

Transporta un sakaru institūts
Transport and Telecommunication Institute

RESEARCH and TECHNOLOGY – STEP into the FUTURE

Volume 16. No. 2 - 2021

ISSN 1691-2853
ISSN 1691-2861
(On-line: www.tsi.lv)

Riga
2021

EDITORIAL BOARD:

Prof. Igor Kabashkin (Editor-in-Chief), *Transport & Telecommunication Institute, Latvia*

Prof. Irina Yatskiv (Issue Editor), *Transport & Telecommunication Institute, Latvia*

Assoc. Prof. Dariusz Bazaras, *Vilnius Gediminas Technical University, Lithuania*

Dr. Zohar Laslo, *Sami Shamoon College of Engineering, Israel*

Dr. Enno Lend, *College of Engineering, Estonia*

Prof. Andrzej Niewczas, *Lublin University of Technology, Poland*

Prof. Lauri Ojala, *Turku School of Economics, Finland*

Prof. Irina Kuzmina-Merlino, *Transport & Telecommunication Institute, Latvia*

Prof. Alexander Grakovski, *Transport & Telecommunication Institute, Latvia*

Editor:

Irina Alekseeva, *Transport & Telecommunication Institute*

Supporting Organization:

Latvian Transport Development and Education Association

Latvian Operations Research Society

THE JOURNAL IS DESIGNED FOR PUBLISHING PAPERS CONCERNING THE FOLLOWING FIELDS OF RESEARCH:

- mathematical and computer modelling
- mathematical methods in natural and engineering sciences
- computer sciences
- aviation and aerospace technologies
- electronics and telecommunication
- telematics and information technologies
- transport and logistics
- economics and management
- social sciences

Articles and review are presented in the journal in English, Russian and Latvian (at the option of authors).
This volume is published without publisher editing.

EDITORIAL CORRESPONDENCE

Transporta un sakaru institūts (Transport and Telecommunication Institute)

Lomonosov 1, LV-1019, Riga, Latvia. Phone: (+371)67100594. Fax: (+371)67100535

E-mail: junior@tsi.lv, [http:// www.tsi.lv](http://www.tsi.lv)

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No 2

ISSN 1691-2853, ISSN 1691-2861 (on-line: www.tsi.lv)

The journal of Transport and Telecommunication Institute (Riga, Latvia)

The journal is being published since 2006

PROGRAMMING COMMITTEE

- **Igor Kabashkin**, Professor, Chairman, Director of Programme, TSI
- **Irina Yatskiv**, Professor, Chairwoman of the Board, TSI
- **Boriss Misnevs**, Professor, Director of the study program, TSI
- **Irina Kuzmina-Merlino**, Professor, Director of Programme, Transport and Management Faculty, TSI
- **Mihails Savrasovs**, Associate Professor, Vice-Rector for Academic & Research, TSI
- **Yulia Stukalina**, Professor, Pro-dean of Transport and Management Faculty, TSI
- **Alexander Grakovski**, Professor, Director of Programme, Engineering Faculty, TSI
- **Ishgali Ishmuhametov**, Assistant Professor, Transport and Management Faculty, TSI
- **Alexander Medvedev**, Professor, Vice-dean of the Engineering faculty, TSI
- **Irina Pticina**, Associate Professor, Vice-rector for Student Affairs, TSI
-

ORGANIZING COMMITTEE

- **Irina Yatskiv**, Professor, Chairwoman of the Board, TSI
- **Mihails Savrasovs**, Associate Professor, Vice-Rector for Academic & Research, TSI
- **Jelena Baranova**, Lecturer, Engineering faculty, TSI
- **Viktorija Gruzite**, Organizing Manager, TSI
- **Dmitry Pavlyuk**, Associate. Professor, Vice-dean of the Engineering faculty, TSI



**The 40th Research and
Academic Conference**

**RESEARCH AND
TECHNOLOGY – STEP
INTO THE FUTURE**

3 December 2021. Riga, Latvia

**40. zinātniski praktiskā
un mācību metodiskā
konference**

**ZINĀTNE UN TEHNOLOĢIJA –
SOLIS NĀKOTNĒ**

2021. gadā 3. decembrī, Rīga

**40-я научно практическая
и учебно-методическая
конференция**

**НАУКА И ТЕХНОЛОГИЯ –
ШАГ В БУДУЩЕЕ**

Рига, 3 декабря 2021 года

CONTENTS

Session 1. Computer Problems of the Information Society

Development and Research of an Artificial Intelligence-Based Figure Skating Referee System <i>Sarmite Danilova</i>	9
Isolation and Mitigation of the Motor and Generator Pair System <i>Hamza Rauf</i>	11
Evaluation of Critical Success Factors for an Airline Business Intelligence System <i>Edite Kolveite</i>	13
Trends and Challenges in Digital Transformation of Financial Intelligence Units: Case Study of Financial Intelligence Unit of Latvia <i>Ligita Pula</i>	14
Improving the Decision Support System by Applying ML-Algorithms in a Telecommunications Company <i>Aleksei Ryzhov</i>	16
Development of Requirements for the Intelligent European Union’s Large Scale It Systems in the Area of Freedom, Security and Justice <i>Aleksandrs Gromovs</i>	18
Research on Web Accessibility Requirements for E- Commerce <i>Alina Balabanova</i>	20

Session 2. Innovations and Smart Technologies in Transport and Logistics

Autoparka elektrifikācijas iespēju izvērtējums kravu pārvadājumu nozarē <i>Inese Rodčenkova</i>	25
Improving Manufacturing Company’s Order-To- Delivery Process <i>Roman Atanasov</i>	27
Composite Index Analysis and Development for Evaluating of Supply Chain Effectiveness in Airline Catering Services <i>Ulyana Sobolevskaya</i>	29
Piegādes JYSK klientiem Covid-19 pandēmijas laika ietekmē <i>Artūrs Meisters</i>	31

Session 3. Market: Research, Projects, Technologies and Problems of the Modern Economy

Developing an Employee Compensation Model Based on the Theory of Justice <i>Yury Smirnov</i>	35
Amatpersonu nemateriālās motivācijas un labsajūtas sistēmas pilnveidošana valsts policijas struktūrvienībā krīzes apstākļos <i>Inga Olga Pulle</i>	37
Uzņēmēju sociālā aizsardzība kā nozīmīgākais mazā biznesa attīstības faktors Latvijas Republikā <i>Romāns Biļickis</i>	39
Анализ инвестиционного климата в Латвии и Швейцарии на фондовом рынке <i>Мария Вышар</i>	41

Stimulating Sustainable Development in the Airline Industry <i>Eduards Minajevs</i>	43
Extending the Charter Airline Business Model with Online Booking Services <i>Aleksejs Ogorodnikovs</i>	45
Corporate Social Responsibility in the Latvian Aviation Industry from a Comparative Perspective <i>Santa Krūze</i>	47
The Impact of Digital Solutions and Automation in Air Traffic Control <i>Jeļena Kuzmičova</i>	49
Methodology to Identify Flaky Test Cases <i>Maksims Ivanovs</i>	51
Personāla darba motivācijās sistēmas pilnveidošana starptautisko jūras pārvadājumu jomā <i>Aleksejs Skrunds</i>	52



Session 1

**Computer Problems of the
Information Society**

**Informatīvās sabiedrības
datorizācijas problēmas**

**Компьютерные проблемы
информационного
общества**

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 9-10
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

DEVELOPMENT AND RESEARCH OF AN ARTIFICIAL INTELLIGENCE-BASED FIGURE SKATING REFEREE SYSTEM

Sarmite Danilova

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
sarmitedanilova@inbox.lv*

Keywords: Artificial Intelligence, Image recognition, Convolutional Neural Networks (CNN), Referee system

Technology allows tasks to be solved more precisely. It doesn't make the tasks less complex or easier. Sports referees make decisions based on perceptions. Perception is subjectively interpreted individually. Artificial Intelligence has been evolving in the last years in many industries. Artificial Intelligence could help referees make decisions to reduce the percentage of wrong decisions. This would assess a situation correctly and determine a correct fact. Artificial Intelligence is used to support decisions for example by helping the decision maker to choose actions in real-time. This approach could help the referees in the decision-making process to decrease the proportion of wrong judgments.

Retail product (software) for referee not developed yet. There is research for figure skating video analysis where target task was learning to score of each skater's performance.

The Fujitsu developed a GPU-accelerated deep learning application that was used as referee system in Olympic games for gymnastic. There are also Image recognition researches for tennis, football and figure skating.

The main goal is to propose solution that could help the make referee decisions for figure skating.

The actuality of the research determine the tasks:

- to get knowledge of last modern innovative tendencies in the field of area,
- to understand effective class of models of Image recognition for figure skating,
- what kind of judgment tasks could be supported by the system,
- what kind of criteria could be recommend for referee system.

Convolutional Neural Networks (CNNs) (LeCun *et al.*, 1998) have been demonstrated as an effective class of models for understanding image content, giving results on image recognition. CNN are widely used to identify satellite images, process medical images, forecast time series, and detect anomalies. Images and videos have become ubiquitous on the internet, which has encouraged the development of algorithms that can analyse their semantic content for various applications, including search and summarization. (Karpathy *et al.*, 2014).

The Fujitsu methodology – unsupervised 3D deep learning looks very impressive with high precision from training on the entire data.

I compare, analyse existing methods and technologies to propose better solution, develop recommendations and structure of system.

The research supervised by Associated professor, Dr. sc. ing. Dmitry Pavlyuk.

References

1. Karpathy, A., Toderici, G., Shetty, S., Leung, T., Rahul, T. and Fei-Fei, L. (2014) *Large-scale Video Classification with Convolutional Neural Networks*. Google Research, Computer Science Department, Stanford University.

2. Liu, H, Cocea, M. and Ding, W. (2017) *Decision tree learning based feature evaluation and selection for image classification.*
3. Haiqin, L. and Wang, J. (2016) Application of Artificial Intelligence Technology in Sport Competition. *Journal of Computational Science & Engineering.*

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 11-12
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

ISOLATION AND MITIGATION OF THE MOTOR AND GENERATOR PAIR SYSTEM

Hamza Rauf

*Transport and Telecommunication Institute
Riga, Latvia, Tallinas iela 30a, 33
hamzarauf158@gmail.com*

Keywords: Wind, solar, battery, grid, inverter, dc to dc converter, load, DVR and FOPID

The main aim of the research study is to design Grid connected hybrid energy and energy management system with Motor and generator pair.

Research Problem: Now days the world has reached to a point when integration of renewable energy sources like the wind energy, solar energy etc. with the electricity grid of the country will have a greater role as such when the global warming rate has reached to distressing rate in the world. Also, there will be problems while implementing the connection of wind turbines and any other renewable energy sources with grid. One of the problems related to this is called ‘Fault ride through disturbances’ this work proposed asynchronous Motor and synchronous Generator Pair system as a probable solution for the integration of renewable energy to recover inertia and improve network stability.

Previous studies: Following the findings of a prior study (Huang *et al.*, 2020) renewable power units are being used to provide reliable fault cycle through capacity in order to avoid large-scale disconnection of renewable energy due to grid failures. A benefit of renewable energy linked to the grid via the motor-generator pair (MGP) system is that grid issues are separated, in contrast to existing problem-riding systems. Because most synchronous machines have high voltage and current resistance capabilities, a benefit of renewable energy linked to the grid via the MGP system is that grid issues are separated. Finally, it was discovered that while on the generator side, the MGP system is capable of separating grid issues, the fluctuation amplitudes on the motor side are relatively small, and that the generator is capable of providing significant reactive current assistance to the grid during three different grid issues. (Li *et al.*, 2018) present the first record of solar power generation and wind power results due to power system failure, focusing on incorrect steering and sudden shutdown. If there is a major emergency in the power transmission system, the inverter-based power generation's temporary shutdown may result in a large power outage going out immediately.

