Latvia is a rare example of recipient of FDI that enjoyed inflows five years running contrasted to dramatic recent falls of global FDI. Of 135 countries of origin of FDI in Latvia, the United Arab Emirates made significant progress raising from 39th rank to the 22nd in 5 years by volume that increased 118,6 times from November 2019 to May 2025. The aim of research is to analyse the structure of DI from UAE to propose measures for progress of the industries transforming Latvia into modern digital economy. Set of qualitative and quantitative research methods includes pioneering use of NACE codes in longitudinal analysis.

Background: Latvia as an open market economy in the European Union (EU) and Eurozone is a destination for Foreign Direct Investments (FDI). Since restoration of the statehood in 1991 amidst collapse of the Soviet Union the total volume of FDI from 135 countries of origin in Latvia has overcome 12 billion euro and affects 516 industries defined by NACE (Nomenclature des Activités Économiques dans la Communauté Européenne) as a classification of economic activities in the European Union.

DI from United Arab Emirates (UAE) is a non-EU and retarded one. The first DI from UAE came in Latvia in 1990 and was followed by rare new inflows for almost two decades. Meanwhile, spectacular rise of the UAE as a global economic player occurred. And in 2019, noticeable inflows of DI from the UAE started to accumulate in Latvia. The rise of the UAE DI rating from 44th to the 22nd in Latvia in 2025 is unique. Structurally, a variety of NACE industries are covered. However, no research accompanied this process.
Aim of this research is to investigate the structure of DI from UAE in Latvia and propose directions of its perfection in view of the green and digital era.

The tasks to be solved include review of literature, own research design, collection of secondary and mining of primary data, doing research and discussing its results, formulating conclusions and recommendations.
The object of research is the DI from the UAE in Latvia.
The subject of research is the structure of accumulated DI from the UAE in Latvia measured by hierarchical classification NACE common for the EU.

Hypothesis: structure of DI inflows of DI from the UAE can trigger progress mainstreaming to the green and digital era.

Research methodology unites qualitative and quantitative analysis. The qualitative methods are represented by literature review, personal observations, case study, analysis of websites, and interviews. The quantitative methods are time-series and structural analysis of the accumulated DI from the UAE in Latvia. Longitudinal analysis of DI from the UAE in Latvia structural change is a pioneering step in research. The latest version of NACE (Rev. 2.1), to be used for European statistics from 2025 onwards is implemented. The methodology of structural analysis by the author sets the direction for further FDI research.

DISRUPTIVE BRANDS – NEW CHALLENGES IN A DIGITAL ERA

Martin Koers

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German Association of the Automotive Industry (VDA)

Brands play an important role in the consumer decision-making process. Undoubtedly, the success of the German automotive industry is to a large part based on the high global popularity of its premium brands. Therefore, it is not for nothing, that branding is a key topic for the long-term success of many established companies with a strong history. However, the digital revolution is currently bringing many new players to the market in many sectors, such as the automotive industry. With disruptive technologies, they don't need 100 years of brand history to be successful. In contrast, we see young companies that are growing so fast that in a few years they might not only dominate markets but create entirely new markets.

When Apple introduced the iPhone in 2007, the Finnish mobile phone giant Nokia had (according to the understanding at the time) a global smartphone market share of more than 50 percent. People joked about the iPhone's non-replaceable battery and the “greasy finger wiping” on the glass surface without buttons. Today we know: Apple is one of the most valuable companies in the world, and Nokia no longer plays a role in the smartphone world.

This so called “Nokia moment” - a sleeping giant being overtaken by a newcomer on the market thanks to disruptive technology - is now threatening established manufacturers also in the car industry. This article analysis the new and changing “brand scenery” in the car industry and explores what defines disruptive brands and how they differ from established brands.

How can established manufacturers respond to these disruptive brands? And can established brands even be disruptive themselves?

Keywords: brands, branding, identity, disruption, transformation, innovation

Session 3
Economics & Business / Finances & Law / Modern Technology / Multidisciplinary issues (I)

BENCHMARKING ISOLATION FOREST, ONE-CLASS SVM AND AUTOENCODERS FOR DETECTING CORRUPTED LOAN RECORDS

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This study sets out to compare the effectiveness of three unsupervised anomaly detectors: Isolation Forest (IF), One-Class Support Vector Machine (OC-SVM) and deep Autoencoders in identifying corrupted observations within retail-loan data. To mimic operational noise, we intentionally injected logical contradictions, negative values and invalid categorical codes into a public Kaggle dataset, then tuned each model via grid search and evaluated accuracy, recall, precision, F1-score, and run-time on a 12th-Gen Intel® Core™ i9-12900H laptop running Python 3.12, Scikit-learn 1.4.2 and TensorFlow 2.16.1. The experiments demonstrate that IF achieves perfect recall (1.00) and the highest overall accuracy (0.91) but trades off precision (0.50). OC-SVM delivers balanced yet moderate performance (recall 0.51; precision 0.34). The Autoencoder lags markedly (recall 0.09; precision 0.02) while demanding the longest training time. These results suggest that IF is well suited to scenarios where missing corrupted records is unacceptable, whereas OC-SVM may suffice when false positives must be minimised. Deep Autoencoders appear to require richer feature engineering or more extensive tuning before they become competitive. By providing a fully reproducible benchmark and linking model choice to operational trade-offs, the paper offers practical guidance for anomaly-detector deployment in credit analytics.

Keywords: Isolation Forest, One-Class SVM, Autoencoder, Corrupted Data Detection

AI AND FACILITY MANAGEMENT: APPLICATION AREAS AND POTENTIAL IMPACT

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Over the last decade, the awareness of Artificial Intelligence (AI) as a seemingly limitless fountain of technological advance and indescribable potential has risen in economic research and business. While its usage is getting increasingly sophisticated among various industries, the concrete application of AI in facility management (FM) remains relatively unclear. As this holistic technology consortium is getting more and more into focus of corporate real estate (CRE) and FM research, the purpose of this study is to examine the main fields of practical application in FM. Furthermore, it strives to explore the operational impact of AI on FM as an economic discipline as well as to determine the significance of single areas of application.

The questions of research are therefore what potential usages this auspicious technology offers for FM and how these respective influences can be quantified. To answer this, a comprehensive literature analysis is conducted. By focusing on current CRE and FM literature, also existing information systems (IS) research is taken into consideration to enrich the discoveries of the built environment and asset management with digital technology insights. This implies also two case studies concerning the operation of a sports facility and a public education facility and their use cases of targeted AI utilization. Furthermore, a survey among 121 companies is conducted with detailed focus on the application areas examined in the preceding step of the research. The questioned companies were chosen by their public listing in the German CDAX index, being part of this index between the years 2013 and 2024.

The electronically shared questionnaire was derived on the identified application fields and created on the basis of a 5-point Likert scale offering opportunities of statistical analysis of ordinal data. In addition to several descriptive findings, the overall impact of AI was finally measured numerically and put in relation to the single measured impact on the application fields applying a Spearman's rank correlation coefficient. As a result, an explicit usage can be identified in the fields of predictive maintenance, failure avoidance, decreasing operating costs, maximizing asset utilization, energy management, heating management, decision making, data analysis and building information modeling (BIM).

While all application fields show a significant influence of and enabling by AI, specifically failure avoidance, the decreasing of operating costs and the maximizing of asset utilization correlate especially strongly with AI. This implies that AI already shows a strong appearance in companies with professionally operated FM and that the impact of AI is already noticeable. Future research should verify these findings by in-depth case studies of FM providers and numerical quantitative evaluations allowing more possibilities for statistical assessment.

