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QUALITY AND ITS APPLICATIONS. TOWARDS SUSTAINABLE FUTURE. 2025. IN BANI WORLD.

THE BOOK OF ABSTRACTS

SOPOT, 2025

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Quality management of honey amid complexity and instability – innovations and challenges in the BANI world

The beekeeping sector is confronted with challenges resulting from the complexity and volatility of its environment, which can be characterized within the framework of the BANI concept - brittle, anxious, nonlinear, and incomprehensible. Climate change, supply and demand instability, trade globalization, and regulatory inconsistencies affect both honey quality and the sector's competitiveness.

The aim of this paper was to analyze the complexity of quality management in the honey sector in the context of the BANI world, and to identify key challenges, strategic directions, and innovative tools that support the assurance of honey quality and authenticity.

A review-based approach was applied in the paper, including the analysis of literature, legal frameworks, and industry data. The paper also presents examples of modern technologies that support the evaluation of honey quality and authenticity, such as spectroscopy, chemometrics, and artificial intelligence

The analysis confirmed the relevance of integrating classical quality assessment methods (physicochemical and organoleptic) with system-oriented solutions that utilize data analysis and digital technologies. Particular importance was attributed to regulatory harmonization, consumer education, and support for small producers in adapting to evolving market conditions.

In view of the identified challenges and proposed directions of action, a shift from incidental practices to integrated, long-term quality management strategies - grounded in scientific knowledge, planning, and risk monitoring - is considered justified. Such an approach is essential to ensuring the lasting quality and authenticity of honey in the complex reality of the BANI world.

Keywords: honey quality, quality management, authenticity, innovative assessment tools, legal regulations

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The municipal waste management system in Poznan (Poland) and the role of local government

Economic development and intensification of consumption have made that proper handling of municipal waste is one of the most important challenges of modern civilization. Creating an optimal and effective municipal waste management system requires not only the construction of appropriate infrastructure but also comprehensive and planned operations supported by logistic solutions. The purpose of this article is to analyze the municipal waste management system implemented in Poznan and to verify the technical, logistic and organizational capabilities of the commune in this area.
The paper is based on a desk research. A review of recent literature, reports of international and national institutions, materials provided by companies and other Internet sources was carried out to determine whether the implemented municipal waste management system is optimal and allows to achieve the required levels of recycling.
Current municipal waste management system implemented in Poznan is effective and the level of recycling and preparation for reuse of the municipal waste is obtained and compatible with the legal regulations.
The way of organising and managing waste, as well as methods of waste segregation and collection ensure the achievement of goals and standards in municipal waste management. However, it is necessary to constantly intensify activities in the field of selective waste collection and recovery.
The article contributes new knowledge on improving the productivity and efficiency of municipal waste management and improving the effectiveness of integrated municipal waste management systems.

Keywords: municipal waste management, waste policy, segregation, collection system, recycling

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The environment as a determinant of the implementation of research and development projects in the field of energy

Contemporary technological projects in the energy sector play a strategic role in environmental transformation and the achievement of sustainable development goals, especially in terms of reducing pollutant emissions and improving the energy efficiency of the entire economy. At the same time, their implementation takes place in a highly unstable external environment, where political, legal, economic and technological factors generate high risks for the implementation and sustainability of project results. These risks can both strengthen and destabilise the course of research and development (R&D) projects, and its improper identification and assessment may result in the failure to achieve implementation objectives – thus, it can be both an opportunity and a threat to the achievement of project objectives. The aim of this study is to analyse the impact of the external environment on the sustainability of technological projects in the energy sector and to indicate the role of risk management as a tool for strengthening their implementation resilience. The scientific problem concerns the relationship between environmental variability and the effectiveness of implementing pro-environmental solutions that have achieved positive results in the research phase but encounter institutional or economic barriers at the project commercialisation stage. The article uses the PEST approach and the VUCA and BANI concepts as a framework for analysing environmental factors. The empirical part uses a case study of the bankruptcy of RAFAKO S.A., a key player in the Polish energy sector and a leader in consortia implementing R&D projects. It shows that even innovative technologies that comply with regulatory requirements are not guaranteed to be implemented in the absence of organisational stability on the part of the project leader. The conclusions point to the need for earlier identification of institutional risk and integration of risk management with environmental project planning. The recommendations were addressed to financing institutions, project promoters and innovation policy makers in the energy sector.

Keywords: sustainable development, energy, external environment, risk management, RAFAKO S.A.