Methodology: This work proposed asynchronous Motor and synchronous Generator Pair system as a probable solution for the integration of renewable energy to recover inertia and improve network stability. In this work analyze briefly the Fault Ride Through scenario of wind energy conversion system (WECS) and solar system with this work establish the Dynamic Voltage Restorer (DVR) configuration or manage strategy. To compensate for power for each phase disjointedly, a closed loop PI manage law is proposed in d-q reference frame. The proposed technique provides fast response and effectual case recompense functions and run a MATLAB/SIMULINK simulation of such type of Low Voltage Fault Ride through Scenario, as well as analyzing the results Asynchronous Machine and Synchronous Machine Generator Pair Will Be Designed. Therefore, for this study, the main research question would be:

- How dynamic voltage restorer (DVR) can be mitigation voltage fluctuations?
- How to increase stability of hybrid energy with motor and generators pair?
- How can be the performance of the battery efficiency increase?

Following Parameters will be carried out in the MATLAB Simulation

- Voltage, Current, real and reactive power for input and output,
- Injected voltage and after DVR mitigate voltage scope will be display
- Grid voltage and current will be display
- Solar power will be show
- Wind current voltage, generator and motor current will be show
- After mitigate voltage and current for load will be show
- Total Harmonics Distortion

Fault ride through disturbances' this work proposed asynchronous Motor and synchronous Generator Pair system as a probable solution for the integration of renewable energy to recover inertia and improve network stability All above research results grid efficiency can be improved after adding DVR in the circuit of grid energy system, because power fluctuations and uneven voltage can be mitigating du fact device.

The research is supervised by Dr.sc.ing. Professor Aleksandrs Grakovskis.

References

1. Huang, Y., Gu, Y., Wu, Q., Li, C., Zhao, H., & Zhan, Y. (2020) Isolation and protection of the motor-generator pair system for fault ride-through of renewable energy generation systems. *IEEE Access*, 8, 13251-13258.
2. Li, C., and Reinmuller, R. (2018) Fault responses of inverter-based renewable generation: on fault ride-through and momentary cessation. *IEEE Power & Energy Society General Meeting (PESGM)*, 1-5.

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 13
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

EVALUATION OF CRITICAL SUCCESS FACTORS FOR AN AIRLINE BUSINESS INTELLIGENCE SYSTEM

Edite Kolveite

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
kolveite@inbox.lv*

Keywords: Business Intelligence (BI), Critical Success Factors (CSF), airline, implementation, analytical hierarchy process (AHP)

The use of Business Intelligence (BI) is an important factor for the success of an organization. The airline industry generates an excessively large volume of data and requires a solution like BI to help airlines make better and faster decisions. According to research 62% of airlines already have major programs in place for BI solutions and 33% are planning a pilot or research on BI by 2022 (SITA, 2019). However, there is a lack of guidance on how airlines can go from current decision-making practices to fact-based decisions driven by data using BI tools. Understanding and focusing on the aspects that influence the success of the BI system can help ensure success. The use of critical success factors (CSF) helps to align new systems with business objectives and gives a solid foundation for defining the criteria to be followed during the BI system implementation phase (Olszak, 2016). Despite the fact that the absence of CSFs could result in the BI system failure, CSFs of BI system implementation are still poorly understood (Yeoh *et al.*, 2015).

This study intends to identify and prioritize CSFs of a BI system from the perspective of airline employees that are involved in BI system implementation and utilization. The study begins with an identification of the BI term and an investigation of the benefits and challenges of the BI system. Next, based on a literature review, previously explored CSFs are developed in the form of a theoretical framework and categorized. Data is collected with the use of a questionnaire. The questionnaire target audience includes data analysts, IT managers, and executives of an airline. Data from questionnaires are analysed using Analytic Hierarchy Process (AHP). The weight of CSF impact was calculated using a pair-wise comparison of factors. It allows comparing the factors by generating a matrix of paired comparisons.

The anticipated results of this research will show which criteria and categories of CSFs are considered to be the most influential when implementing the BI systems in an airline.

This research is supervised by Assoc. prof., Dr. sc. ing. Savrasovs Mihails.

References

1. Olszak, C. M. (2016) Toward Better Understanding and Use of Business Intelligence in Organizations. *Information Systems Management*, 33(2), 105–123. DOI: 10.1080/10580530.2016.1155946
2. SITA (2019) Air Transport IT insights 2019, viewed 17 December 2020, <https://www.sita.aero/resources/surveys-reports/air-transport-it-insights-2019/>
3. Yeoh, W., and Popovič, A. (2015) Extending the understanding of critical success factors for implementing business intelligence systems. *Journal of the Association for Information Science and Technology*, 67(1), 134–147. DOI: 10.1002/asi.23366

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 14-15
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

TRENDS AND CHALLENGES IN DIGITAL TRANSFORMATION OF FINANCIAL INTELLIGENCE UNITS: CASE STUDY OF FINANCIAL INTELLIGENCE UNIT OF LATVIA

Ligita Pula

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
ligita.pula@gmail.com*

Keywords: Digital transformation, FIU, Money Laundering, digital strategy, evaluation

Money laundering is complicated illegal process comprised of three stages, starting with placement of illegally gained assets in financial institutions, following by misleading transactions to hide its original source (layering) and finally obtaining the cleaned money (integration).

The estimated amount of money laundered globally in one year is 2–5% of global GDP, or \$800 billion – \$2 trillion in current US dollars (UNODC, 2021). According to German Federal Ministry of Finance (calculation performed by Professor Bussmann) it is estimated that in Germany annually 100 billion EUR are generated through money laundering (Federal Ministry of Finance, 2019). According to Latvian National Risk assessment the total amount of illegally generated assets is 1.5 billion EUR in a year (FIU Latvia, 2021). Money laundering is recognised as a critical risk in many countries.

Key requirement to ensure effective anti-money laundering system in a country is to receive valuable suspicious transactions and activities (STR/SAR) in Financial Intelligence Unit (FIU), perform analysis in timely manner and forward enriched cases to law enforcement agencies to conduct investigation. FIU is complicated and unique environment from IT and processes perspective. According to FIU Information System Maturity Model developed by Egmont group in 2013, there are 15 domains at the FIU environment, starting from Access to information to International cooperation, which should be supported by digital tools.

Digital transformation has the potential to solve the challenges of FIUs related to “3V” – Volume, Velocity and Variety, rising from large amount of unstructured data is received from obliged entities in FIUs, requirement to be processed in high speed to detect money laundering in time (FATF, Egmont group, 2021), however, it has been observed the implementation of digital transformation in FIUs to be significantly slower than in the private sector.

Digital transformation refers to a process of adoption of digital tools and methods by an organisation, involving the whole organisation and changing organisational culture and relationships to users, as well as rebuilding existing business processes, there are remarkable challenges to FIUs to implement digital transformation. Not only resources are invested, but it also demands the corporate strategy to be translated into digital transformation strategy.

The aim of the research is to complete the analysis of the existing approaches/frameworks/methods for digital transformation and develop the framework for digital transformation to the targeted FIU.

In theoretical part of research, the author while analysing scientific literature, answers to following research questions: What is digital transformation of FIU? What are driving forces and what challenges to implement digital transformation in FIU? What are existing approaches/frameworks/methods for digital transformation in the entire organization?

This research is supervised by Assoc. prof., Dr. sc. ing. Savrasovs Mihails.

References

1. FATF, Egmont group (2021) *Digital Transformation of AML/CFT for Operational Agencies*. Available at <https://www.fatf-gafi.org/media/fatf/documents/Digital-Transformation-executive-summary.pdf> [accessed: 7 November 2021]
2. Federal Ministry of Finance (2019) *First National Risk Assessment 2018/2019, Germany*. Available at https://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Press_Room/Publications/Brochures/2020-02-13-first-national-risk-assessment_2018-2019.html [accessed: 7 November 2021].
3. Finanšu izlūkošanas dienests (2021) *Nacionālais NILLTPF risku novērtēšanas ziņojums par 2017.–2019. gadu*. Available at <https://fid.gov.lv/lv/darbibas-jomas/nacionalais-risku-novertejums/nacionalais-risku-novertejums-2017-2019> [accessed: 7 November 2021].
4. UNODC (2021). *Money Laundering*. Available at <https://www.unodc.org/unodc/en/money-laundering/overview.html> [accessed: 7 November 2021].

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 16-17
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

IMPROVING THE DECISION SUPPORT SYSTEM BY APPLYING ML-ALGORITHMS IN A TELECOMMUNICATIONS COMPANY

Aleksei Ryzhov

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
avryzhov1990@yandex.ru*

Keywords: machine learning, decision support system, ML models, classification, ML algorithms, business process

Currently, artificial intelligence is actively used in a wide range of fields of activity, including in the telecommunications industry. Machine learning algorithms play a key role in automation tasks, classification tasks, segmentation and clustering, in support and decision-making systems (Jepsen, 2021). The author of this work solves the problem of automating a business process in a telecommunications company using machine learning algorithms.

The purpose of this research is to consider the possibility of introducing machine learning algorithms to automate part of the business process of launching product offerings in a telecommunications company. The result of the business process is classified product offers (services) in the accounting system in order to build the company's financial statements.

One of the most significant technological advances of the last decade has been the development and widespread adoption of machine learning (ML). Decision making systems using ML algorithms can be applied in various applied areas for intelligent decision making to minimize manual human labor in business processes. The development and use of these systems will require ML algorithms, frameworks and programming.

To achieve the goal of the study, a number of tasks have been identified: analyze the existing business process, identify bottlenecks and shortcomings in its organization, develop KPIs to measure its effectiveness and propose a new solution for organizing the business process. Changes to the business process will affect the logic of organizing a business process, building models of business processes, making changes to existing information systems, as well as reducing the use of human labor in data processing by automating them using machine learning algorithms.

Author of this research proposes a model that automates manual labor, a technical solution for making changes to an existing information system, which should support the operation of a ML model and use the results of predictions in an automated business process. When developing a machine learning model, algorithms were used: a random forest, decision trees, a model based on the XGBoost algorithm was considered (Breiman, 2001; Swalin, 2018).

The implementation of the developed models entails changes in the existing information system at the level of user interface and at the level of interaction of the elements of the information system. The author proposes a draft technical solution for making these changes to the information system. These changes also imply changes to the logic of the existing business process. For this, models have been developed in BPMN notation AS IS and TO BE.

The research is supervised by Dr. sc. ing. Jelena Kijonoka.

References

1. Jepsen, C. (2021) *The Truth About Machine Learning In Enterprise Software*, retrieved 1 August 2024, from: <https://www.forbes.com/sites/forbestechcouncil/2021/07/07/the-truth-about-machine-learning-in-enterprise-software/?sh=5641f94844f8>
2. Breiman, L. (2001) Random forests. *Machine Learning*, 45, 5–32.
3. Swalin, A. (2018) *CatBoost vs. Light GBM vs. XGBoost*, from: <https://towardsdatascience.com/catboost-vs-light-gbm-vs-xgboost-5f93620723db>

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 18-19
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

DEVELOPMENT OF REQUIREMENTS FOR THE INTELLIGENT EUROPEAN UNION’S LARGE SCALE IT SYSTEMS IN THE AREA OF FREEDOM, SECURITY AND JUSTICE

Aleksandrs Gromovs

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
aleksandrs.gromovs@gmail.com*

Keywords: artificial intelligence, IT systems, Smart Borders, Justice and Home Affairs, GDPR

Area of Freedom, Security and Justice is a specific area of the European Union (EU) where decisions are made based on correctness and quality of the information provided in EU large scale IT systems (EU IT systems). Such information is used by public authorities of EU Member States to enhance security, ensure border control, migration and asylum processes in the EU. Decisions taken based on information stored in these systems can affect the rights and even lives of EU citizens and travellers both inside and outside of the EU. Each EU IT system has a specific defined scope strictly regulated by the relevant EU legislation.

Currently the following EU IT systems are used: SIS; VIS; EURODAC.

Commission (2014) has explored and analysed the concept of Smart Borders from different angles such as biometrics identifiers, border processes, data and architecture. eu-LISA agency’s pilot project (2015) has revealed that some of the key elements of Smart Borders such as infrastructure, standardisation, new technology and transformation of experience require additional attention. Based on that new EU IT systems are being developed and should enter into operations in 2023: EES; ETIAS; EU interoperability.

Commission (2019a, 2019b, 2020a, 2020b) has made significant progress in defining the usage of Artificial Intelligence (AI) in the EU as well eu-LISA agency (2019) studied implementation of interoperability components. Moreover, Commission (2021) has published a proposal to regulate the usage of AI in the EU, which is currently under assessment in the relevant EU institutions.