THE FRAGILITY OF MENTAL HEALTH IN THE WORKPLACE: THE PREVALENCE OF PSYCHIATRIC DISORDERS AND THEIR RELATION TO ORGANIZATIONAL CULTURE

Lāsma Jaudzema

Irēna Kokina

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Mental health in the workplace is becoming one of the most important aspects of occupational safety and employee well-being in the 21st century. Increasing work pace, long working hours, and job insecurity contribute to anxiety, depression, burnout, and reduced productivity.

The World Health Organization (WHO) and the International Labour Organization (ILO) recognize that the work environment is a significant factor influencing mental health — it can be both protective and harmful. The growing prevalence of mental health disorders, especially depression, anxiety, and burnout, has become a global priority in occupational safety and public health.
WHO's 2022 report highlights that while work can provide meaning, stability, and income, it can also be a source of long-term stress, insecurity, and overload if supportive organizational culture and policies are lacking.

Global data show a rising proportion of psychiatric disorders among the working-age population — depression and anxiety are leading causes of work disability worldwide, and it is projected that by 2030, depression will be the leading cause of disability. Furthermore, burnout syndrome — strongly linked to the work environment — has been included as an occupational risk condition in WHO's International Classification of Diseases (ICD-11), underlining the close connection between mental health and organizational structure, leadership, and workload.

A particularly problematic issue is the fragility of mental health in the workplace, which manifests as a reduced ability to cope with psychological demands, recover from stress, or seek support. This fragility is further intensified by insufficient managerial support, non-transparent organizational systems, and high work intensity. A growing body of evidence shows that mental health problems are not only individual issues but also structural problems within organizations, developing as a result of prolonged stress, unjust work relationships, and cultural deficiencies. (World Health Organization, 2022; Monteiro & Joseph, 2023; Pūras, 2022; OECD, 2021).

In Latvia, available research on mental health issues in the workplace is limited. Existing data are primarily derived from studies initiated by the Centre for Disease Prevention and Control (SPKC), which mainly focus on the psychological well-being of children, adolescents, and youth within the educational environment. As a result, there is a lack of systematic data on the mental health status of working-age adults within organizational settings.

In Latvia, approximately 16% of the working-age population suffer from some form of mental disorder, most commonly depression, anxiety, and excessive alcohol use. Studies show that only about one-third of these individuals receive any professional help, and even fewer receive adequate treatment. The fragility of mental health in Latvia is exacerbated by limited access to services, societal stigma, and a weak prevention culture in the workplace. These indicators have created a "snowball effect" and emphasize the urgent need to develop a psychosocially safe and supportive work environment, especially in organizations with high emotional demands. (Slimību profilakses un kontroles centrs, 2023; Dudina & Martiņsone, 2024; World Health Organization, 2022).
Therefore, integrating mental health into strategic organizational management is no longer a choice but a necessity — from both a human resource and economic perspective. Organizations that ignore employee mental health risk not only productivity loss and high turnover but also reputational damage and legal consequences.

Aim of the article: To investigate the prevalence of psychiatric disorders among employees in organizations, to analyze statistical trends of these disorders in Latvia, Europe, and worldwide, and to explore the potential relationship between the specifics of organizational culture and employee mental health.

Keywords: mental health, work environment, organizational culture, burnout.

MEASURING HUMAN CAPITAL IN LATVIA: A QUANTITATIVE APPROACH

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The significance of human capital as a driver of economic growth has been acknowledged for centuries, resulting in the development of various methods for its quantitative assessment, each offering a unique insight into the contribution of human capital to a country's economic performance. These methods give an opportunity to evaluate the quality of human resources in a country.

The study reviews several widely accepted quantitative human capital assessment methods, including the human capital indicator and index by the World Bank, the human capital indicator by the United Nations Environment Programme and Urban Institute of Kyushu University, the human capital index by the Institute of Health Metrics and Evaluation, the human development index by the United Nations Development Programme and the global human capital index by the World Economic Forum. The results indicate that Latvia maintains a relatively stable position across the assessment methods. However, some of the methods rely on outdated information or emphasize a single indicator related to human capital, limiting their ability to provide timely and comprehensive insights about the human capital in the country. To address these limitations, this study proposes a new human capital index for Latvia that can be updated annually and integrates several human capital related indicators.

The results of the new human capital index show that, although Latvia has made a significant progress in the development of human capital over the years, it has still achieved just over two-thirds of its human capital potential.

In future research, the new index can be further refined and used as a tool for evidence-based policymaking aimed at developing human capital.

Keywords: human capital, quantitative approach, economic growth, Latvia.

THE NUANCES OF ORTHOGONALIZATION: CHOLESKY, SQRTM, AND THEIR IMPLICATIONS FOR SPILLOVER INDEX MEASUREMENT

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In the context of the Diebold and Yilmaz Spillover Index framework, this study examines the essential distinctions between orthogonalization techniques based on Cholesky and Square Root Matrix (SQRTM). The goal of this study is to give a methodological understanding of how these orthogonalization techniques are applied. The study methodically adjusted the variance-covariance matrix path to accomplish this. The author's findings reveal that neither orthogonalization method consistently serves as a lower or upper boundary for the other for two- and three-variable systems. Rather, the covariances of the variable shocks determine the relative magnitudes of the indices based on SQRTM and Cholesky. In particular, the Cholesky-based Spillover Index tends to overestimate the true connectedness levels when shock covariances rise, indicating more persistent shocks. This study's restriction to cases with up to three variables is a noteworthy limitation. Expanding to higher variable numbers would require substantially more computational resources because of the exponential increase in Cholesky-orderings. A promising direction for further research is highlighted by this computational challenge.

Keywords: spillover index, Cholesky orthogonalization, square root matrix, connectedness

Session 4
Economics & Business / Finances & Law / Modern Technology / Multidisciplinary issues (II)

THE EXPERIENCE ECONOMY AS A PREREQUISITE FOR THE DEVELOPMENT OF CROSS-BORDER MARKETING IN A TURBULENT BUSINESS ENVIRONMENT

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This paper presents a generalized methodology developed by the author for identifying optimal innovative marketing strategies in the context of a turbulent business environment

Keywords: turbulent business enviroment, experience ekonomy, matrix methods, cross-market marketing strategies, Octopus method, criteria for innovative marketing strategies.

DIGITAL TRANSFORMATION AND POVERTY ALLEVIATION PROSPECTS IN GEORGIA'S ONGOING GLOBALIZATION AND EUROPEAN INTEGRATION PROCESS

Murman Tsartsidze

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For the country's economic development goals, overcoming the problem of poverty is of particular importance. It is unfortunate that even in the conditions of ongoing globalization, digital transformation of the economy, and European integration, the existence of mass, chronic unemployment and poverty in Georgia still represents the most acute, global macroeconomic problem and challenge. Moreover, it is recognized as a major factor hindering economic development. Despite this, that in country recent yers has made some positive changes in terms of economic development, it has not been possible to significantly reduce the unemployment and poverty levels. According to this it is natural that, at the current stage of the functioning of the labor market, it will be very important to develop a system of macroeconomic policy measures focused on overcoming poverty in order to improve the quality of working life of the population and raise the standard of living in general. Successful realization of the latter will be impossible without the formation of a modern civilized market environment and its corresponding infrastructure.