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Quality costs in the era of quality 5.0

In recent years, we have witnessed dynamic changes in enterprise management. On one hand, these changes stem from the rapid development of new technologies and the growing implementation of the Industry 5.0 concept; on the other, from rising customer expectations shaped by the Society 5.0 model. Today's customers no longer focus solely on the reliability and high quality of products or services — increasingly, their purchasing decisions also take into account a company's actions related to Corporate Social Responsibility (CSR) and Sustainable Development (SD). Organizations are becoming more aware of these expectations, which is confirmed by research conducted worldwide. One of the tools promoted to assess corporate actions in these areas is the ESG (Environmental, Social, Governance) reporting system.

These transformations also impact quality management approaches. Today, quality is perceived much more broadly — not only as the product's or service's conformity with customer requirements, but also as meeting the expectations of other stakeholders, including society, while incorporating sustainability principles and utilizing modern technologies in organizational processes.

This trend has been recognized by scholars, who have begun to define a new quality management paradigm known as Quality 5.0. One of the classical tools used to assess quality management in enterprises is the cost of quality (CoQ) accounting, primarily based on the PAF model (Prevention, Appraisal, Failure). However, the quality cost structures presented in the literature are still mostly tailored to the context of manufacturing enterprises and fail to fully reflect the new realities introduced by the Quality 5.0 concept. Therefore, there is a growing need to revise the approach to quality cost accounting so that it also captures the costs associated with implementing the assumptions of Quality 5.0. Particularly important is the inclusion of prevention costs and failure costs resulting from a failure to meet stakeholder expectations — especially in the area of social responsibility. This problem is recognized in the academic literature, but there is a lack of proposed new cost accounting models.

The aim of this presentation is to propose a new structure of quality cost accounting, aligned with the expectations of 21st-century customers and the operational realities of organizations managed in accordance with the Quality 5.0 philosophy. First, the concept of Quality 5.0 will be introduced, followed by the author's model of quality cost structure tailored to contemporary quality management.

Keywords: Quality 5.0, Costs of quality

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Quality 5.0: Sustainability-Oriented Products and Services

The intention was to investigate the context of Quality 5.0 as emphasis on sustainability is rapidly increasing, and the use of possibilities with AI systems is changing even faster. In the face of escalating global challenges, Quality 5.0 emerges as a transformative framework that redefines organizational excellence by integrating sustainability, advanced technology, and human-centered values. Building on the foundations of Quality 4.0 and aligning with the broader vision of Industry 5.0, Quality 5.0 moves beyond efficiency and defect reduction to embed environmental stewardship, social responsibility, and economic resilience directly into the definition of quality. This paper explores how organizations can leverage cutting-edge technologies such as Artificial Intelligence (AI), digital twins, blockchain, and the Internet of Things (IoT) to foster predictive, transparent, and sustainable operations. Central to this evolution are concepts like circular economy principles, life-cycle thinking, and strategic Asset Management, which together drive operational excellence, risk resilience, and long-term value creation. Through a detailed case study of the SFI LEO initiative in offshore asset management, the paper demonstrates the practical application of Quality 5.0 principles. Ultimately, the adoption of Quality 5.0 offers a roadmap for organizations seeking to thrive in an increasingly complex and sustainability-driven global landscape, where success is measured not only by performance but by lasting, positive impact on people and the planet. The work is limited by how Quality 5.0 is seen from the authors' work with Industrial Asset Management context and international projects. Quality 5.0 offers possibilities to augment Industry 4.0 technologies in an Industry 5.0 context where humans make sustainable use of the technologies. One such possibility is the extension of the life of buildings, equipment, and systems. This paper tries too set an industrial framework for Quality 5.0 with its sustainable possibilities.

Keywords: Quality 5.0, Sustainability, Artificial Intelligence (AI), Asset Management, Industry 5.0

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A Method for Evaluating the Strategy of Managing Research Infrastructure in the BANI World – A Case Study of a Research Unit

The BANI world (brittle, anxious, non-linear, and incomprehensible) forces a revision of the approach to research infrastructure management. The article analyzes to what extent the strategy for managing the research network infrastructure of Łukasiewicz is ready to adapt to BANI conditions. Based on the analysis of scientific literature and strategic documents of the Łukasiewicz Research Network, a validation tool is proposed to support the assessment of the resilience of the adopted strategy for research infrastructure management to the challenges of the BANI world. Recommendations for further improvement actions are presented.