The primary hypothesis of this research is that currently existing methodologies, requirements and technical standards for the development, testing, adaptation, implementation and operation of intelligent EU IT systems are not sufficient. Secondary, it is also necessary to study how to incorporate in the technological development of any intelligent solution certain legal restrictions such as the privacy-by-design principle, requirements of GDPR, principles of necessity and proportionality and the principle of individual assessment. The latter principle is critical as it provides that no decision by the public authorities restricting a person’s rights shall be based on automation.

The research goal is to develop requirements for making EU IT systems more intelligent.

Data collection methods within present research are specific defined questionnaires for relevant national authorities of EU Member States and semi – structured interviews of law enforcement and IT experts, as well as desk research of relevant documents and legislation to identify possible constraints, gaps and challenges for introduction a truly “intelligent” solution.

Target group – national authorities responsible for implementation of EU IT systems, which will be asked to propose competent experts in the field of IT development, business analysis as well as end-users. Usage of multiple research methods will improve the quality of data gathering and analysis.

Through the desk research of documents and legal acts all high-level requirements already defined for respective EU IT systems will be identified and gathered. The assessment of identified high-level requirements as regards to their appropriateness and proportionality will be made in combination with analysis of answers provided to questionnaires and within semi-structured interviews of relevant experts. Fusion of results mentioned analysis and of desk research will allow to test the hypothesis and to develop the set of requirements for introduction of AI components into EU IT systems.

As a secondary objective, the research should provide proposals on how introduction of AI components into EU IT systems following the set of developed requirements could improve the effectiveness, accuracy and precision of their potential of usage, including a reduction of administrative burden, facilitated decision making process and overall increase of the level of internal security in the EU.

The research supervised by Prof. B. Misnevs.

Acknowledgements

I would like to express my acknowledgement to the State Border Guard of the Republic of Latvia for the support provided in the development of this paper.

References

1. European Commission. (2014) *Technical Study on Smart Borders*. Brussels: European Commission.
2. European Commission. (2019) *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions “Building Trust in Human-Centric Artificial Intelligence”*. Brussels: European Commission.
3. European Commission. (2019) *Ethics Guidelines for trustworthy AI*. Brussels: European Commission.
4. European Commission. (2020) *White Paper “On Artificial Intelligence – A European approach to excellence and trust*. Brussels: European Commission.
5. European Commission. (2020) *“Opportunities and Challenges for the Use of Artificial Intelligence in Border Control, Migration and Security”, Volume 1: Main Report*. Brussels: European Commission.
6. European Commission. (2021) *Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts*. Brussels: European Commission.
7. eu-LISA agency. (2015) *Smart Borders Pilot Project, Report on the technical conclusions of the Pilot*. Tallinn: European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice (eu-LISA).
8. eu-LISA agency. (2019) *Summary of the Feasibility Study “Elaboration of a Future Architecture for Interoperable IT Systems at eu-LISA”*. Tallinn: European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice (eu-LISA).

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 20-21
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

RESEARCH ON WEB ACCESSIBILITY REQUIREMENTS FOR E- COMMERCE

Alina Balabanova

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
balabanovalina@gmail.com*

Keywords: Web Accessibility, Web Content Accessibility Guidelines (WCAG), e-commerce, airline, framework development

Despite commonly accepted comprehensive guidelines on web accessibility developed in the European Union, many web pages remain being unsuitable for people with disabilities or age- related impairments (Pelzetter, 2021). Internet is used by many as a primary source of information and as a tool to utilize various paid online services, including buying and selling, with airlines specifically promoting utilisation of online booking and check-in systems (Gutierrez, *et al.*, 2005). Today many airlines offer online check-in free of charge, while at airport check-in desks it is a paid service. During the check-in process passengers are offered to purchase auxiliary services such as meals, seats and airport services. Despite that, only few airlines made their online check-in systems accessible for people with disabilities and impairments, which clearly goes against Article 9 of Convention on the Rights of Persons with Disabilities (CRPD) adopted by the United Nations in 2006.

This study explores Web Content Accessibility Guidelines (WCAG) adopted in European Union, analyses challenges of building accessible web-based information system and e-commerce sites and aims to develop a framework for web accessibility to make SmartLynx Airlines online check-in system more accessible. Such framework may not only help SmartLynx Airlines to comply with WCAG along with increasing both revenue and customer satisfaction, but it may also be applied by other passenger airlines across Europe.

There are various research exploring web accessibility challenges with proposed frameworks applicable to different areas like e-learning, health sector, etc. Sohaib and Kang (2017) conducted research on e-commerce web accessibility and WCAG compliance and proposed in their study recommendations will be considered while working on this framework. It will be developed as a result of qualitative research by means of data collection and a case study. The SmartLynx Airlines online check-in system shall be tested using a website accessibility evaluation tool to assess conformance level to World Wide Web Consortium's WCAG 2.1.

Based on collected data and anticipated test results, an accessibility widget will be implemented allowing passengers with disabilities and impairments to adapt web content to their specific needs.

The research is supervised by Dr.sc.ing. M.Savrasovs.

References

1. Gutierrez, C.F., Loucopoulos, C. and Reinsch, R.W. (2005) Disability-accessibility of airlines' Web sites for US reservations online. *Journal of Air Transport Management*, 11(4), 239–247.

2. Pelzetter, J. (2021) A Declarative Model for Web Accessibility Requirements and its Implementation. *Frontiers in Computer Science*, [online] 3. Available at: https://media.suub.uni-bremen.de/bitstream/elib/4669/1/dissertation_jens_pelzetter.pdf
3. Sohaib, O., Kang, K. (2017) E-Commerce Web Accessibility for People with Disabilities. *Complexity in Information Systems Development*, 87-99. Switzerland: Springer International Publishing.
4. W3C (2018) *Web Content Accessibility Guidelines (WCAG) 2.1*. [online] W3.org. Available at: <https://www.w3.org/TR/WCAG21/>



Session 2

**Innovations and Smart
Technologies in Transport
and Logistics**

**Inovācijas un viedās
tehnoloģijas transportā un
loģistikā**

**Инновации и умные
технологии в сфере
транспорта и логистики**

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 25-26
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

AUTOPARKA ELEKTRIFIKĀCIJAS IESPĒJU IZVĒRTĒJUMS KRAVU PĀRVADĀJUMU NOZARĒ

Inese Rodčenkova

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
inese.rodcenkova@gmail.com*

Atslēgas vārdi: Zaļais kurss, kravu pārvadājumu nozare, autotransports, elektrifikācija

Pieaugot zaļās apziņas nozīmei sabiedrībā, arvien vairāk nozares nostājas pamatotu pārmaiņu priekšā. Izņēmums nav arī noteikts kurss transporta politikā, paredzot iniciatīvas publiskā, privātā un biznesa sektorā, par mērķi izvirzot, ka līdz 2050. gadam gandrīz visi viegļie automobiļi, furgoni, autobusi un jauni lielas noslodzes transportlīdzekļi būs bezemisiju transportlīdzekļi. (Eiropas Komisija, 2020) Autoparku elektrifikācijas iespēju izvērtējuma kravu pārvadājumu nozarē nepieciešamību un aktualitāti pamato Eiropas Zaļais kurss autotransporta nozarē, kas vērsts uz CO₂ samazināšanu un nozīmē jaunus izaicinājumus Latvijas autotransporta nozarei. Ievērojot jautājuma starptautisko aktualitāti, nav zināms Latvijas autotransporta uzņēmumu iespējas autoparku elektrifikācijas praktiskai īstenošanai kravu pārvadājumu nozarē.

Pētījuma mērķis ir analizēt uzņēmumu iespējas realizēt pāreju no dīzeļdzinēju aprīkotiem kravas transportlīdzekļiem uz elektriskajiem kravas transportlīdzekļiem, nosakot priekšnosacījumus šīs pārejas veiksmīgai īstenošanai.

Teorētiskā pētījuma rezultāti liecina, ka ES Zaļajam kursam un Latvijas transporta politikas pamatnostādņu mērķi ir atbilstīgi, tomēr Latvijā mazāk skaidri definēti to sasniegšanai veicamie uzdevumi, radītie priekšnosacījumi un plānotās atbalsta rīcības.

Kravu automašīnu ražotāji, savu izvirzīto ražošanas mērķu ziņā, apstaidz Eiropas transporta politikas 2050. gadam noteiktos autoparku elektrifikācijas termiņus. Eiropas septiņi lielākie smago kravu automašīnu ražotāji: DAF, DAIMLER, FORD, IVECO, MAN, SCANIA un VOLVO, ir parakstījuši vienošanos, kurā noteikts, ka līdz 2040. gadam ražotāji pārstās savu iekšdedzes dzinēju darbināmo transportlīdzekļu tirgošanu un koncentrēsies uz ūdeņradi, akumulatoru tehnoloģijām un tīrām degvielām. (Campbell, 2020). Šāda Eiropas kravas automašīnu ražotāju rīcība, atzīstot “transporta zaļināšanas” nepieciešamību, liecina, ka šo ražotāju bezizmešu mobilitātes mērķi tiks sasniegti par desmit gadiem ātrāk salīdzinājumā ar noteiktiem mērķiem ES rīcībpolitikas dokumentos.

Privātais sektors elektroauto ieviešanā ir soli priekšā autokravu pārvadājumu jomai, noteiktu stimulu un atbalsta formu ziņā. Šodien stimuli elektriski uzlādējamām automašīnām ir pieejami katrā no 27 ES dalībvalstīm. Praktizēti tiek atvieglojumi, kas saistīti ar elektromobiļu iegādi, īpašumtiesībām, nodokļu atlaides u.c.. (ACEA, 2021)

Latvijas autotransporta kravu pārvadājumu nozarē šobrīd darbojas 4744 ir licencēti starptautiskie kravas pārvadātāji, kuru rīcībā ir 16336 licencēti kravas transportlīdzekļi (Autotransporta direkcija, 2021) – to skaitam pakāpeniski palielinoties un lielākai daļai arī atjaunojoties atbilstoši augstākajai EURO V un EURO VI emisiju kategorijai (Autotransporta direkcija, 2021), kas dod pieeju starptautiskajam kravu autopārvadājumu tirgum – 42 valstīm (Transporta attīstības pamatnostādnes 2021.–2027. gadam 1.pielikums, 2020). Vienlīdz tie ir arī nozares dalībnieki, kas līdz 2050. gadam tiks pakļauti turpmākajām plānotajām pārmaiņām un tālāku lēmumu pieņemšanai par uzņēmumu autoparku elektrifikāciju. Šobrīd uzņēmumu rīcībā esošais kravas elektroauto skaits sastāda tikai 0,0004% no kopēja reģistrēto kravas transportlīdzekļu skaita.

Praktiskā pētījuma gaitā intervēti 8 starptautiska mēroga Latvijas autotransporta kravu pārvadājumu uzņēmumu vadītāji. Divi intervijā iesaistītie uzņēmumi kravu pārvadājumus pasūtīja interesēs īsteno no/ uz Latviju, viens – tranzītā caur Latviju, bet pieci – ārvalstu teritorijā. Brauciena mērķa tirgus ir gan Baltija, Skandināvija un Eiropa, gan NVS valstis.

Vidējais nobraucamais attālums (km) no iekraušanas vietas līdz izkraušanas vietai trīs uzņēmumiem ir 151–300 km, bet diviem uzņēmumiem 301–500 km, trīs intervētajam uzņēmumam 500 un vairāk km. Autoparka lielums (uzņēmuma rīcībā esošais licencēto transportlīdzekļu skaits starptautiskajos kravu pārvadājumos) aptaujātajos uzņēmumos vidēji sastāda no 20 līdz 30 transporta vienībām.

Intervijas norisinājās tiešsaistē 2021. gada 1. novembrī, izmantojot strukturētās intervijas anketu ar 17 slēgta un atvērta tipa jautājumiem. Pētījuma gaitā meklētas atbildes uz jautājumiem: vai nozares dalībnieku skatījumā elektriskā transporta ieviešana kravu pārvadājumos ir pamatota un pārdomāta?; kādi faktori uzņēmuma vadītājus motivētu elektroauto ieviešanai uzņēmumā?; vai uzņēmumu vadītāji plāno autoparku elektrifikāciju un kādiem svarīgiem kritērijiem pievēršat uzmanību iegādājoties kravas transportlīdzekli komercpārvadājumu veikšanai?; kā arī, kādām atbalsta formām uzņēmēju skatījumā dodama priekšroka šī procesa sekmēšanai?