The purpose of the work is - Identifying the main factors affecting unemployment and poverty, taking into account the current events, changes, trends, and development characteristics in the country's economy and especially in the labor market, which occur as a result of the use of modern digital work platforms and the development of a system of measures to overcome them. To achieve this goal, the primary task is to ensure decent, effective employment for the country's population, with special attention paid to working conditions, protection, safety, and decent, adequate remuneration.
In the paper is used quantitative and qualitative analysis methods, in particular economic and mathematical-statistical analysis methods.

Key words: digital transformation, poverty, living standards, labor market, effective employment, globalization, economic growth, development.

STRUCTURAL CHALLENGES AND EMPLOYMENT DYNAMICS: TOWARDS INCLUSIVE LABOUR MARKET DEVELOPMENT

Nino Mikiashvili

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Small open economies such as Georgia face persistent labor market challenges that hinder inclusive economic development. This paper examines the structural factors influencing employment trends in Georgia, including demographic ageing, labor out-migration, regional inequality, and rates of informal employment. These issues intersect with broader social policy concerns, particularly in terms of access to quality employment, labor mobility, and human capital development.

The study adopts a mixed-methods approach, incorporating analysis, synthesis, and comparison, as well as correlation and regression techniques using national labor force and employment data. The research identifies critical barriers to employment growth, including a mismatch between labor market demand and the qualifications of job seekers, as well as limited labor absorption capacity in high-productivity sectors.

Findings show that structural unemployment remains high despite economic growth, while vulnerable groups—particularly youth, women, and rural populations—face disadvantages. Informal employment continues to dominate, especially in agriculture and low-skill services. Statistical analysis reveals a strong correlation between higher education and access to formal employment, highlighting the need for better alignment between education systems and labor market requirements.

The paper concludes with policy recommendations aimed at improving employment quality, supporting regional labor markets, and strengthening labor market institutions. Emphasis is placed on integrating employment policy with broader social and economic development strategies to ensure sustainable and inclusive labor market outcomes in Georgia.

Keywords: Labor market, employment policy, human capital, labor economics, regional disparities

CONCLUSIVE ACTIONS IN LABOUR LAW (ISSUES AND PRACTICE)

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Cooperation between employers and other labour market participants often depends not only on words but is sometimes expressed through behaviour or silence.

The article examines the types of conclusive actions, their legal basis, and the specific features of their practical application in the organization of labour relations.

A conclusive action is the action that is associated with an unspoken willingness to conclude, continue, change or terminate a contract. Conclusive actions are recognized and used in many countries, with their application varying depending on local legal systems, judicial practices, and traditions.

They constitute a significant element of labour relations and provide a flexible mechanism for the conclusion, interpretation, and execution of employment contracts.

The use of conclusive actions helps employers manage the work process more effectively; however, misinterpretation of such actions may lead to employer errors, non-compliance with employment contracts, and economic losses.

Keywords: conclusive actions, legal basis, non-verbal communication, labour relations, employment contract

EMPLOYMENT CHANGE TRENDS IN GEORGIA IN THE CONTEXT OF DIGITAL TRANSFORMATION OF THE ECONOMY AND ONGOING EUROPEAN INTEGRATION

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In the context of ongoing globalization and digital transformation of the economy, when the European integration process is intensively underway in the country, ensuring decent and effective employment of the economically active population is of paramount importance for economic development and improving the quality of working life. This one is one of the global socio-economic problems and represents a very serious challenge for the country. Unemployment in Georgia is recognized as the main factor causing poverty, which seriously hinders the development of the country's labor potential and economic progress. In such circumstances, it becomes even more urgent to considerate recommendations of the International Labor Organization to realize the concept of decent work in the country. So that, given the current reality on the labor market, the most essential importance should be given to decent, highly productive, and efficient employment, especially in today digital transformation of the economy.

According to the above, in the paper is presented a detailed analysis of the current situation in the employment sector, as well as ongoing sectoral and structural changes. In particular, the employment structure is studied by types of economic activity and regions, and by job positions held. According to research is identified the main sectors in which particularly high economic activity is expected in the coming years, which in turn is one of the necessary prerequisites for employment growth in these sectors. Based on the research results, in the paper is formulated key conclusions and recommendations that should ensure the development of the labor market and effective employment in the near future, improve the quality of working life, and ultimately raise the standard of living of the population.
In the paper is used quantitative and qualitative analysis methods. Especially economic and mathematical-statistical analysis methods.

Key words: decent, effective employment, unemployment, labor market, employment structure, digital transformation, economic development, Georgia.

A HOLISTIC UNDERSTANDING OF MANAGED SYSTEMS, OPERATING PRINCIPLES, DETERMINANTS AND CHANGE TRENDS AS A PREREQUISITE FOR THE DEVELOPMENT OF FLEXIBLE THINKING IN A MODERN LEADER

HOLISTISKA IZPRATNE PAR PĀRVALDĪTAJĀM SISTĒMĀM, DARBĪBAS PRINCIPIEM, NOTEICOŠIEM FAKTORIEM UN PĀRMAIŅU TENDENCĒM KĀ PRIEKŠNOTEIKUMS MŪSDIENĪGA VADĪTĀJA ELASTĪGAS DOMĀŠANAS ATTĪSTĪBAI

Anna Dembovskaya

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Raksts ir veltīts domāšanas paradigmas nozīmes un tās mainīguma rakstura izpētei pasaules uztveršanas koncepcijas evolūcijas gaitā. Uzsvērts, ka, tai evolucionējot, klasisks pasaules skatījums vairs nespēj ņemt vērā mūsdienas pasaules izaicinājumus, tāpēc, lai veiksmīgi attīstītos vajadzīgi jauni uzvedības modeļi un pieejas, kas piepildīti ar jaunu konceptuālo saturu un nozīmi (Haddad, 2017; Perekrestova, 2021). Rodas izpratne par to, ka panākumus sasniedz ne tie, kuri atzīst jaunu pasaules uztveršanas koncepciju, bet tie, kuri spēj mainīt savu redzējumu un apgūt jaunas zināšanas un kompetences. Rakstā īpaša uzmanība akcentēta mūsdienu vadītāja fundamentālajām zināšanām, uz kurām balstās gan konceptuālā, gan sistēmiskā domāšana, gan spēja elastīgi reaģēt uz vides izaicinājumiem. Bez šīm zināšanām nav iespējama nedz jēgpilna ideju strukturēšana, nedz sistēmu analīze un to izpratne (Jasim, 2019; Rahman, 2019).

Fundamentālās zināšanas un spēja domāt sistēmiski apvienojumā ar vairākām elastīgo domāšanu veicinošām pieejām (Turner et al., 2020) pārveido vadītāja redzējumu, maina domāšanas veidu un reakciju, veicina proaktīvu uzvedību un sekmē efektīvu un videi atbilstīgu vadības lēmumu pieņemšanu (Bell, Wechsler, 2015). Tāds vadītājs spēj mūsdienīgi paskatīties uz organizācijā notiekošiem procesiem, akcentējot uzmanību uz visiem elementiem un faktoriem, ko tie veido. Tāds vadītājs ir spējīgs aptvert kontekstu, viņš kļūst fleksibls un spējīgs izmantot piemērotākās rīcības alternatīvas.

Raksta mērķis ir izpētīt fundamentālo zināšanu nozīmi vadītāja mūsdienu domāšanas veidošanā, ņemot vērā vides nepastāvības un sarežģītības kontekstu.