Keywords: evaluation method, research infrastructure, research institutes, BANI, management strategy

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The role of healthcare spending in shaping healthcare outcomes in European Union countries

Theoretical background: The relationship between healthcare expenditure and healthcare outcomes, quality, accessibility, and level of services provided is a key area of research not only in economics and health sciences, but also in management and quality sciences. Healthcare outcomes can be measured using indicators that provide a comprehensive assessment.
Purpose of the article: The purpose of the study is to assess the relationship between healthcare expenditure and healthcare outcomes, including quality, access to healthcare, and healthcare services in EU member states. Using descriptive statistics, we tested the hypothesis that higher healthcare spending leads to better healthcare outcomes. We will analyze factors that help improve healthcare outcomes without significantly increasing healthcare spending.
Research methods: The study is based on a quantitative approach, first analyzing scientific articles, government reports, and data collected from the OECD, the World Health Organization, the European Commission, and the Copenhagen Institute for Futures Studies. The data was carefully prepared for statistical analysis, with healthcare spending (as a percentage of GDP) as the independent variable and healthcare quality, access, and services as the dependent variables. Pearson's correlation was performed using SPSS software, applying bootstrapping to determine 95% confidence intervals. Second, based on the results of the statistical correlation, we examined the factors that contribute to improving healthcare outcomes by comparing EU member states in terms of the adoption of personalized technologies, healthcare quality, accessibility, and services.
Key findings: The results of our study indicate a moderate positive correlation between healthcare expenditure and outcomes, including healthcare quality, accessibility, and services, across EU member states. While healthcare spending has a substantial impact in some areas, its effect on healthcare quality is weaker and less consistent, as a significant portion of healthcare spending is often directed toward infrastructure, equipment, or administrative needs rather than directly toward improving the quality of care. Further analysis shows a comparison between EU Member States, highlighting factors such as effective resource allocation, systemic reforms, and integrating innovative technologies, which are key to improving healthcare efficiency.

Keywords: Healthcare spending, Cost reduction, Quality of healthcare, Access to healthcare, Healthcare services

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From the BANI world to the BANIL world

Developing civilizations were and continue to be a generator of problems and as a consequence of challenges faced by the further functioning of societies, economies and organizations, especially those oriented towards quality, with the intention of their further sustainable development. The aim of this paper is to present specific approaches, especially ‘antifragility’ and ‘mindfulness’, as well as ‘longing for’, in relation to the global challenges put forward in the BANI world concept. The issues related to this were first included in the VUCA concept, and then in the form of the ‘BANI world’, where: B is brittle, A is anxious, N is nonlinear and I is incomprehensible. The range of elements of the BANI world has led to the need to develop new approaches in order to have the possibility of pro quality, sustainable development of the world. The first element in the BANI world ‘fragility’ became the starting point for Nassim Taleb to define the opposite concept. It is assumed that something that is fragile can be easily destroyed, and here comes Taleb's innovative idea that since shocks harm the fragility of an object, its opposite should be helped by these shocks, giving the chance to function in practice of the concept of ‘antifragility’ proposed by him. The second element in the world of BANI provides an opportunity to enter the desired path from ‘restlessness’ to ‘mindfulness’, which comes down to the daily strengthening of inner awareness, expanding the range of perception and a broader understanding of the connections and influences of the world. To sum up, decision makers in companies who notice the challenges of the world of BANI and are able to adapt the functioning of their companies accordingly have a clearly greater chance of achieving success. Expanding the issue of the world of BANI, even greater effects can be achieved by adding an additional element, namely L (in the sense of longing for), meaning “longing for” the world of principles not only in the economy, but also in various other spheres: science, sports or spiritual life, which in total creates the world of BANIL. In science, maintaining high ethical standards is essential to maintaining the integrity of science and its credibility. Ethics in sports are fair play honest and open competition in which players adhere to established rules. As for spiritual life, Christoph Benke argues that the longing for spiritual life, which is more than just a psychological need, is vividly present in every person, and various ethical systems, including religious ones, can respond to this longing.

Keywords: BANI World, antifragility, mindfulness, BANIL world

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Model Happy Work Culture Model

The article aims to present and critically analyze the Happy Work Culture (HWC) model for assessing workplace culture. The research problem is to answer the question: What is the HWC model and what can be the benefits of using it? Critical literature analysis, case studies, content analysis, and logical synthesis and reasoning were used. The analysis confirms that implementing the model by organizations can significantly support work culture diagnostics by providing data that allows for informed decision-making to shape the appropriate quality of work in conditions of happiness. HWC enables the identification of areas requiring improvement, the creation of a targeted human resources management strategy, and monitoring progress in implementing cultural changes and process optimization. Systematic use of HWC contributes to improved employee engagement, reduced turnover, and increased competitiveness of organizations in the market. HWC is a proprietary and pioneering solution on a national and international scale. It allows for an in-depth analysis of six key aspects of the work environment, identifying its strengths and areas requiring development. HWC allows for the identification of bottlenecks and gaps in organizational culture - significant elements that may go unnoticed but that impact the atmosphere, engagement, and effectiveness of teams. This provides an invaluable foundation for developing personalized strategies and recovery plans tailored to the organization's actual needs. This article contributes to understanding the impact of organizational culture on business results, offering practical guidance for managers who want to consciously shape the work culture in their organization.