Empīriskā pētījuma rezultāti liecina, ka iegādājoties kravas automobili šobrīd, uzņēmumu vadītāji pievērš uzmanību iegādes vērtībai un vidējam degvielas patēriņam. Tikai diviem uzņēmumu vadītājiem aktuāla ir ekoloģiskās klases kategorija. Tai pat laikā visi intervētie norāda, ka apsver iespēju elektroauto iegādei, bet par galvenajiem priekšnosacījumiem izvirza konkurētspējīgu elektroauto iegādes cenu, salīdzinājumā ar dīzeļdzinēja automašīnām un zemākas ekspluatācijas izmaksas. Aktuāls ir arī plaši pieejams uzlādes staciju tīkls un uzlādes ātrums. Pētījuma rezultāti ļauj izdarīt pieņēmumu, ka pamatā nepieciešams atbalsts subsīdiju elektrisko kravas transportlīdzekļu iegādei, atbrīvojums no autoceļu nodevām un ikgadēja ceļa nodokļa apmaksas formā.

Šis materiāls atspoguļo pētījuma gaitu, vadītājs Ph.D. Juris Kanels.

Izmantotā literatūra

1. Eiropas Komisija. (2020) *Komisijas paziņojums Eiropas parlamentam, padomei, Eiropas ekonomikas un sociālo lietu komitejai un reģionu komitejai. Ilgtspējīgas un viedas mobilitātes stratēģija — Eiropas transporta virzība uz nākotni. COM(2020) 789 final.* Eiropas Komisija: Brisele, 09.12.2020. Pieejams: <https://eur-lex.europa.eu/legal-content/LV/TXT/HTML/?uri=CELEX:52020DC0789&from=ES> [02.11.2021.]
2. Campbell, P. (2020) *European truckmakers to phase out diesel sales decade earlier than planned* (2020). Pieejams: <https://www.ft.com/content/7d49589b-ff50-444d-8eef-b8abe5691f91> [02.11.2021.]
3. ACEA. (2021) *Electric vehicles: tax benefits and purchase incentives in the EU, by country* (2021). Pieejams: <https://www.acea.auto/figure/electric-vehicles-tax-benefits-and-purchase-incentives-in-eu-by-country/> [02.11.2021.]
4. VSIA Autotransporta direkcija. (2021) *Autotransports Latvijā.* Pieejams: <https://www.atd.lv/lv/jaunumi/autotransports-latvij%C4%81> [02.11.2021.]
5. Transporta attīstības pamatnostādnes 2021.–2027. gadam 1.pielikums. Esošās situācijas raksturojums un galvenie izaicinājumi (2020). Pieejams: https://www.sam.gov.lv/lv/sabiedriska-apsriesana-transporta-attistibas-pamatnostadnu-2021-2027gadams-projekts-un-strategiskas-ietekmes-uz-vidi-novertejuma-vides-parskataprojekts/1_pielikums_esosas_situacijas_raksturojums_izaicinajumi.pdf [02.11.2021.]

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 27-28
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

IMPROVING MANUFACTURING COMPANY'S ORDER-TO- DELIVERY PROCESS

Roman Atanasov

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
roman.atanasov96@gmail.com*

Keywords: Order to delivery process, supply chain, lead time, manufacturing strategy, performance measurements

The order-to-delivery (process) is defined as an entire workflow from receipt of customer's order until the product is shipped and documented. It can be divided into six main steps, such as order placement, order entry, order processing, order assembly, transportation and order receipt (Christopher, 2011). Following Viswanadham (2012), in more general terms, the order-to-delivery (OTD) is considered as principal means by which buyers and sellers communicate with each other.

The last two decades have been defined as the period of rapid changes in business environment, such as economic globalization, increased international competition and moving from product centric to customer centric orientation. Under the circumstances, manufactures are forced to quickly respond to customer needs, especially related to the flexibility, speed and reliability of delivery (Welker, 2004). Performance of order-to-delivery process therefore becomes of significant importance for manufacturing companies. They have to structure and manage their OTD process in such a way as to remain efficient and competitive in the market.

The OTD process deals with unexpected events and complexity in many aspects: uncertainty on both the production side and the demand side, ambiguity in values and objectives, interdependency among the supply chain participants (Welker, 2004). Moreover, there are no standardized solutions for OTD performance measurements. Instead, each company has to adjust performance measurements to its own capabilities, needs and limitations. Given above, it is of great importance for manufacturing companies to select the right performance factors to measure. Thus, the relevance of the problem is explained by the need to increase the knowledge on how to interpret, measure and manage the performance of the OTD process in order to steer a company in the desired direction.

The subject of this study is the order-to-delivery process in manufacturing companies.

The research aims to find ways to improve the order-to-delivery process of the manufacturing company.

For this purpose, the following questions will be observed in relation to a manufacturing company:

- What is the scope of order-to-delivery process?
- What are performance measures/dimensions of order-to-delivery process?
- What are bottlenecks that may affect efficiency and effectiveness of order-to-delivery process?

In addition, a case study will be conducted in order to examine the OTD process in practice. The study will be conducted based upon documentary research which includes articles, textbooks, and electronic data as well as personal observations based on the experience gained while working for a manufacturing company. The results of this study will help to identify more specific characteristics of the OTD process in manufacturing companies, explore existing OTD performance measurements and suggest improvements for each possible bottleneck. If this is

done correctly, the research will be of value for any manufacturing company who wish to manage its OTD process more efficiently and consequently improve the overall company performance.

The research is supervised by professor Dr. Sc. Ing. Genadijs Gromovs.

References

1. Christopher, M. (2011) *Logistics and supply chain management* (4th ed.). Pearson Education Limited, at https://www.icesi.edu.co/blogs/supplychain0714/files/2014/07/Martin_Christopher_Logistics_and_Supply_Chain_Management_4th_Edition_2011-1.pdf
2. Welker, G.A. (2004) *Patterns of order processing*. University of Groningen at <https://pure.rug.nl/ws/portalfiles/portal/9839718/thesis.pdf>
3. Viswanadham, N. (2012) *Analysis of Manufacturing Enterprises*. Springer Science & Business Media. ISBN: 978-1-4615-4645-0
4. Forslund, H., Jonsson, P., Mattsson, S.A. (2009) Order-to-delivery process performance in delivery scheduling environments. *International Journal of productivity and Performance and Management*, 58(1), at https://www.researchgate.net/publication/242020153_Order-to-delivery_process_performance_in_delivery_scheduling_environments

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 29-30
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

COMPOSITE INDEX ANALYSIS AND DEVELOPMENT FOR EVALUATING OF SUPPLY CHAIN EFFECTIVENESS IN AIRLINE CATERING SERVICES

Ulyana Sobolevskaya

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
ulyana.sobolevskaya@gmail.com*

Keywords: supply chain effectiveness (SCE), airline catering services, supply chain model, composite index, logistic operations

The rapid development of the widespread economic relationships and the growing competition makes the companies to enter into contracts towards supply chain logistics operations and reduce the costs to focus on the key capabilities. Innovative methods have been continuing to outperform the traditional transportation sphere (Elfriede, 2005). Supply Chain Effectiveness (SCE) is considered to be the significant issue for the logistic companies all over the world. In order to be able to manage the huge multitude of food deliveries in catering logistics, the effective supply chains model needs to be constantly improved, which reflects the difference from the general logistics. The largest providers of catering services for airlines expect to increase their performance because it allows improving competitiveness by means of reducing delivery time, insufficient quality, goods overproduction (Chang, 2013). Currently the logistic processes represent interconnection of the enforcing, planning and regulating management, that are intended both to satisfy the needs of the customers and to submit the core source for the strategic cooperation between logistic companies and forwarders, which in turn provides the logistic supply chain effectiveness (Brian, 2014). The constantly changing logistic area in airline catering services has an impact on the supply chain system targets by virtue of putting greater emphasis on the consolidated information technologies, logistic flows, the varied range of suppliers, planned deliveries operations and logistic flexibility to satisfy customers needs in airline catering services.

The main objective of this study is to develop the composite index based on supply chain model parameters for airline catering services sphere. The research aims to find out criteria that describes supply chain effectiveness and analyze the criteria for supply chain model parameters determination.

The subject of the study is the supply chain effectiveness which is considered in airline catering services sphere.

For this purpose, the following tasks have been performed:

- To review the current composite indicators used in the logistic area and the analysis of the factors used in these composite indicators;
- To choose the parameters for the composite index development that exist for evaluating of supply chain effectiveness;
- To develop the composite index based on the selected parameters;
- To define the scale of measurement for assessment of the composite index;
- To apply the indicated results on the working model of supply chain.

The above tasks have included sub-tasks that are interconnected to specifically define the role of composite index analysis in the sphere of airline catering services. With the assistance of revising the relevant literature and highlighting composite index analysis, the results about evaluating influence on supply chain effectiveness have been obtained. The research tasks

assisted in specifying of the current impact of composite index analysis on supply chain effectiveness and analysing the future impact of defined index for supply chain model parameters.

The current study has been conducted on the basis of scientific articles, electronic data, personal experiences obtained through working for an international company.

The implementation of the composite index to the airline catering services is based on the results of the current research and assist us in establishing reviewed results into the workflow.

The research is supervised by M.sc.ing. Aleksandrs Avdeikins.

References

1. Brian, K., Scott, K. (2014) Managing the Storage and Handling of Materials and Products in Supply Chain, pp. 136-140.
2. Chang, H., Hsu, C. (2013) E-procurement and supply chain performance. Supply Chain Management, pp. 47-51.
3. Elfriede, K., Hans, M., Viara, P., Martijn, S. (2005) *Performance Indicators in Logistic Service Provision and warehouse Management – a literature review and framework*, pp.8-11.
4. Mamothena, M., Jeroen, M., Hanani, T., Lucia, K. *Development and testing of a composite index to monitor the continuum of maternal health service delivery at provincial and district level in South Africa.* Plos One 2021, at <https://doi.org/10.1371/journal.pone.0252182>.

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 31
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

PIEGĀDES JYSK KLIENTIEM COVID-19 PANDĒMIJAS LAIKA IETEKMĒ

Artūrs Meisters

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
Ameisters1@gmail.com*

Atslēgvārdi: transporta veidi, “last mile” piegāžu veidi, galvenie veikstspējās rādītāji (KPI), statistika

Darba mērķis ir parādīt piegādes ķēdes izmaiņas COVID-19 pandēmijas laika ietekmē. Pandēmijas ietekme uz tirdzniecību kopumā ir bijusi ļoti būtiska. Tika aizvērti veikali un ierobežota to darbība, kas lika mainīt tirgotāju pieeju saviem klientiem un cilvēku paradumus iepirkties. Strauji pieauga e-komercijas tirdzniecība. Tomēr e-komercijas pārdošanas apjoms bija ļoti viļņains dēļ periodiskajiem ierobežojumiem, kuri tika uzlikti katrā konkrētajā valstī savādāk balstoties uz valsts nostāju un stratēģiju cīņā pret pandēmiju.

Teorētiskajā daļā tiek apskatīti visa loģistika kopumā un transporta veidi atsevišķi. Tiek skatīta transporta hierarhija. Tiek konkrēti izskatīti “last mile” piegādes izaicinājumi pirms un pandēmijas laikā, kā tie mainījās un kādas tendences ir vērojamas nākotnē. Tāpat bez loģistikas nav iedomājama arī datu klātbūtne, kas ir biznesa pamatā. Tiek veikts loģistikas radītāju hierarhijas apskats. Kādus datus izmanto uzņēmuma vadība līdz operatīvo procesu darbinieku datiem.