IMPLEMENTATION OF INNOVATIVE TECHNOLOGIES AS A KEY FACTOR IN INCREASING THE COMPETITIVENESS OF FOREIGN ENTERPRISES

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In the context of rapid technological progress, companies need to adapt to new market realities and ensure a sustainable competitive advantage. This paper examines the introduction of innovative technologies as a key factor in increasing the competitiveness of foreign companies, using the example of NFC Kazakhstan LLP. The factors influencing the company's market positioning are analyzed, and areas that can strengthen its competitive advantages are identified. The proposed technological solutions are focused on digital transformation, process automation, and improving project management efficiency.

The results of the study confirm the relevance of integrating modern technologies into the activities of industrial enterprises striving for leadership at the national and international levels.

Session 5
Challenges in Economics and Finances & Digital Society (I)

GLOBAL UNCERTAINTY AND SUSTAINABLE COMPETITIVENESS OF SMALL COUNTRIES

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This study provides a systems analysis of the contemporary challenges accompanying the process of integration into the European Union, which are exacerbated by the increasingly confrontational nature of globalization and increased global uncertainty. Particular attention is paid to small countries as the most vulnerable players in the context of a transforming international order. The importance of increasing the competitiveness of national socio-economic systems as a key factor in adapting to the new realities of integration is emphasized, and the specific requirements for the sustainability and flexibility of these systems are determined.

The results of the study indicate that in the context of exponential growth of global uncertainty, the task of ensuring sustainable competitiveness is becoming strategically critical, especially for small states on the path of European integration. In particular, it is emphasized that in order for Georgia to achieve a sustainable competitive advantage in the international arena, it is necessary to transform the economic model in order to increase its sustainability, which implies a focus on inclusive economic growth, the development of intellectual capital, and increasing the efficiency of resource use.

Keywords: global uncertainty, global sustainable competitiveness, small EU candidate countries

METHODS OF ASSESSING FINANCIAL TRANSPARENCY IN THE CONTEXT OF THE DIGITAL TRANSFORMATION OF COMPANIES

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In the context of digital transformation, financial transparency is becoming a priority for regulators, investors, and companies themselves. This article provides a comprehensive overview of digital and quantitative methods used to assess the integrity and reliability of financial statements. Particular attention is paid to the XBRL (eXtensible Business Reporting Language) format as a standardized and machine-readable tool that improves the availability, comparability and accountability of corporate data. Quantitative methods such as Benford's Law and the Beneish M-Score model are also discussed, which remain relevant for identifying numerical anomalies and earnings manipulation in a digital reporting environment. The overview highlights the growing role of artificial intelligence (AI) and machine learning (ML) in real-time fraud detection, continuous auditing and anomaly recognition tasks. The article demonstrates how the integration of traditional statistical models with modern digital technologies creates a more reliable and dynamic system for ensuring financial transparency in the modern corporate environment.

ADVANCING SUSTAINABLE DEVELOPMENT OF THE ASIA-PACIFIC REGION THROUGH HIGHER EDUCATION IN THE DIGITAL TRANSFORMATION CONTEXT

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The Asia-Pacific region, characterized by rapid economic growth, urbanization, and population expansion, is facing severe environmental challenges including air and water pollution, biodiversity loss, land degradation, and water scarcity. These pressures threaten the long-term sustainability of ecosystems and communities across the region. In response, there is a growing consensus that higher education institutions (HEIs) must play a central role in driving sustainable development.

This research critically examines the strategic roles of HEIs in promoting sustainability in the Asia-Pacific region, particularly within the context of accelerating digital transformation of the area. It explores how HEIs can leverage digital technologies and platforms to enhance their contributions to addressing environmental degradation through education, research, innovation, and community engagement. Sustainability policies can only work if they are made and applied through the collaboration of governments, businesses, and civil society. Through universities, students are given chances to learn about sustainability, green innovations, environmental studies, and grow into responsible citizens for nature.

The paper stresses that universities should work towards the United Nations Sustainable Development Goals (SDGs), mainly by introducing green campuses, sustainable ways of purchasing, and policies that help conserve resources and prioritize social responsibility. It should also be mentioned that more dialogue and cooperation between different parties are needed, so HEIs should be actively involved with local communities, authorities, and businesses. Leveraging their research and knowledge sharing, universities would help create policies and new ideas for handling environmental difficulties.

The research also considers how digital tools and data-driven insights can optimize resource management, promote sustainable practices, and foster greater regional collaboration towards a more environmentally resilient and digitally empowered Asia-Pacific region.

SOCIAL-ECONOMIC EFFECTS OF GLOBAL INCOME INEQUALITY

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Global income inequality has emerged as a persistent and pressing issue, presenting complex economic, political, and social challenges in both developed and developing countries. This paper investigates the multifaceted nature of income inequality by synthesizing theoretical frameworks, analyzing empirical trends, and examining the influence of key macroeconomic variables. The analysis draws on foundational theories, including Kuznets' hypothesis on the evolution of inequality during industrialization and Piketty's theory of capital accumulation, to provide a comprehensive understanding of the underlying causes of modern income disparities. It further explores how income redistribution policies—such as progressive taxation and public social expenditure—are shaped by institutional contexts and governance quality across different nations. The study also assesses the dual impact of globalization and technological advancement, which, while driving economic growth in some regions, have simultaneously contributed to labor displacement and wage polarization in others. In addition, the paper includes an econometric analysis to empirically evaluate the relationships between income inequality and selected macroeconomic variables. This quantitative approach provides further insights into the structural determinants of inequality and enhances the robustness of the study's findings. Emphasizing the urgent need for a coordinated global response, the paper advocates for policies that promote fair taxation, enhanced financial transparency, inclusive economic institutions, and increased investment in health and education. It offers actionable recommendations for policymakers aiming to address the root causes of inequality and foster more equitable and sustainable economic growth.

Ultimately, this research contributes to the global discourse on reducing income inequality in alignment with the United Nations Sustainable Development Goals (SDGs).

FACTORS INFLUENCING THE DEVELOPMENT OF FINTECH COMPANIES BASED ON THE EXAMPLE OF THE BALTIC STATES

Aina Čaplinska

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The global FinTech sector is experiencing rapid growth, driven by advancements in information technology that enhance the accessibility and efficiency of financial services. Since 2019, the number of FinTech companies worldwide has more than doubled. In Latvia, FinTech firms constitute a quarter of all startups, including some of the fastest-growing and most successful FinTech companies in Europe. Financial sector enterprises in Latvia are implementing and utilizing innovations that improve customer experience and offer modern, convenient services. The integration of technology in the financial industry is not only necessary but also inevitable to optimize financial processes and provide innovative products and services. This integration highlights the essential role of technology and innovation in economic development, as these elements are fundamental to enhancing productivity and creating new economic opportunities. This article's theme was selected to understand the factors influencing the growth of FinTech companies and the appeal of the country as a host for foreign financial technology firms. The objective of this study is to examine and analyze the development of the FinTech sector in Latvia, in comparison with other Baltic nations. To achieve this objective, the following tasks have been set: to investigate and assess the dynamics of FinTech development in Latvia as compared to developments in the Baltic states, identify key trends and challenges, and draw conclusions. To ensure the competitiveness and sustainable development of Latvia's FinTech sector, it is essential to continue evolving and refining the regulatory environment, with a particular focus on the integration of new technologies and international collaboration. Significant investment in digital infrastructure and ICT education is crucial for enhancing local technological capacity and competitiveness. To mitigate investment volatility, policies and instruments must be developed to ensure stability and attractiveness to investors, such as tax incentives and risk mitigation mechanisms.

Keywords: financial technology, banking, startups, entrepreneurship.