Keywords: organizational culture, work culture, work quality, happiness, Happy Work Culture

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The Importance of Quality Labels in Ensuring Food Safety and Quality

In recent years, there has been a growing consumer interest in food products distinguished by quality labels. The increase in public awareness regarding food quality and health safety is reflected in the actions of the European Union, which, under the Common Agricultural Policy, places a strong emphasis on initiatives aimed at ensuring high quality and safety of food products, thus responding to the evolving expectations of consumers. One of the key instruments supporting these efforts is the implementation of voluntary food certification systems, which allow products with specific quality attributes to be distinguished through the use of quality labels. Within the European Union, including Poland, various such designations are in use. The aim of this paper is to present the significance of quality labels in ensuring food safety, with particular attention to the role of certification in building consumer trust and supporting sustainable and responsible food production. Among the most recognizable quality labels is the organic farming logo, which confirms that a given product has been produced in certified organic farms and processing facilities in accordance with the requirements of Regulation (EU) 2018/848, with respect for the natural environment, human health, and animal welfare. Products originating from specific regions or produced using traditional methods may receive designation under one of three categories: Protected Designation of Origin (PDO) or Protected Geographical Indication (PGI) for regional products, and Traditional Speciality Guaranteed (TSG) for those with traditional characteristics. The use of these quality labels serves as a clear message to consumers that the purchased product is not only of high quality but also characterized by unique, traditional production methods and contributes to the preservation of native livestock breeds and plant varieties. The requirements concerning the production, processing, and labeling of products under these systems are regulated by legal acts at both the EU and national levels. Poland also promotes its own national quality schemes (e.g., Quality Tradition, Try Fine Food, Polish Product) and programs (QMP, PQS, QAFP, TAQ), which confirm the unique quality of food. The certification of these products is based on legal regulations, national standards, as well as sectoral standards developed by industry organizations. Quality-labeled products are subject to control by designated authorities, which verify both the production process and the quality of the final product. It can thus be concluded that quality labels play a significant role in the food safety and quality assurance system, support supply chain transparency, enable informed consumer choices, and contribute to raising standards in food production.

Keywords: quality labels, food safety, consumer

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Sustainable management of selected commercial banks in Poland

The aim of this article is to assess the impact of new regulatory requirements on the sustainable management of selected commercial banks in Poland. In light of increasing pressure from supervisory authorities, as well as rising social and investor expectations regarding ESG, compliant activities, financial institutions are required to adjust their reporting practices and consequently their strategies to the principles of sustainable development. The study analyzes the implementation of current regulations and the quality of disclosed data in the reports of selected Polish commercial banks. Based on the findings, the article offers recommendations for policymakers and banking sector managers on how to effectively integrate sustainable development goals into operational practice, taking into account the dynamically evolving regulatory environment and market expectations.

Keywords: sustainable development, ESG; CSRD directive, non-financial reporting, green financing

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Environmental efficiency of organizations – in the aspect of BANI

The article analyzes the issue of environmental efficiency of organizations in the context of contemporary challenges described by the BANI paradigm (Brittle, Anxious, Nonlinear, Incomprehensible), which is an extension and deepening of the earlier VUCA model (Volatile, Uncertain, Complex, Ambiguous). Both paradigms indicate the need for a new approach to management in conditions of instability and unpredictability. Still, BANI emphasizes the fragility of systems, decision-making anxiety, nonlinearity and incomprehensibility of phenomena, including environmental ones.

The article presents the research results conducted among organizations with certified environmental management systems registered in EMAS and organizations without formalized environmental management systems. The research was conducted on a sample of 847 organizations. Factor analysis was used, which revealed four main clusters of factors influencing environmental efficiency (organizational factors, social factors, legal factors and economic factors).

The research results suggest that the traditional approach to environmental management, focused on compliance and resource optimization, is becoming insufficient. In the BANI environment, adaptive management based on flexibility, organizational resilience and rapid response to changes, taking into account the fragility of decisions, social anxiety, non-linearity of processes and the difficulty of understanding environmental phenomena, is necessary.