Praktiskajā piemērā tiek apskatīts uzņēmuma JYSK profesionālā darbība. Pandēmijas sākumā uzņēmuma JYSK vadība noteica konkrētu klientu piegāžu stratēģiju, kura tiek īstenota, lai sasniegtu labāko iespējamo piegāžu servisu saviem klientiem. Darbā tiek parādīta Baltijas valstu klientu piegāžu ķēde, kāda tā bija pandēmijas sākumā, kā šī ķēde attīstījās un kādi ir nospraustie turpmākie attīstības scenāriji, lai saviem klientiem nodrošinātu ātrākas, drošākas pasūtījumu piegādes. Viens no ieviešumiem ir sava transporta iegāde Baltijas valstu galvaspilsētās un ekspress piegādes veida ieviešana. Ar ekspress piegādi tiek nodrošināta sūtījumu aizvešana klientiem tajā pašā dienā. Tiek arī uzskatīti galvenie veikstspējās rādītāji, kuriem tiek sekots līdzī, lai novērtētu šo procesu efektivitāti. Rādītāji nodaļas vadītājam ļauj analizēt kā darbojas ieviestie procesi mērāmajos termiņos. Mērāmie termiņi var būt dažādi, atkarībā no tā cik bieži ir nepieciešams izvērtējums – stundas, dienas, nedēļas vai mēneši.

Šis materiāls atspoguļo pētījuma gaitu, vadītājs prof. Jurijs Tolujevs.

Izmantotā literatūra

1. Praude, V., Beļčikovs J. (2003) *Loģistika*. Rīga: Vaidelote, 541 lpp.
2. Praude, V. (2013) *Loģistika*. 2. pārstrād. un papild. izd. Rīga: Burtene, 560 lpp.
3. Krūmiņš, N. (2004) *Rokasgrāmatā loģistikas sistēmu vadīšanai*. Rīga: Latvijas Republikas Ekonomikas ministrija.
4. Centrālā statistikas pārvalde (2020) *Iekšzemes tirdzniecības un pakalpojumu statistika*. Pieejams: <https://stat.gov.lv/lv/statistikas-temas/tirdznieciba-pakalpojumi/iekšzemes>.



Session 3

**Market: Research, Projects,
Technologies and Problems
of the Modern Economy**

**Tirgus: pētījumi, projekti,
tehnoloģijas un mūsdienu
ekonomikas problēmas**

**Рынок: исследования,
проекты, технологии и
проблемы современной
экономики**

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 35-36
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

DEVELOPING AN EMPLOYEE COMPENSATION MODEL BASED ON THE THEORY OF JUSTICE

Yury Smirnov

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
doonto@gmail.com*

Keywords: Employee compensation, social justice, theory of justice, performance management

Compensation is an extremely important component of an organization's strategic management, influencing the company's performance by motivating employees and retaining and attracting high-quality talents. Labour compensation is the largest single expense for a firm. Disbalance in the compensation model, employee needs, abilities and the strategy of the organization will lead to low performance, attrition and other well-known people-management issues.

The current research is focused on building an employee compensation model based on the John Rawls' Theory of Justice (Rawls, 1971) considering humanistic principals of egalitarianism and meritocracy. The theoretical fundament used to build the compensation model is built by the multiple works in the talent management field by (Cappelli, 2008), (Cappelli, 2014), deep insights on the psychological factors, driving the employees behavior are brought here by analysis of (Larkin *et al.*, 2012), (Larkin, 2008), as well as multiple philosophical references. The Agency Theory (Jensen, 1976), given the world the agency business model is highly questioned here, due to its noticed transformation in the business over time. The upgrade of the agency model, brought by the "Pay for performance" approach, also causing significantly higher unsatisfaction rates "Pay for performance" (Larkin *et al.*, 2012). With the current increasing popularity of the leftist theories, sharing economy, the main principles of the theory of justice may be demanded again, at the new angle now "Social comparison theory" (Festinger, 1954). Some modern ideas, enabled by the technology growth and development, such as algocracy (Gartner, 2021) and Nudge theory and architecture of choice (Ebert, 2017) are also considered here. Consistency of the multiple theories brought up together are validated, using principles of the system thinking (Zexian, 2010).

The research aim is to create an employee compensation model using principles of the Theory of Justice. The object of the study is companies using the agency-based business model. The subject of the study is the main principles to be applied for building an employee compensation model.

The research questions include:

1. What employee compensation models are used in business nowadays?
2. What principles are used for building a suitable compensation model?
3. Can the compensation model based on the Theory of Justice principles satisfy real needs of an employer and employees?

The research methodology involves the following methods:

- Analysis of theoretical sources and previous research to create a theoretical basis and provide a historical overview of the subject of the study.
- Lean Canvas – to deconstruct the main pain points, appealing in the talent management and propose the solution in a short and structured way.
- SWOT analysis – to describe the attributes of the suggested model.
- PESTLE analysis – to identify relevant external factors.

- HADI Canvas (hypothesis, actions, data, insights) – to validate the hypothesis and analyses the outcomes.
- Strategy Canvas – to reflect the business plan and validated by the MOST analysis (mission, objective, strategy, tactics, use).
- An online survey to estimate the possible feedback on implementation the featured employee compensation model in the company using the successive independent samples method.
- MS Excel – for processing the obtained data and performing necessary calculations.

A developed employee compensation model is supposed to be used by the company's management to improve their HR practices.

This research is limited by the agency-model based companies such as consulting companies and service providers.

The research is supervised by Dr.sc.admin., Professor Yulia Stukalina.

References

1. Cappelli, P. (2008) Talent management for the twenty-first century. *Harvard Business Review*, 86(3), 74–81.
2. Cappelli, P. (2014) Talent management: Conceptual approaches and practical challenges. *Annual Review of Organizational Psychology and Organizational Behaviour*, 1, 305–331.
3. Ebert, P. F. (2017) Nudge management: applying behavioural science to increase knowledge worker productivity. *Journal of Organization Design* (<https://doi.org/10.1186/s41469-017-0014-1>).
4. Festinger, L. (1954) A Theory of Social Comparison Processes. *Human Relations*, 7(2), 117-140.
5. Gartner. (2021) *Hype cycle for human capital management technology*.
6. Larkin, I. (2008) Bargains-then-ripoffs: innovation, pricing and lock-in in enterprise software. *Best Paper Proceedings of the Academy of Management Meeting*.
7. Larkin, I. *et al.* (2012) The psychological costs of pay-for-performance: Implications for the strategic compensation of employees. *Strategic Management Journal*, 33(10), 1194–1214.
8. Jensen, M.C., Meckling, W. H. (1976) Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4), 305-360.
9. Rawls, J. (1971) *A Theory of Justice*. Cambridge.
10. Zexian, Y. X. (2010) A revolution in the field of systems thinking—a review of Checkland's system thinking. *Special Issue: Systems methodology and social development: a global conversation in China*, 27(2), 140-155.

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 37-38
Transport and Telecommunication Institute, Lomonosova 1, Rīga, LV-1019, Latvia

AMATPERSONU NEMATERIĀLĀS MOTIVĀCIJAS UN LABSAJŪTAS SISTĒMAS PILNVEIDOŠANA VALSTS POLICIJAS STRUKTŪRVIENĪBĀ KRĪZES APSTĀKĻOS

Inga Olga Pulle

*Transport and Telecommunication Institute
Lomonosova 1, Rīga, LV-1019, Latvia
inga.pulle@inbox.lv*

Atslēgas vārdi: Nemateriālā motivācija, Labsajūtas sistēma, Valsts policija, Krīze, Covid-19 pandēmija

2020.gada 11.martā Pasaules Veselības organizācijas ģenerāldirektors Dr.Tedross Adanoms Gebrejesuss plašsaziņas līdzekļu brīfingā par Covid-19 atzīmēja, ka Covid-19 infekcijas uzliesmojums tiek raksturots kā pandēmija. Tāpat viņš norādīja, ka visām pasaules valstīm ir jāpanāk labs līdzsvars starp veselības aizsardzību, ietekmes uz ekonomiskās un sociālās sfēras samazināšanu līdz minimumam un cilvēktiesību ievērošanu. Šī krīze neskar tikai sabiedrības veselību, tā skar absolūti katru nozari un cīņai ar to ir nepieciešams iesaistīt katru indivīdu. (WHO, 2020).

Viena no Covid-19 infekcijas izraisīto pārmaiņu ietekmes visvairāk skartajām institūcijām Latvijas Republikā ir Valsts policija, kuras amatpersonas pildīja un turpina pildīt amata pienākumus Covid-19 infekcijas izplatības ierobežošanā un krīzes pārvarēšanā.

Covid-19 pandēmija var ietekmēt policijas garīgo veselību laikā, kad tā sabiedrībai ir visvairāk nepieciešama. Likumsargi nav pasargāti no Covid-19 infekcijas sabiedrībai radītā stresa, patiesībā, viņus tas var ietekmēt spēcīgāk, jo viņi ir vieni no tiem, kam jāturpina strādāt un pildīt dienesta pienākumus, kamēr citi var patverties mājās. Papildus Covid-19 tiešajai ietekmei uz policijas amatpersonām, ietekmi pastiprina arī apstākļi, ka tiem ir jāsakaras ar personām, kuras cieš no garīgās veselības problēmām, ko papildus vēl pastiprina bailes no inficēšanās, ekonomiskās nenoteiktības, resursu trūkuma, izolācijas. (SpringerLink, 2020).

Valsts policijas priekšnieks Armands Ruks savā uzrunā arī atzīmēja, ka, neraugoties uz kopējā noziedzības līmeņa samazināšanos Latvijā, ir pieaudzis to noziegumu skaits ģimenē, piemēram, konflikti ģimenē un vardarbība ģimenē, kuru cēlonis ir emocionālais stress, ko izraisa Covid-19 pandēmija (Ruks, 2021).

Krīzes izraisīto pārmaiņu apstākļos Valsts policijas personālam ir nepieciešama īpaša attieksme, kura būtu vērsta uz amatpersonu drošības nodrošināšanu, amatpersonu fiziskās un garīgās veselības saglabāšanu, slimības risku mazināšanu un amatpersonu labsajūtas uzlabošanu. Lai to panāktu ir nepieciešama Covid-19 izraisīto pārmaiņu laikam atbilstoša motivācijas un labsajūtas sistēma, kuras mērķis ir saglabāt Valsts policijas amatpersonu labsajūtu, lojalitāti un darba efektivitāti, kā arī samazināt Covid-19 izraisīto faktoru ietekmi.

Pētījuma objekts ir Valsts policijas struktūrvienība.

Pētījuma priekšmets ir Valsts policijas amatpersonu nemateriālās motivācijas un labsajūtas sistēma.

Pētījuma mērķis ir novērtēt Covid-19 pandēmijas ietekmi uz Valsts policijas struktūrvienības amatpersonu motivāciju un labsajūtu un izstrādāt rekomendācijas nemateriālās motivācijas un labsajūtas sistēmas pilnveidošanai.

Lai sasniegtu pētījuma mērķi, tika izstrādāti šādi uzdevumi:

- Precizēt, analizēt un apkopot motivācijas un labsajūtas teorijas;
- Analizēt un apkopot starptautisko un nacionālo faktisko pieredzi par Covid-19 pandēmijas ietekmi uz policijas darbu un amatpersonu ikdienas darba organizāciju;

- Analizēt un novērtēt esošo Valsts policijas struktūrvienības nemateriālās motivācijas un labsajūtas sistēmu;
- Izstrādāt rekomendācijas esošās Valsts policijas struktūrvienības nemateriālās motivācijas un labsajūtas sistēmas pilnveidošanai.

Darba uzdevumu risināšanai tiek izmantotas šādas pētījuma metodes: empīrisko pētījumu metode, teorētisko pētījumu metode, aprakstošā metode, socioloģisko pētījumu metodes – anketēšana un intervijas.

Pētījuma ierobežojumi: ņemot vērā, ka pētījuma maksimālais apjoms neļauj veikt visu Valsts policijas iecirkņu amatpersonu viedokļu analīzi par Covid-19 ietekmi uz viņu motivāciju un labsajūtu, darba veikšanai tika izvēlēts viens Valsts policijas iecirknis gadījuma analīzes veikšanai – Valsts policijas Rīgas reģiona pārvaldes Baložu iecirknis.

Pētījuma zinātniskā novitāte un praktiskais pielietojums sastāv no praktisko rekomendāciju izstrādāšanas esošās Valsts policijas Rīgas reģiona pārvaldes Baložu iecirkņa nemateriālās motivācijas un labsajūtas sistēmas pilnveidošanai, kas var tikt pielietotas arī pārējos Valsts policijas iecirkņos Latvijas Republikā.