SUSTAINABLE DEVELOPMENT AS A STRATEGIC COMPONENT OF SME OPERATIONS – AN ANALYSIS OF IMPLEMENTATION BARRIERS AND DRIVERS IN THE ESG CONTEXT

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This article presents the results of a study on the perception, implementation, and financial determinants of sustainable development in small and medium-sized enterprises (SMEs), with particular emphasis on the growing importance of ESG factors (Environmental, Social, Governance) in shaping and executing business strategies. The analysis is based on data collected through a survey conducted among representatives of Polish SMEs across various industries in December 2024.

The main objective of the article is to identify key barriers to the implementation of sustainable development principles (including lack of practical knowledge, limited capital, and high transformation costs) and to determine the drivers that can accelerate the integration of ESG goals into long-term corporate strategies. The study specifically examines the role of financial support instruments, business partner expectations, and regulatory requirements in shaping strategic decisions. Special attention is given to external stimuli—such as grants and preferential financing for ESG-compliant investments—as potential catalysts for change.

The findings highlight that ESG implementation in the SME sector is increasingly being treated not only as a matter of ethical responsibility but also as a strategic economic decision, influencing competitiveness, access to capital, and stakeholder relations. The article contributes to the ongoing debate on integrating sustainability principles into enterprise management and financing systems in a rapidly evolving regulatory and economic environment.

ENTERPRISE MANAGEMENT IN THE CONTEXT OF DIGITAL NOMADISM

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The modern digital economy has given rise to a new kind of professional: the digital nomad. Digital nomads are individuals who leverage technology to work remotely while traveling. Their rise is forcing companies to rethink traditional management approaches. In this review, we synthesize existing research to lay a foundation for a new "Digital Nomad Management Model."

In this study we integrate findings from four key areas: digital nomad work characteristics, organizational change in the digital era, adaptations of classical management theories, and the use of artificial intelligence (AI) in management. Guided by PRISMA standards, we carried out a bibliometric analysis covering research published between 1981 and 2025. Find that the number of relevant publications grew exponentially after 2020, reflecting how remote work and digital nomadism have entered the mainstream. Citation and keyword analyses reveal emerging themes such as remote collaboration, work–leisure integration, autonomy, and digital infrastructure. Traditional management models (e.g., Scientific Management, the PDCA cycle, the McKinsey 7S framework) offer useful insights but fall short in addressing digital nomads' mobility and autonomy. In response, new AI-driven management approaches – like intelligent collaboration platforms and data-driven performance analytics – have begun to fill these gaps. We identified several research gaps: a lack of quantitative studies, unclear strategies to integrate digital nomads into corporate structures, insufficiently culturally nuanced management frameworks, and limited exploration of AI's role beyond efficiency optimization. Therefore, we recommend that future research explore flexible, AI-driven management models aligned with digital nomads' values. These new models should encompass more key dimensions such as digital integration, remote collaboration, individual autonomy, spatial freedom, and agile management.

Session 6
Economics & Business / Modern Technology

DIFFUSION OF RENEWABLE PROPULSION TECHNOLOGIES IN AGRICULTURAL MACHINERY: POTENTIAL AND LIMITATIONS

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Over the past years, the transition toward sustainable and decarbonized energy has become an increasingly relevant topic in the agricultural sector. Although renewable propulsion technologies – such as electric engines, hydrogen fuel cells, and biofuels – are evolving rapidly, their specific application in agricultural machinery remains limited and often uncertain. As specifically tractors play a key role for maintaining the global food system and simultaneously have tremendous environmental impact, this study aims to explore the key drivers and barriers influencing the adoption of renewable propulsion systems in tractors. The two central research questions are: What drivers of prevents the adoption of such technologies in agriculture? What is the status of diffusion in current scientific research? To answer these questions, a comprehensive literature analysis is conducted, drawing from interdisciplinary sources in agricultural engineering, environmental economics, innovation studies, and technology acceptance theory. Emphasis is placed on economic feasibility, infrastructure availability, regulatory frameworks, technological maturity, and user attitudes. In addition, the study incorporates sociocultural perspectives by addressing social acceptance, generations preferences, educational background, and the influence of regional farming traditions. Furthermore, an analysis of relevant statistical data regarding the adoption of renewable energy in agriculture adds quantitative verification. Through a synthesis of findings across these domains, this research identifies recurring obstacles such as high investments costs, uncertainty regarding performance, inadequate energy infrastructure in rural areas, as well as skepticism based on mistrust, lack of technical familiarity, or limited access to information. In contrast, governmental incentives, ecological awareness, rising fuel prices, and long-term monetary benefits emerge as major adoption drivers. The study concludes that although the technical potential of renewable propulsion systems in agricultural tractors is increasingly acknowledged, a broader diffusion is still hampered by a complex interplay of economic, technological, and sociocultural barriers. Future research should deepen these findings through targeted case studies and comparative analyses, particularly focusing on education, regional identity, and farm succession as potential levers of change.

Keywords: environment, agriculture, farming, renewable, tractors, technology adoption, sustainability, innovation

THE CONCEPT OF SUSTAINABILITY AS A BASIS FOR SUSTAINABLE URBAN DEVELOPMENT

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Contemporary urban development increasingly relies on the principles of sustainability, yet the practical application of these principles largely depends on how the concept of sustainability is understood and interpreted. The aim of this paper is to analyze the theoretical foundations of the concept of sustainability, its evolution, and its role in shaping sustainable urban environments, as well as to explore how this concept is implemented in urban planning and design practices.
The article begins by exploring the origins and development of the sustainability concept, emphasizing its multidimensional nature—including environmental, social, and economic dimensions—and the need for balance between these aspects in urban contexts. The paper reviews various academic definitions and policy interpretations of sustainability and highlights the conceptual challenges arising from its broad and sometimes ambiguous use.
Further, the study examines the significance of sustainability in contemporary urban planning, focusing on its influence on spatial structure, mobility solutions, green infrastructure integration, and public participation. Special attention is given to the transfer of sustainability from theoretical and political frameworks to practical applications in the built environment.

Keywords: sustainability, sustainable urban development, public participation, environmental design

ACKNOWLEDGMENTS

The study is conducted with the support of the European Union Recovery and Resilience Mechanism under the Research and Development Grant No RTU-PA-2024/1-0040 "NextGen Civic Engagement: Shaping Sustainable Urban Futures" within the project No 5.2.1.1.1.i.0/2/24/I/CFLA/003 “Implementation of consolidation and management changes at Riga Technical University, Liepaja University, Rezekne Academy of Technologies and Latvian Maritime Academy and Liepaja Maritime College for excellence in higher education, science and innovation”.

MECHANISMS FOR IMPROVING THE MANAGEMENT AND DISPOSAL OF MUNICIPAL PROPERTY

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Municipal property management is traditionally defined as the exercise of influence by local self-government authorities over assets assigned to them in order to implement their powers as effectively as possible and solve the economic tasks facing them.
Together with local finances, municipal property constitutes the core economic foundation of local self-government. Therefore, ensuring the effective governance and rational utilization of municipal assets stands as a pivotal priority for municipal entities.

The main goal of this study is to investigate and analyze the processes of municipal property management and utilization in terms of legislation, current practices and contemporary challenges, existing in Georgia. Using a combination of quantitative and qualitative methods, special attention is paid to the example of Batumi Municipality. At the final stage of the study, based on the obtained results, recommendations are formulated for the improvement of the municipal property management system.

LOF, KNN OR PCA? CHOOSING THE RIGHT DETECTOR FOR CORRUPTED LOAN DATA

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The objective of this paper is to clarify how corruption severity shapes the relative strengths of three unsupervised detectors: Local Outlier Factor (LOF), k-Nearest Neighbours (kNN) and Principal Component Analysis (PCA) when cleansing large-scale loan datasets. We began by injecting synthetic errors ranging from 0 % to 100 % into a public loan database, encompassing contradictory numerical ranges, invalid category codes and negative balances. Each detector was then benchmarked on F1-score, runtime and memory footprint under equal parameter budgets. Results indicate that LOF exploits local-density deviations to achieve near-perfect F1-scores at low-to-moderate corruption levels (5–40 %), however with quadratic runtime growth. Once corruption exceeds 50 %, global-distance-based kNN and reconstruction-error-driven PCA overtake LOF, maintaining stable detection accuracy while imposing lighter computational loads. kNN trains almost instantaneously but infers more slowly; PCA offers the most balanced resource profile. These findings imply that organisations experiencing sporadic data issues can justify LOF's heavier compute cost, whereas kNN or PCA constitute robust alternatives for severely compromised datasets or resource-constrained environments. By linking detector efficacy to corruption intensity and hardware demands, the study supplies actionable guidance for strengthening data-quality pipelines in financial services.

Keywords: Local Outlier Factor (LOF), k-Nearest Neighbours (kNN), Principal Component Analysis (PCA), Corrupted Data Detection

OPPORTUNITIES FOR EDUCATION FOR SUSTAINABLE MOUNTAIN DEVELOPMENT

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Based on qualitative research and a case study methodology, this paper explores undergraduate and graduate programs focused on teaching sustainable mountain development in various countries and compares them with the experience of the Georgian Technical University (GTU). The programs offered by GTU stand out on the international stage for their specialized focus and innovative approach.

This work was prepared within the framework of the Competitive Innovation Fund (CIF) grant project, part of the I2Q Project, which aims to diversify funding sources and promote internationalization. The project is implemented by the Georgian Technical University under the academic supervision of the UNIMONT Research Center of the University of Milan and with pratnersip of Grigol Robakidze University. Using content analysis and comparative methods, the article presents international experiences in master's-level research related to sustainable mountain development.

UNESCO's Framework for the Implementation of Education for Sustainable Development (ESD) (UNESCO, 2019) emphasizes the need for:
• Essential action through transformative learning;
• A deep understanding of the structural, context-specific changes required for sustainable development;
• Critical reflection on the challenges and opportunities posed by a technological future.

Since 2020, GTU has been implementing educational programs through its Faculty of Sustainable Mountain Development, responding to the objectives set out in UNESCO's ESD Framework. This initiative reflects the state's commitment to joining global efforts and initiating transformative changes for the sustainable development of mountain regions.

Georgia, a predominantly mountainous country, faces a number of socio-economic challenges in its highland areas due to harsh climates, natural hazards, and geographical isolation. In response, the Georgian government adopted a Law on the Development of Mountain Regions in 2015. In parallel, it has introduced new educational approaches aimed at improving societal skills and ensuring sustainable development. These efforts also align with UN General Assembly Resolution No. 77/172 of December 14, 2022, on sustainable mountain development.

GTU currently offers four state-funded, accredited bachelor's programs in Georgian, with steadily growing student enrollment:
• Sustainable Development of Mountain Rural Environments (Qualification: Bachelor of Environmental Sciences)
• Sustainable Mountain Tourism and Hospitality Management (Qualification: Bachelor of Tourism)
• Management of Organic Farming Systems in Mountainous Regions (Qualification: Bachelor of Management)
• Natural Hazards; Sustainable Environment and Protection (Qualification: Bachelor of Engineering in Environmental Engineering)

This article emphasizes the need to develop an English-language master's program on Sustainable Development of Mountain Areas at GTU to further align with international standards and expand global academic collaboration in this field.

DYNAMIC INTERCONNECTEDNESS IN FINANCIAL ECOSYSTEM: EVIDENCE FROM THE AVERAGE CORRELATION PLOT

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Understanding the intricate web of financial interconnectedness is paramount for assessing systemic risk and ensuring financial stability. While the Spillover index has significantly advanced our ability to quantify shock propagation, this paper introduces a complementary methodology that offers a novel visual and quantitative perspective on financial linkages. The goal of this study is to create a new chart that helps understanding the interconnectedness of an entity with others in the system. Our methodology leverages Engle's Dynamic Conditional Correlation (DCC) model, applied to the daily stock returns of leading European financial institutions. By analyzing the time-varying conditional correlations, we propose a new visualization perspective, namely "Average Correlation Plot", designed on a per entity-basis to illustrate the dynamic connectedness among financial entities. This provides a granular understanding of which entities act as central hubs or peripheral participants in the network. Unlike spillover indices that focus on variance decomposition, this paper's approach highlights the direct correlation flows, offering an intuitive tool for policymakers and researchers to identify potential channels of contagion and monitor the evolving landscape of financial interconnectedness. This complementary framework enriches the toolkit for systemic risk analysis.

Keywords: time-varying correlations, dynamic conditional correlation, financial interconnectedness, average correlation plot, spillover index

ABSORPTIVE CAPACITY AND GREEN MARKETING STRATEGIES IN ENHANCING STARTUP SUSTAINABILITY: THE MODERATING ROLE OF ENTREPRENEURIAL ECOSYSTEMS

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Startups face the dual challenge of achieving growth while operating sustainably. This article examines how absorptive capacity—a startup's ability to recognize, assimilate, transform, and exploit external knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002)—and green marketing strategies (Gatignon & Xuereb, 1997; Peattie & Belz, 2010) jointly enhance startup sustainability. We propose that absorptive
capacity fuels ecoinnovation, while green marketing builds legitimacy and demand among ecoconscious consumers. We further argue that a strong entrepreneurial ecosystem—comprised of investors, mentors, institutions, and enabling policies—amplifies these effects (Isenberg, 2011; Roundy, Bradshaw, & Brock, 2018).

The article concludes that integrating internal capabilities with an enabling ecosystem is crucial for startups to achieve longterm resilience and a competitive edge in an increasingly sustainabilityoriented marketplace.

Keywords: absorptive capacity; green marketing; startup sustainability; entrepreneurial ecosystem; sustainable Entrepreneurship

Session 7
Multidisciplinary issues

UNDERSTANDING LONG-TERM USER ENGAGEMENT IN SURPLUS FOOD RESCUE PLATFORMS: THE ROLE OF PSYCHOLOGICAL AND BEHAVIORAL FACTORS

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The purpose of this study is to know the user's long-term engagement with surplus food rescue platforms by examining the role of behavioral and psychological factors. The study assess how user satisfaction, perceived usefulness, motivation and habit formation impact the intention of users to continue using these platforms and their long-term engagement. A mixed-method approach has been used in this study, applying both qualitative and quantitative data. The outcomes of the study reveal that habit formation, user satisfaction, motivation, and perceived usefulness significantly influence continuance intention, which in turn has a positive relationship with long-term engagement with surplus food rescue platforms.

The interviews highlighted key factors like contributing to sustainability, economic benefits, and community engagement in sustained use. The results of this study can help policy makers to design even more effective strategies to enhance sustainability outcomes and retention. This research will contribute to community well-being by reducing food wastage and motivating surplus food rescue platforms. This study is limited to only platform types and specific regions, which may affect its generalizability. This study provides a deep understanding of all those factors motivating long-term user engagement with surplus food rescue platforms, an area that has been studied very little.