Šis materiāls atspoguļo pētījuma gaitu, vadītāja profesores Dr.oec. Irinas Kuzminas- Merlino.

Izmantotā literatūra

1. Ruks, A. (2021) *Valsts policija: kopējais noziedzības līmenis valstī sarūk, pieaug vardarbība ģimenē*. Pieejams: <https://www.sargs.lv/lv/viedoklis/2021-02-08/valsts-policija-kopejais-noziedzibas-limenis-valsti-saruk-pieaug-vardebiba> [19.10.2021]
2. Stogner, John *et al.* (2020) Police Stress, Mental Health, and Resiliency during the Covid-19 pandemic. *American Journal of Criminal Justice*, 45, 718-730. Springer Link. Pieejams: https://link.springer.com/article/10.1007/s12103-020-09548-y?error=cookies_not_supported&code=4fc243b4-f38e-4237-ad17-2328c6bfbe4b [19.10.2021]
3. www.who.int (2020) WHO Director-General's opening remarks at the media briefing on COVID-19. *Official webpage of World Health Organization*. Published 11 March, 2020. Pieejams: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020>. [19.10.2021]

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 39-40
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

UZŅĒMĒJU SOCIĀLĀ AIZSARDZĪBA KĀ NOZĪMĪGĀKAIS MAZĀ BIZNEŠA ATTĪSTĪBAS FAKTORS LATVIJAS REPUBLIKĀ

Romāns Biļickis

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
romans.bilickis@gmail.com*

Atslēgas vārdi: Mazais bizness, pašnodarbinātie, sociālā aizsardzība, bezdarbs

Augstais bezdarba līmenis provocē ievērojamu valsts budžeta līdzekļu piešķiršanu sociālās apdrošināšanas sistēmai, lai atbalstītu cilvēkus, kuri uz laiku ir zaudējuši darbu. Viens no produktīvajiem līdzekļiem cīņā pret bezdarbu ir valsts radīti labvēlīgi apstākļi jaunu uzņēmēju piesaistei komercdarbībai ar saimnieciskās darbības palīdzību, kā arī mikrouzņēmumu veidošana. Tas ļauj daudzām valstīm mazināt pieaugošā bezdarba sociālo ietekmi ekonomikas lejupslīdes laikā. Rezultātā pašnodarbinātība kļūst arvien izplatītāka daudzās valstīs, un šī proporcija svārstās no 7% līdz 30% no strādājošajiem ES valstīs (Eurostat, 2021).

Mazā biznesa ekonomisko un sociālo nozīmi ir grūti pārvērtēt. Mazā biznesa attīstība valstī samazina bezdarba līmeni, iedzīvotājiem kļūst pieejams plašāks preču un pakalpojumu klāsts, kā arī uzlabojas pakalpojumu kvalitāte. Palielinoties konkurencei tirgū, samazinās patēriņa preču cenas. Mazo uzņēmumu galvenā loma ir ekonomikas stimulēšanai un bezdarbnieku skaita samazināšanai.

Latvijā mazie uzņēmumi un pašnodarbinātie (MUP) ir viena no vājāk sociāli aizsargātajām ekonomiski aktīvo iedzīvotāju grupām.

Viena no lielākajām problēmām ir tā, ka MUP Latvijā parasti ir garāka darba diena, ir īsāks atvaļinājums vai arī tā nav vispār, un atšķirībā no lielo uzņēmumu darbiniekiem nevar ņemt slimības lapu. Šai strādājošo iedzīvotāju grupai, kā likums, nav obligātās sociālās apdrošināšanas iemaksas.

Šajā sakarā MUP bieži cieš no tādām slimībām kā sirds un asinsvadu sistēmas slimības, garīgi traucējumi, alkoholisms. Nepieciešamība izveidot efektīvu uzņēmēju sociālās aizsardzības mehānismu un šīs tēmas nepietiekama atspoguļošana publikācijās noteica izvēlētas tēmas aktualitāti. Šīs tēmas aktualitāte ir tāda, ka, neraugoties uz valsts struktūru politiku attiecībā uz esošo pasākumu īstenošanu, kuru mērķis ir atbalstīt mazo un vidējo uzņēmējdarbības segmentu, joprojām nav atrisinātas vairākas problēmas, kas negatīvi ietekmē ne tikai Latvijas Republikas iedzīvotāju

vēlme veidot neatkarīgu biznesu, bet arī pastāvīga nevēlēšanās joprojām pastāv.

Pētījuma priekšmets ir mazo uzņēmumu un pašnodarbināto personu sociālās aizsardzības mehānisms Latvijā.

Šī pētījuma mērķis ir, pamatojoties uz ekonomiski attīstīto valstu pieredzi, izstrādāt pasākumu kopumu, lai uzlabotu (izveidotu) mazo uzņēmumu sociālās aizsardzības mehānismu ārkārtas situācijās.

Pētījuma objekts ir mazie uzņēmumi, kuros strādā līdz 50 darbiniekiem. Lai sasniegtu pētījuma mērķi, autoram jāatrisina šādi uzdevumi:

- ✓ definēt mazā biznesa lomu Latvijas ekonomikā; noteikt tendences mazo uzņēmumu attīstībā, kuros strādā līdz 50 darbiniekiem;
- ✓ noteikt faktorus, kas ietekmē mazo uzņēmumu uzņēmējdarbības aktivitātes līmeni;

- ✓ analizēt sociālās aizsardzības mehānismu kā vienu no valsts atbalsta veidiem uzņēmējdarbībai;
- ✓ izstrādāt pasākumu kopumu uzņēmēju sociālajai aizsardzībai ārkārtas situācijās, kas motivētu mazā biznesa attīstību Latvijā.

Kā maģistra studiju metodisko pamatu autors izmantoja tādas zinātniskās pētniecības metodes kā: literatūras apskats par pētījuma tēmu; statistisko datu analīze un to interpretācija grafiku, tendenču plānošana, tabulu veidā; aptaujas metode anketas veidā; mazo uzņēmumu sociālās aizsardzības pieredzes vispārināšana Eiropas Savienības ekonomiski attīstītajās valstīs. Uzņēmēju aptauja tiek veikta anonīmi un stingri konfidenciāli; visi iegūtie rezultāti tiks izmantoti tikai vispārinātā veidā.

Plānotais darba rezultāts ir ieteikumu izstrāde sociālās aizsardzības mehānisma pilnveidošanai un labvēlīgāku apstākļu radīšanai mazā biznesa un pašnodarbināto segmentiem Latvijas Republikā.

Šis materiāls atspoguļo pētījuma gaitu, vadītāja Prof. Irina Kuzmina-Merlino.

Izmantotā literatūra

1. Eurostat (2021) *Percentage of self-employed by sex, age groups and household composition*. Pieejams: https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfst_hhsety&lang=en [26.10.2021]

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 41-42
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

АНАЛИЗ ИНВЕСТИЦИОННОГО КЛИМАТА В ЛАТВИИ И ШВЕЙЦАРИИ НА ФОНДОВОМ РЫНКЕ

Мария Вышар

*Институт транспорта и связи
Ломоносова 1, Рига, LV-1019, Латвия
mariia.vyshar@gmail.com*

Ключевые слова: ценные бумаги, финансовая система, банки, фондовая биржа, Латвия, Швейцария

Существует множество вариантов инвестиций и каждый выгоден по-своему. Традиционные виды вкладов безопаснее и вызывают больше доверия, тогда как появляются более рискованные виды вложений, которыми нужно уметь управлять. Ценные бумаги – довольно большой блок активов разной степени риска и прибыльности: обращение с некоторыми из них просто и понятно, тогда как с другими более рискованно и требуют помощи специалистов.

Вопрос ситуации на фондовом рынке в той или иной стране поднимаются в работах научных деятелей региона. Примерами таких трудов могут служить такие работы как «Оценка эффективности и волатильности фондового рынка в Российской Федерации» Омрана Шади (Диссертация на соискание учёной степени кандидата экономических наук от 2020-го года), «Индекс финансового развития Кыргызстана: современные тенденции» авторов Гордячкова О.В., Каназаров Д.К от 2019 и другие. Также аспекты и тенденции развития финансовых рынков и систем выносятся на ряд международных форумов, такие как Московский финансовый форум и Форум Международной Ассоциации Рынков Капитала” The ISMA”.

В данной работе будут рассмотрены два рынка – Латвии и Швейцарии – для того, чтобы понять, что заставляет или мешает вкладывать деньги в такой неоднозначный актив: к каким инструментам прибегают частные вкладчики, чего опасаются, какими активами располагают, какие риски существуют в данной области, структуру законодательства двух стран и их различия, а также другие факторы, которые влияют на данную сферу финансового рынка.

Целью исследования, является проведение анализа фондовых рынков Латвии и Швейцарии и дать рекомендации по улучшению инвестиционного климата в Латвии.

Для достижения цели исследования в работе поставлены следующие задачи:

1. Рассмотреть теоретические аспекты по теме инвестирования в финансовые инструменты;
2. Провести сравнительный анализ инвестиционного климата в Латвии и Швейцарии;
3. Разработать предложение по улучшению инвестиционного климата на финансовом рынке Латвии.

На основе данного анализа можно будет составить рекомендации и прогнозы как для самих вкладчиков, так и для других участников данной области по улучшению ситуации и контролю факторов, влияющих на эффективность вкладов.

Для изучения проблемы и поиска решения были использованы следующие методы:

1. Анализ литературных и онлайн научных источников для создания теоретической базы научного исследования и использования опыта других исследователей для более полного погружения в вопрос исследования.

2. Анализ статистических данных для полноценного представления текущей ситуации и истории развития сложившейся ситуации, а также ее причин и возможных последствий.

3. Интервью со специалистами для уточнения существующих нюансов в процессах, происходящих на финансовых рынках и возможные проблемы, которые возникают при работе в данной области.

Представленный материал отражает ход исследования, проводимое под руководством Кожевниковой Марины Владимировны.

Используемая литература

1. Swiss National Bank. (2021) *Swiss stock indices* [online] Available at: <https://data.snb.ch/en/topics/finma#!/cube/capweums> [Accessed 13 April 2021].
2. Павлюк, О. (2013) Регулирование рынка финансовых инструментов в Латвии (Конспект лекции). *Балтийский курс. Новости и аналитика*. [online] Available at: http://www.baltic-course.com/rus/ekonomiceskaja_istorija/?doc=84918 [Accessed 12 March 2021].
3. ФКТК. (2021) Statistics [online] Available at: <https://www.fktk.lv/statistika/> [Accessed 30 March 2021].
4. *Закон ЛР о рынке финансовых инструментов*. (2004) Рига: Latvijas Vēstnesis, 1.04.2004.

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 43-44
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

STIMULATING SUSTAINABLE DEVELOPMENT IN THE AIRLINE INDUSTRY

Eduards Minajevs

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
edmin@inbox.lv*

Keywords: Aviation Industry, sustainability, environment, performance, methods

The aviation industry has changed the world, providing fast and reliable transportation, contributed to worldwide economy growth, and offered numerous opportunities for people around the world. Before the Covid-19 crisis, aviation industry alone provided more than 11 million of jobs and supported nearly 88 million of jobs and provided global economic impact for \$ 3.5 trillion. At the same time, growing concerns related to climate change and environmental impact is getting worldwide attention. With the aim to reduce environmental impact, all industries set their course to sustainable development.

The International Civil Aviation Organization has set ambitious target for aviation industry, to reduce its environmental impact by cutting carbon dioxide or CO₂ emission by 2050, with the base line emission volume being chosen 2005 year and improving fuel efficiency by 2% annually.

While the aviation industry is already working hard in reducing its' environmental impact by introducing fuel-saving technologies and practices, the goals set by International Civil Aviation Organization might be too challenging with current approach, due to several considerable obstacles. The fuel-efficiency improvement with developing of the existing technologies is not enough to compensate growing demand and slow deployment of new airplane models into the fleets of airlines around the world (Abrantes *et al.*, 2021). Radical alternative technologies, like hydrogen fuel, are still far from wide deployment (Pfeifer, 2021). Sustainable Aviation Fuels, which are considered to be quite promising in reducing aviation's CO₂ emission (Ahmad *et al.*, 2021) has significantly higher price, compared with traditional fossil fuels, low production volume, and some uncertainties related to feedstock.