Keywords: Surplus Food Rescue; User Engagement; Perceived Usefulness; Continuance Intention; Food Waste Reduction

MANIPULATION AND EMPLOYEE MOTIVATION: AN UNEXAMINED RELATIONSHIP

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A substantial and rigorous literature exists on manipulation. Similarly, an even more substantial and rigorous literature exists on motivation. However, we believe almost nothing examining the theory and practice of employee motivation and manipulation. This paper explores organizational schemes for increasing employee's motivation to achieve higher levels of performance within the framework of manipulation. The paper lays out a definition of manipulation and applies it to classic organization motivation theory and practice - Frederick Herzberg's Two Factor Theory. The theory is explained and compared with the definition of motivation. The paper tries to answer two questions: is this a manipulation and is it unethical. In those instances where we find the ideal motivational practices as non-manipulative, we explore ways they could be altered to make them manipulative.

Keywords: Manipulation, Motivation, Two Factor Theory, Herzberg

CREATIVE PROCESS ON ARCHITECTURAL REPRESENTATION

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This study delves into the dynamic evolution of perception within architectural drawing, tracing its transformation from traditional hand-drawing techniques to the integration of computer-assisted design (CAD) and immersive virtual reality (VR) environments. By examining the historical and theoretical frameworks of perception, the research explores how these paradigms have shaped architectural expression and the design process, particularly in the conceptualization of project models and spatial forms. It underscores the pivotal role of perception in mediating the relationship between the architect's creative intent and the observer's interpretation, highlighting how different tools influence the cognitive and aesthetic dimensions of architectural representation.

Historically, hand-drawing served as the cornerstone of architectural practice, relying on descriptive geometry to translate three-dimensional concepts into two-dimensional representations. This method fostered a tactile and intuitive connection between the architect and the design, embedding subjective nuances into the creative process. However, the advent of digital tools, including CAD software and VR platforms, has revolutionized spatial representation by introducing unprecedented levels of precision, scalability, and interactivity. These technologies enable architects to simulate complex environments, manipulate forms in real-time, and explore spatial relationships with enhanced clarity. The study investigates how these digital advancements redefine the boundaries of creativity, allowing architects to transcend traditional limitations while introducing new challenges in balancing technical proficiency with artistic expression.

By comparing manual and virtual methods, the research addresses the cognitive and aesthetic impacts of these practices on both architects and observers. Digital tools facilitate a more analytical approach, enabling precise calculations and visualizations that enhance the accuracy of project models. Conversely, hand-drawing retains a unique capacity to convey emotional and conceptual depth, often lost in highly polished digital renderings. The study argues that the integration of these approaches fosters a richer creative process, where manual techniques provide a foundation for intuitive exploration, and digital tools amplify precision and communication. This synergy not only enhances the architect's ability to conceptualize innovative forms but also transforms how audiences perceive and interact with architectural spaces, particularly through immersive VR experiences that simulate real-world interactions.

Furthermore, the investigation emphasizes the enduring relevance of descriptive geometry as a critical tool for understanding and communicating architectural forms. Despite technological advancements, the principles of geometry remain foundational, bridging traditional and modern practices. The findings advocate for a balanced approach that leverages the strengths of both paradigms, encouraging architects to harness digital tools while preserving the expressive qualities of manual drawing. This integrative framework contributes to advancing knowledge on the interplay between tradition and innovation in architectural representation, supporting a deeper engagement with the complexities of spatial design. By exploring the cognitive, aesthetic, and technical dimensions of these practices, the study offers insights into how architects can navigate the evolving landscape of design tools to create meaningful and impactful architectural expressions, fostering a dialogue between historical methodologies and cutting-edge technologies.

A NEW MODEL OF ENTERPRISE MANAGEMENT IN THE CONTEXT OF DIGITAL NOMADS

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In the contemporary era, digital technologies are not only transforming how businesses operate but also the very nature of work itself. This transformation is most evident in the emergence and growth of what is commonly referred to as "digital nomads" - workers who leverage technology to perform their jobs from anywhere in the world.

The rise of digital nomads signals a significant shift in workplace dynamics from traditional office-based operations to geographically dispersed, digital-first working environments. However, these new modes of work present unique challenges for businesses, particularly around management and coordination. Classic management models emphasize control and coordination within the physical boundaries of an organization, techniques that are progressively becoming obsolete or, at the very least, less effective in the face of an increasingly remote and digital workforce.

This study is inspired by the substantial shift in work paradigms due to digital nomadism, aiming at creating a replicable model of management for businesses navigating their journey around the digital nomad phenomenon. By exploring the new form of work-life realities brought about by digital technologies, the research seeks to conceptualize, develop, and validate a holistic model of corporate management that aligns with the rise of digital nomadism.

Through in-depth interviews, surveys, and case studies, I conducted a comprehensive investigation into the working characteristics and management needs of digital nomads. This research led to the development of the innovative "DMM"（Digital Management Model): "DRISA", encompassing five dimensions: Digital Integration, Remote Collaboration, Individual Autonomy, Spatial Freedom, and Agile Management. This model uniquely addresses both the mobility and autonomy of digital nomads, while particularly considering the dual role of digital nomad entrepreneurs as both managers and managed individuals.

My research reveals that traditional management theories face significant limitations in the digital nomad context. To address this, I explored the integration of artificial intelligence with the DRISA model, investigating AI's innovative applications in remote collaboration, performance evaluation, and cultural development. Through empirical studies across multiple organizations, the research validates the model's feasibility and effectiveness. The findings demonstrate that the AI-enhanced DRISA model significantly improves the management efficiency of digital nomad workforces while providing practical management tools for digital nomad entrepreneurs.

This study not only bridges a crucial gap in digital nomad management theory but also provides organizations with an actionable management framework. Importantly, it reveals that corporate management models in the digital transformation era must emphasize flexibility, autonomy, and technological empowerment, offering valuable insights for the future development of management theory.

Session 8
Challenges in Economics and Finances & Digital Society (II)

THE ROLE OF GOVERNMENT POLICIES IN ENCOURAGING TECHNOLOGICAL INNOVATION (ON EXAMPLE OF GEORGIA)

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This thesis investigates the role of government in fostering technological innovation in Georgia, analyzing the effectiveness of policies and strategies implemented to stimulate innovation across various sectors. Technological innovation is a cornerstone for economic growth and competitiveness, and governments play a pivotal role in creating an environment that supports and nurtures innovation.

This study provides a detailed examination of the mechanisms employed by the Georgian government, including financial incentives, regulatory frameworks, and support for research and development (R&D). The research employs a mixed-method approach, combining qualitative data from policy analysis and stakeholder interviews with quantitative data from innovation performance metrics and economic indicators. This comprehensive approach allows for a nuanced understanding of the successes and challenges in Georgia's innovation ecosystem.

The qualitative data includes insights from government officials, industry leaders, and academic experts, while the quantitative analysis focuses on metrics such as R&D expenditure, number of patents filed, and the growth of technology startups. The findings indicate that the Georgian government has made significant strides in promoting technological innovation through various initiatives. Financial incentives such as grants, subsidies, and tax breaks have been effective in encouraging private sector investment in R&D. Additionally, the establishment of innovation hubs, technology parks, and incubators has provided startups with essential infrastructure and support services. University-industry collaborations have also played a crucial role in translating academic research into marketable technologies.