In order to stimulate further sustainable development within the airline industry, and provide support for those airlines, which are already undergoing sustainability transformation, a comprehensive mechanism should be developed. The framework of such mechanisms should include a comprehensive analysis of airlines' sustainable performance, ranking or any other analysis results displaying mechanism, and set of benefits, which shall be linked to sustainability analysis result. Such support mechanism will also stimulate sustainability development of airline industry, technology innovation and penetration into the market, without compromising affordability of air travel, jobs and economy growth.

The aim of the research is to develop assessment methods and tools for evaluating the environmental efficiency of an airline in the context of stimulating its sustainable transformation based on the customers' demand for sustainable products and services. The subject of the research is methods and tools used for evaluating the environmental efficiency of an airline. The object of the research is an international airline. The following research questions were set to accomplish the research aim:

- What does the Sustainable Development concept presuppose in the Airline Industry?
- How can sustainable development of airlines be stimulated and assured over a long period of time?

- What are the current and anticipating challenges airlines may face in the course of sustainable transformation?
- What are the main criteria of the sustainability for the airlines and how they could be measured?
- What measurement system is suitable for evaluating the environmental efficiency of an airline?

The methods used by the author include 1) theoretical literature review; 2) analysis of the previous research in the field, as well as basic regulatory documents in the Aviation Industry; 3) case studies; 4) expert interviews; 5) a survey; 6) statistical analysis of the obtained data.

The research is supposed to have both theoretical and practical significance, because it is aimed to analyze the existing problems within the Airline Industry and provide some solutions to these problems as well. The obtained research results would help to steer future policy of the airlines, to match the companies' offers with the market demand. Furthermore, the developed solutions would help stimulate sustainable development of the airlines based on the research results.

The limitations of the research are related to the limited numbers of the survey participants and subjective judgments, which might impact the survey results. The same subjective judgment limitations can be observed during expert interviews. Another limitation of the research is the lack of relevant theoretical literature on the topic.

The research is supervised by Dr.sc. admin., Professor Yulia Stukalina.

References

1. Abrantes, I, Ferreira, A. F, Silva, A, Costa, M. (2021) Sustainable Aviation Fuels and imminent technologies- CO2 emission evolution towards 2050. *Journal of Cleaner Production*, DOI:10.1016/j.clepro.2021.127937
2. Ahmad, S, Ouenniche, J, Kolosz, B.W, Greening, P, Andresen, J.M. Maroto-Valer, M. M, Xu, B. (2021) A Stakeholder's participatory approach to multi-criteria assessment of sustainable aviation fuels production pathways. *International Journal of Production Economics*, DOI:10.1016/j.iipe.2021.108156
3. Pfeifer, S. (2021) Airbus gears up for hydrogen jet as fuel of future edges closer to reality. *Financial Times*. Available at: <https://www.ft.com/content/87941b8d-0460-4b54-a861-d6ebc6da29e8>. Accessed 10.10.2021.

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 45-46
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

EXTENDING THE CHARTER AIRLINE BUSINESS MODEL WITH ONLINE BOOKING SERVICES

Aleksejs Ogorodnikovs

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
aleksejs.ogorodnikovs@gmail.com*

Keywords: Airlines, Online Booking, Check-in, IT Platform, Vertical Integration, Lateral Marketing

A business model describes the rationale of how an organization creates, delivers, and captures value (Osterwalder, 2010). Charter business considered as a separate category of an airlines business where six informal categories generally recognized by aviation society (Fichert, 2020). Charter Business determined as a model with secured cash flow provided by agreements with tour operators signed before each season. Current charter business models do not consider distribution channels. Opportunities that emerged by the implementation of IT platforms dramatically change the landscape of the charter business model.

The main problem of charter carriers is to obtain profitable contracts with tour operators. Supply quite often exceeds market demand. Therefore, this pushed charter market players to the high competition within B2B market. The issues of vertical integration and horizontal interlinkages seem to be the most challenging. The author considers this part as an unutilized opportunity (Kotler, 2003). The author considers research relevant both from the practical applicability of results for business (profit generation) and from the view of scientific exploration (developing of methodology).

Analysis takes necessity to disassemble the charter business in terms of its functioning. For that purpose – the methodology (decomposition) of *The Canvas Business Model* has been applied (Osterwalder, 2010). Drilling down within this business model defines the role of the booking system. Based on *The Canvas Business model* – one of the most important specific of charter airline business model is that Revenue Stream (RS) is fully secured because of entire aircraft is always being sold. Therefore, B2C demand is equal to 100% for confirmed contracts within solid customer segment (CS). Where CS for even big charter airlines is short-listed. The research part is based both on an empirical approach (Eisend, 2019) – a survey of charter business experts (six charter airlines of the Avia Solutions Group), and on statistical models using the Octave GNU modelling environment (gnu.org, 2020). The model represents airline industry Charter airline. As separate part of research – two options of online booking system implementation for Charter Company have been analysed – “outsourcing” vs “in-house”.

Result of the study provides assessment of vertical integration for charter companies, supported by booking system. Giving a methodology for finding optimal relationships with B2B partners while maximizing own profit. All those leveraged by utilization of the new sales channels and generation of direct B2C products or services. Usage of lateral marketing combined with IT sophisticated techniques - shapes new B2C and even B2B products (as act of innovation process). Showing benefits of “in-house” approach for the booking within charter airline. Case study demonstrated the excellent forecasting ability of the statistical model coincident with empirical data, collected from the industry experts.

The research is supervised by Professor Dr. Sc. Ing. Dmitry Pavlyuk.

References

1. Osterwalder, A. (2010) *The Business Model Canvas*. 1st. ed. Hoboken, New Jersey: J.Wiley & Sons.
2. Kotler, P., Trias de Bes, F. (2003) *Lateral Marketing. New Techniques for finding breakthrough ideas*. Hoboken, New Jersey: J. Wiley & Sons.
3. Eisend, M., Kuss, A. (2019) *Research Methodology in Marketing. Theory Development, Empirical Approaches and Philosophy of Science Considerations*. New York:Springer.
4. gnu.org (2020) *Scientific Programming Language GNU Octave* [Online], Available at: <https://www.gnu.org/software/octave/index> (Accessed: 1 March 2021)

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 47-48
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

CORPORATE SOCIAL RESPONSIBILITY IN THE LATVIAN AVIATION INDUSTRY FROM A COMPARATIVE PERSPECTIVE

Santa Krūze

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
santakruze.lv@gmail.com*

Keywords: Corporate social responsibility practice, stakeholders, international airport, aviation strategy

Aviation industry has been hit very hard by the Covid-19 and it will take years to come to the situation it was before pandemics. The current circumstances can be used to engage in corporate social responsibility (CSR) activities that would offer great opportunities in aviation industry to enhance recovery after pandemics.

The most important player globally, the United Nations, refer to CSR as management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders (UN, 2000). In the academic environment, it is referred to CSR as integration of the enterprise's social, environmental, ethical and philanthropic responsibilities towards society into its operations, processes and core business strategy in cooperation with relevant stakeholders (Rasche *et al.*, 2017).

In 2015, a new policy of aviation in the European Union – *An Aviation Strategy for Europe*, was launched by the European Commission (EC). According to the EC (European Commission, 2015), the Aviation Strategy for Europe is a milestone initiative to generate growth for European business, foster innovation and let passengers' profit from safer, cleaner and cheaper flights, while offering more connections. Thus, with the development of CSR in the aviation industry, it is essential to enhance sustainable development after Covid-19 pandemics, strengthen the role of aviation in the development of society, contribute to environmental protection, climate targets 2030, economic development, digitalization and increase passenger numbers.

The research aim is to assess CRS practices used in the aviation industry and perform a comparative analysis of the CSR practices applied in different airports. The subject of the research is CSR practices used by modern international airports. The object of the research is an international airport.

The following research questions were formulated by the author:

1. What are the main objectives of CSR in the aviation industry?
2. How do different CSR practices contribute to sustainable development of a modern international airport?
3. Which factors influence the choice of CSR activities of an airport?
4. What are the internal and external airport stakeholders in the context of an airport's CSR policy and what role do they play?
5. What is the relationship between the CSR practices used in the airport and the airport's performance in the context of sustainable development?
6. What CSR practices can be applicable in the Latvian Aviation Industry to enhance its sustainable development?

Research methodology includes the review of theoretical literature and documentation of Riga International Airport and Stockholm Arlanda Airport, relevant regulating documents of Latvia and Sweden, CSR guidelines and reports, IACO, IATA and EASA documents, analysis of the publicly available data provided by Riga International Airport and Stockholm Arlanda Airport as well as statistical data analysis.

The results obtained provide the basis of a few recommendations for the airport management responsible for developing an effective corporate social responsibility policy aimed at supporting sustainable development of an airport.

The limitations of the research are mainly associated with the research base that includes two international airports. Another limitation is the period of conducting the research (2020-2021).

Acknowledgements

The author expresses her gratitude to the research supervisor *Dr.sc.admin., professor Yulia Stukalina* for the support and guidelines.

References

1. European Commission (2015) *An Aviation Strategy for Europe*. COM (2015) 598 final.
2. Rasche, A., Morsing, M. and Moon, J. (2017) *Corporate Social Responsibility. Strategy, Communication, Governance*. Cambridge University Press.
3. United Nations (2000) *Global Compact*. Retrieved 23 August 2021 from: <https://www.unglobalcompact.org/>

*RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 49-50
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia*

THE IMPACT OF DIGITAL SOLUTIONS AND AUTOMATION IN AIR TRAFFIC CONTROL

Jeļena Kuzmičova

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
inmyseptember@inbox.lv*

Keywords: digital solutions, automation, air traffic control, artificial intelligence, remote tower service

Airline industry is recovering from global pandemic crisis, so growth rate of air traffic returns to earlier trends. Labour force and finances are limited resources, thus there is a great need for optimizing multiple processes of Air Traffic Control (ATC).

Since number of aircraft in the sky is steadily increasing and the systems onboard become more sophisticated, so does the airspace – getting more complicated to manage and cumbersome for Air Traffic Controllers. Digital solutions can be not only a valuable tool for them, but also a real saviour in difficult situations. Automation and digital solutions can significantly improve work efficiency of Air Traffic Control unit.

The main task of ATC is to ensure safe, orderly and expeditious traffic flow (ICAO Doc 4444 PANS-ATM, 2016). These functions are performed by air traffic control officers (ATCOs), whose main task is to prevent collisions between aircraft by applying proper separation and providing clearances in timely manner to organize orderly flow of air traffic, along with Flight Information and Alerting Service provision.

There is no doubt that automation of processes facilitates and considerably enhances the safety and the effectiveness of ATC operations. In fact, the use of automation is not a new idea in aviation. This concept has brought many changes by implementing progressive and sophisticated technologies. The principal objective of this is the use of various control networks and approaches to reduce the need for the close human presence and involvement into the workflow. The diversity of applications becomes wider constantly. These high-end technological decisions, once rare and limited, do not accept any borders, because what we are used to think as routine, in fact have emerged as a global challenge for the whole world. They act as a separate individual organism previously dependent on IT specialists. The most topical issue is it a threat or the new opportunity for improving weapons, means of transport or even our bodies and mind. There are no doubt new forms of life can be created and thereafter the course of evolution will be changed.

Decision support tools are the best possible example in the context of ATC. This system is used to provide its users recommendation or possible ways to address issues before the implementation of appropriate proposal. The more data, systems, and procedures we have, the greater need to process information, thereby increasing workload and leading to the higher number of human factor errors. That is why, automated support tools can become a valuable support in complicated situations. These systems include approach spacing tool to manage separation between arriving flights (AMAN) and Medium-Term Conflict Detection (MTCD), which indicates potential conflicts between aircraft.

Distant ATC is at the forefront of technologies. This concept can even replace Tower Controllers. Remote Tower Service allows to manage the airport from one central position, and so save enormous costs of construction and maintenance of infrastructure. For example, constructing a new ATC tower can range from \$8 million up to \$112 million for a large tower (Rogers, 2020).

Besides, the system has additional options relating to safety – poor visibility can become a serious issue for controllers. Remote towers, in turn, use video surveillance, sensors and radars to provide with better view.

ATC industry is ready for revolution, since the basics of ATC system applicable in the whole world today are similar enough to the working principles introduced in 1960s.

The research is supervised by Ph.D Ioseb Gabelaia.

References

1. International Civil Aviation Organization. (2016) Chapter 7, Procedures for aerodrome control service, 7.1.1 General, Doc 4444 PANS-ATM, Sixteenth edition. Montréal, Quebec, Canada: ICAO
2. Rogers, C. (2020) *In plane sight, Remote virtual towers could replace costly airport structures*, <https://www.raytheonintelligenceandspace.com/news/feature/plane-sight>

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 51
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

METHODOLOGY TO IDENTIFY FLAKY TEST CASES

Maksims Ivanovs

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
yeglind3@gmail.com*

Keywords: software functional testing, flaky test cases, classification

Each software update, before being submitted to customers, should successfully pass Functional Testing stage. Engineers use predesigned test cases to validate core components of an examined application. Even executed test fails, developers typically expect to see a deterministic output to work with. However, some of the test cases can provide completely controversial outcomes after numerous executions. Such non-deterministic tests are called flaky. These ones are challenging to debug and almost impossible to reproduce. Today, the most popular approaches to combat them are tests rerunning or their exclusion from the testing stack (Mascheroni & Irrazabal, 2018). Obviously, this is time consuming and demanding per resources processes, that do not guarantee successful problem resolution.

It was noticed by Luo *et al.* (2014) that there is a list of test features, that cause flaky test occurrence. Authors assumed that solution of the problem might be an identification of flaky test cases before their execution. In the recent work Alshammari *et al.* (2019) explored list of 16 test features or test smells that could be used as predictors. By applying statistical analysis methods, they managed to successfully identify wide range of flaky tests among their observations. However, their training set was imperfect. This paper extends this research, in accordance with authors guidelines and recommendations. The main purpose of this work is to detect features that influences test flakiness the most, using real project test cases.

Experiment involved 100 test cases as a sample data. These were handpicked from the actual software testing plan. 26 of them were already identified as flaky tests. At the very beginning testing features list were updated and extended to 20 records. Author have noticed that some of the previously obtained values have no practical application and should be replaced. Correlation analysis was selected as the main statistical method to discover dependencies between examined variables. In addition, application of the Factor analysis has required very soon, since initial input data have not shown strong correlation between values.

The preliminary results obtained confirm the existence of the specific predictors among examined data. Factors, that includes test features like Unhandled code checking or Usage of environment-based settings, have shown strong correlation towards flaky test cases from a training sample. Currently, author is looking forward, to develop flaky test cases classifier, using acquired knowledge about test features.

The following research is conducted under Prof. B. Misnevs supervision.

References

1. Alshammari, A., Morris, C., Hilton, M. & Bell, J. (2021) FlakeFlagger: Predicting Flakiness Without Rerunning Tests. In: *Proceedings of the 43rd International Conference on Software Engineering (ICSE)*, 1572–1584.
2. Luo, Q., Hariri, F., Eloussi, L. & Marinov, D. (2014) An Empirical Analysis of Flaky Tests. In: *Proceedings of the 22nd ACM SIGSOFT International Symposium on Foundations of Software Engineering, FSE*, 643–653.
3. Mascheroni, M. & Irrazabal, E. (2018) Continuous Testing and Solutions for Testing Problems in Continuous Delivery: A Systematic Literature Review, *Computacion y Sistemas*, 22(3), 1009–1038.

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No. 2, 52-53
Transport and Telecommunication Institute, Lomonosova 1, Riga, LV-1019, Latvia

PERSONĀLA DARBA MOTIVĀCIJĀS SISTĒMAS PILNVEIDOŠANA STARPTAUTISKO JŪRAS PĀRVADĀJUMU JOMĀ

Aleksejs Skrunds

*Transport and Telecommunication Institute
Lomonosova 1, Riga, LV-1019, Latvia
aleksej.skrunds@rambler.ru*

Atslēgas vārdi: personāla darba motivācija, starptautiskie jūras pārvadājumi, darba motivācijas sistēmas pilnveidošana, organizācija

Kvalificēta personāla darba motivācija ir viens no būtiskākajiem jautājumiem, kas jāņem vērā, pilnveidojot personāla vadības metodes un saglabājot augstu darbinieku produktivitātes līmeni organizācijas ilgtspējīgai attīstībai un konkurētspējai mūsdienu apstākļos.

Personāla vadība nav iespējama bez noteiktas motivācijas sistēmas, kas nosaka attiecības starp darbiniekiem un organizāciju. Protams, jebkura kvalificēta speciālista darba motivācijas materiālās sastāvdaļas pamatā ir savlaicīga un pienācīga alga, kas balstīta uz fiksētām tarifu likmēm un algām. Taču prakse rāda, ka darba motivācijas metodes, kas balstās tikai uz vienlīdzību starp darba samaksas līmeni un kvalificēta darbinieka līdzdalības līmeni darba procesā, ir vienpusīgas, vienkāršotas un nepilnīgas. Darba alga var motivēt kvalificētus darbiniekus nevainojami veikt izvirzītos uzdevumus, taču maz ticams, ka tas palīdzēs palielināt iniciatīvu un radošumu. Tāpēc īpaša uzmanība jāpievērš ne tikai atalgojumam, bet arī augsta darbinieka sociālās aizsardzības līmeņa uzturēšanai, kā arī darba motivācijas materiālo un nemateriālo komponentu apvienošanai. Pilnveidota personāla motivācijas sistēma palīdzēs vadītājam izstrādāt pasākumu kopumu, kura mērķis ir efektīvi izmantot darbinieku potenciālu, kā arī apmierināt katra kvalificēta darbinieka iekšējās vajadzības.

Darba motivācijas sistēmai jābūt vērstai arī uz galveno speciālistu noturēšanu organizācijā un personāla mainības noturēšanu vajadzīgajā līmenī. Tam jābalstās uz analīzi par to, kāpēc cilvēki pamet organizāciju vai paliek tajā (Armstrong *et al.*, 2014). Piemēram, pēc H.T. Graham un R. Beneta (Грэхем *et al.*, 2003) darbaspēka mainības koeficienta aprēķināšanai tiek piedāvāts izmantot divas formulas: atlaišanas vai zaudējumu koeficientu un darbaspēka stabilitātes indeksu. Darbaspēka ilgtspējas indekss mēra to darbinieku īpatsvaru, kuri uzņēmumā nostrādājuši vismaz vienu gadu. Darbaspēka ilgtspējas indeksu var izmantot arī kā indikatoru darbinieku piesaistei, stiprināšanai un attīstībai starptautiskajās kuģniecības organizācijās.

Šīs tēmas aktualitāte pamatojas faktā, ka organizācijās, kas nodarbojas ar starptautiskajiem pārvadājumiem, ne vienmēr pastāv vienota personāla darba motivācijas sistēma, ņemot vērā visas tās sastāvdaļas. Personāla darba motivācijas pētīšanai nepietiekami tiek izmantotas arī pētījumu metodes, kas palīdz identificēt galvenās motivācijas komponentes kvalificētu speciālistu piesaistei un personāla stabilitātes indeksa paaugstināšanai jūrniecības nozarē.

Pētījuma objekts ir kvalificēta personāla darba motivācijas sistēma starptautisko jūras pārvadājumu jomā.

Pētījuma priekšmets ir faktori un procesi, kas ietekmē personāla darba motivācijas mehānismu personāla vadības sistēmā starptautiskās kuģniecības jomā.

Šī pētījuma mērķis ir izpētīt personāla speciālistu darba motivācijas īpatnības, personāla darba motivācijas sistēmu analīzi, pamatojoties uz zinātniskās literatūras analīzi, aptauju rezultātiem, intervijām, organizācijas dokumentāciju un ieteikumu izstrādi personāla motivācijas sistēmas uzlabošanai starptautisko jūras pārvadājumu jomā.

Lai sasniegtu pētījuma mērķi, autoram ir nepieciešams:

- analizēt galvenās teorētiskās pieejas un zinātnisko literatūru par personāla motivācijas problēmu kā vienu no galvenajām personāla vadības jomām jebkurā organizācijā;
- salīdzināt un novērtēt darbinieku darba motivācijas modeļus un īpatnības jūras pārvadājumu jomā;
- vispārināt pētījuma rezultātus un formulēt teorētisko secinājumu.

Empīrisko pētījumu metožu izmantošana maģistra darba galveno daļu risināšanai, lai iegūtu detalizētāku informāciju par kuģniecības nozarē strādājošajiem, viņu sociālo stāvokli un attieksmi pret darbu, organizāciju, sastāvēja no šādiem posmiem:

- anketas, kuģu personāla intervijas. Aptauja tiek veikta konfidenciāli un anonīmi, ņemot vērā personas datu aizsardzības prasības;
- aptaujas rezultātā iegūto datu apstrāde un grafiskā interpretācija;
- iegūto rezultātu vispārināšana, secinājumu formulēšana un efektīvāku pieeju un ieteikumu izstrāde darbinieku darba motivēšanai.

Personāla darba motivācijas pētījuma rezultāti, kas veido organizācijas darba motivācijas sistēmu, pēc autora domām, palīdzēs pievērsīs uzmanību mūsdienu organizāciju darba motivācijas sistēmas iezīmēm jūras transporta jomā, un tos varēs izmantot kuģniecības uzņēmumu vadība kā ieteikumus esošās nemateriālo motīvu sistēmas pilnveidošanai.

Šis materiāls atspoguļo pētījuma norisi, veikto asoc. profesora, Dr.psych. I. Išmuhametova vadībā.

Literatūra

1. Armstrong, M. and Taylor, S. (2014) *Armstrong's handbook of human resource management practice*. 13th Edition. Kogan Page Publishers.
2. Грэхем, Х., Беннетт, Р. (2003) *Управление человеческими ресурсами*. Москва: UNITY.

RESEARCH and TECHNOLOGY – STEP into the FUTURE

ISSN 1691-2853 & ISSN 1691-2861 (on line)

EDITORIAL BOARD:

Prof. Igor Kabashkin (Editor-in-Chief), *Transport & Telecommunication Institute, Latvia*

Prof. Irina Yatskiv (Issue Editor), *Transport & Telecommunication Institute, Latvia*

Assoc. Prof. Darius Bazaras, *Vilnius Gediminas Technical University, Lithuania*

Dr. Zohar Laslo, *Sami Shamoon College of Engineering, Israel*

Dr. Enno Lend, *College of Engineering, Estonia*

Prof. Andrzej Niewczas, *Lublin University of Technology, Poland*

Prof. Lauri Ojala, *Turku School of Economics, Finland*

Prof. Irina Kuzmina-Merlino, *Transport & Telecommunication Institute, Latvia*

Prof. Alexander Grakovski, *Transport & Telecommunication Institute, Latvia*

Editor:

Irina Alekseeva, *Transport & Telecommunication Institute*

Supporting Organization:

Latvian Transport Development and Education Association

Latvian Operations Research Society

THE JOURNAL IS DESIGNED FOR PUBLISHING PAPERS CONCERNING THE FOLLOWING FIELDS OF RESEARCH:

- mathematical and computer modelling
- mathematical methods in natural and engineering sciences
- computer sciences
- aviation and aerospace technologies
- electronics and telecommunication
- telematics and information technologies
- transport and logistics
- economics and management
- social sciences

Articles and review are presented in the journal in English, Russian and Latvian (at the option of authors).

This volume is published without publisher editing.

EDITORIAL CORRESPONDENCE

Transporta un sakaru institūts (Transport and Telecommunication Institute)

Lomonosov 1, LV-1019, Riga, Latvia. Phone: (+371)67100594. Fax: (+371)67100535

E-mail: junior@tsi.lv, [http:// www.tsi.lv](http://www.tsi.lv)

RESEARCH and TECHNOLOGY – STEP into the FUTURE, 2021, Vol. 16, No 2

ISSN 1691-2853, ISSN 1691-2861 (on-line: www.tsi.lv)

The journal of Transport and Telecommunication Institute (Riga, Latvia)

The journal is being published since 2006

Copyright © Transport and Telecommunication Institute, 2021