However, the research also identifies several challenges that hinder the full realization of Georgia's innovation potential. One major challenge is the limited availability of venture capital and private investment, which restricts the growth and scaling of startups. Despite the progress in improving the regulatory framework, further enhancements are needed in areas such as intellectual property protection and ease of doing business. The development of advanced technological infrastructure, including high-speed internet and digital connectivity, remains a critical area for improvement. A comparative analysis with innovation-driven economies such as South Korea and Israel provides valuable insights into best practices that Georgia could adopt. South Korea's emphasis on education and government-funded R&D has propelled it to the forefront of technological innovation. Israel's vibrant startup ecosystem, supported by robust venture capital networks and military-civilian technology transfer programs, offers another model for Georgia to consider. These comparisons highlight the importance of a well-coordinated and comprehensive innovation strategy that integrates public and private sector efforts. The thesis concludes that while Georgia has made commendable progress in fostering technological innovation, a more integrated and multi-faceted approach is necessary to fully leverage its technological potential. Enhancing public-private partnerships, improving access to funding, and developing advanced infrastructure are key areas that require attention. Furthermore, regional collaboration and participation in international innovation networks can provide additional resources and market opportunities for Georgian innovators.

The study contributes to the broader discourse on innovation policy by highlighting the unique context of a transitioning economy and offering policy recommendations tailored to the Georgian innovation landscape. It underscores the importance of a proactive government role in fostering a dynamic and sustainable innovation ecosystem, ultimately contributing to national economic growth and global competitiveness. By adopting best practices from leading innovation-driven economies and addressing existing challenges, Georgia can strengthen its position as an emerging hub of technological innovation.

IMPACT OF MACROECONOMIC INDICATORS ON NON-PERFORMING LOANS (NPLS): PILOT RESEARCH

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It is hard to overestimate the significance of non-performing loans (NPLs) for the stability of financial sectors. Numerous factors influence the level of non-performing loans (NPLs); the purpose of this study is to ascertain how macroeconomic factors affect NPLs in Kazakhstan's banking sector while taking into account the mediating influence of social, saving, and foreign factors. The author conducted a systematic literature review in order to identify the influencing factors. Part of the determined factors was chosen for modelling the situation with NPLs. The Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was employed to ascertain the dependencies among the constructs. Examining the direct impact of macroeconomic factors on non-performing loans (NPLs), a significant negative dependence was found. Investigations were conducted into the mediating role of social, saving, and foreign factors. The relationship between macro factors and non-performing loans is strengthened by the mediation effect of foreign factors. They balance and render the impact of macro factors on NPLs statistically insignificant, but they do not have a mediating effect. By having a direct impact on the financial sector as well as other areas of the national economy, these findings enable policymakers to stabilize the NPL situation in developing nations' financial markets, such as Kazakhstan.

Keywords: non-performing loans; NPLs; PLS-SEM; effect of macro factors; mediation effect of foreign; social; saving factors

HOW IS THE LABOR MARKET IN GEORGIA RESPONDING TO TECHNOLOGICAL PROGRESS?

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Today, technological progress is rapidly changing labor market requirements, the structure of work processes, and the behavior of employers. This process has been relevant for developed countries for a long time, while emerging economies, including Georgia, are only now beginning to really feel the impact of technological transformation. This study aims to assess the impact of state spending on technological development and education on the labor market in Georgia over the period 2006–2023 – in particular, on the number of employees.
The results showed that both investment in technological development and support for the education sector significantly and positively affect the level of employment.
The increase in investments in technologies is closely related to the increase in the number of employees, which indicates a gradual adaptation of the labor market to technological innovations. At the same time, increased funding for education reflects the impact on skills development, which contributes to the qualitative improvement of the labor market.

The results of the study have important implications for economic and social policy makers. They demonstrate that the impact of technological progress on the labor market is not limited to job losses but can also become a source of employment growth if the innovative opportunities inherent in it are properly utilized. In the case of Georgia, an effective response to these processes requires a consistent synchronization of the education system and labor policy - including strengthening the vocational training system, regular labor market analysis, expanding regional involvement, and integrated cooperation with the private sector.

Therefore, maintaining and developing the labor market in Georgia in the context of technological progress depends on the extent to which the country will be able to find the right strategic balance between innovation and social inclusion.

FINANCIAL CONNECTEDNESS IN EUROPE: AN SQRTM-BASED ANALYSIS

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This study presents a novel orthogonalization technique for assessing financial connectedness: the square root matrix (SQRTM) method. The goal of the study is to demonstrate the computational and empirical benefits of the SQRTM approach over the current Cholesky- and GFEVD-based Spillover Indices. The results of the analysis of the 29 leading European financial firms' stock prices show a high average degree of system connectivity. Significant global financial events were found to coincide with periods of exceptionally high connectedness, especially over a multi-year period precursing the Global Financial Crisis of 2008 and lasting into early 2020. The overall dynamic connectedness exhibits a steady trend of reverting to its long-term average, particularly in 2024, despite these elevated periods. There were no overt signs of a financial crisis based on the dynamics of volatility at the time. Thus, the SQRTM-enhanced spillover index provides financial authorities and institutions with a strong and useful tool for keeping an eye on market interdependencies and successfully reducing systemic risk.

Keywords: square root matrix orthogonalization, Cholesky orthogonalization, order-invariant spillovers, spillover Index, net dynamic connectedness

ALGORITHM OF THE PROJECT APPROACH TO ANTI-CRISIS MANAGEMENT OF BANKS' PROBLEM ASSETS

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This process of anti-crisis management of bank's problem assets consists of two implementation stages:
Stage 1. Identification of threats and problems within the organisation, their assessment and making decision on further actions with these risky assets.
Stage 2. Implementation and usage of a project-based approach to implement anti-crisis management of the bank's problem assets.

After identifying problem assets, we begin working with them. The size of non-performing loans (NPLs) in terms of potential recoverable value is certainly important for attracting organisations with knowledge and experience in the field of problem asset resolution. Some of these will be organisations that have proven themselves in the development and implementation of various recovery strategies, while others will be institutional investors that have the authority and familiarity with distressed assets as an investment class, allowing them to participate as investors in non-performing loan transactions. Most distressed asset investors seek a minimum potential market size to justify the effort and associated costs of entering a new market. However, while the nominal value of outstanding loans is the starting point for determining the size of distressed loans, other preconditions will be decisive in determining the likely recoverable value of these assets and the actual potential investment opportunity.

The project structure, which should ensure active participation of the private sector in the acquisition of distressed assets, requires government support for this approach. The following points must be ensured at the state level: a good level of predictability and transparency; assistance in reducing problem loans; encouragement of new business relationships; ensuring the rapid redistribution of real assets; promotion of financial sector stability.

Keywords: anti-crisis management; bank's problem assets; NPLs; a project-based approach; government support

TECHNOLOGY TRANSFER AND ECONOMIC GROWTH: STRUCTURAL MODELING FOR LATVIA

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This paper develops and calibrates two structural macroeconomic models of economic growth for Latvia, focusing on the role of international technology transfer. The first model is a modified Cobb–Douglas framework with endogenous total factor productivity (TFP) growth driven by foreign direct investment (FDI), trade openness, migration, and other external channels. The second model extends this structure by incorporating human capital accumulation, digital infrastructure (ICT), institutional quality, and learning-by-doing mechanisms. Both models are implemented in MATLAB and calibrated using the Latvian economic data. Scenario simulations demonstrate the sensitivity of GDP growth to changes in technology transfer intensity and institutional capacity. The results provide an analytical basis for policy recommendations in education, digital development, migration, and investment strategy to enhance Latvia's long-term growth.

Keywords: Economic growth, technology transfer, Latvia, structural modeling, FDI, human capital, TFP.