The authors propose new indicators and methods of assessing effectiveness that better reflect the realities of the BANI world. They also present examples of good practices and recommendations for managers and decision-maker

Keywords: sustainable development, BANI, VUCA

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Impact of ETS2 Policy on Modern Photovoltaic Systems Profitability in Poland

Research questions: Which type of modern photovoltaic installation and tariff will be most advantageous for consumers from the perspective of the introduction of ETS2?
Objectives: Identification of the most economically advantageous solutions for modern PV installations in the context of ETS2
Hypotheses: H1. The optimal PV system configuration under ETS2 policy shifts toward larger storage capacity installations to maximize economic benefits from reduced grid dependency during peak heating periods
The introduction of ETS2 in 2027 will impose carbon pricing on buildings and road transport, yet its impact on photovoltaic system economics and optimal configurations remains unexplored. The research aims to identify optimal modern PV installation configurations under ETS2 implementation, balancing economic viability with energy independence objectives for households. A comprehensive scenario-based simulation using SMA Sunny Design software analyzed 120 unique configurations across PV capacity, energy storage, heating systems, tariff structures, and electric vehicle integration. Pure economic optimization reveals that heat pump with 5 kWp PV installations without storage achieved optimal NPV. However, multi-criteria analysis incorporating energy independence priorities identifies 5 kWp PV with 6-8 kWh storage as optimal, accepting moderate economic losses for significant autonomy gains. Hypothesis H1 regarding storage optimization was rejected as carbon pricing alone does not incentivize energy storage, yet the study demonstrates rational pathways for storage adoption when household energy security objectives extend beyond pure financial optimization. The findings indicate that ETS2 effectively drives heating system electrification but does not economically justify residential energy storage investments, requiring continued subsidy programs for storage systems to achieve grid stability objectives beyond market mechanisms.

Keywords: ETS2, photovoltaics, energy storage, Heat pump, profitability analysis

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Clean Beauty as a Determinant of Quality and Sustainable Development in the Cosmetic Industry

The modern cosmetics industry operates in a dynamically changing reality. In response to the growing demand for transparency, safety and a sustainable approach, the concept of clean beauty has emerged as one of the leading trends. This article explores the importance of clean beauty for the quality of cosmetic products and its potential as a means of promoting consumer confidence and sustainable development goals. It analyses the ingredient lists of selected 'clean' beauty products and conducts a consumer survey on the perception of the quality and credibility of such products. The results show considerable discrepancies between the advertising claims and the actual formulations, highlighting the need for education and standardisation of the 'clean' label. The article emphasises the importance of transparency, high-quality formulations and the responsibility of manufacturers to build reliable and lasting relationships with consumers under unstable market conditions.

Keywords: clean beauty, cosmetic product quality, sustainable development, consumer expectations, innovation in cosmetics

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The issue of quality and the legal liability of the manufacturer

The article addresses the issue of the relationship between product quality and the scope of the producer's legal liability. It presents the normative foundations of liability for a defective product under civil law, in particular the Civil Code and specific regulations such as the Act on General Product Safety. The analysis also covers the importance of quality standards and their impact on the assessment of the producer's due diligence, including civil and criminal liability risks. The author emphasizes that quality is not merely a technical parameter but serves as a benchmark of liability, the violation of which may result in multi-level legal consequences. The study takes a cross-sectional approach and also includes *de lege ferenda* conclusions

Keywords: product liability, dangerous product, quality standards, legal risk

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Poland's Packaging Industry on the Road to Economy 5.0

In the face of rapid technological change and increasing sustainability demands, Poland's packaging sector is challenged to align with the principles of Economy 5.0. This study explores how packaging companies in Poland are adopting digital technologies to enhance operational efficiency and support social well-being and environmental responsibility. The transition from Industry 4.0, focused on automation and digitalization, to the more human-centric and sustainable Industry 5.0, requires a rethinking of production management and increased investment in digital competencies.

A survey conducted in 2024 among 82 packaging companies in Poland reveals that the most highly valued benefits of digitalization include the optimization of raw material, energy, and water usage, as well as the reduction of production waste. In contrast, benefits such as carbon footprint reduction and transparent ESG reporting received more skeptical responses, likely due to measurement challenges or a lack of appropriate tools. Exploratory Factor Analysis identified two main categories of benefits: operational efficiency and competitiveness and market dynamics. At the same time, two key barriers to digital transformation were identified: financial (high implementation and maintenance costs) and organizational (corporate culture, generational differences, and decision-making issues).

The findings suggest that while many companies recognize the potential of digitalization to enhance sustainability and resilience, fully realizing these benefits requires further investment, the development of digital competencies, and a deeper understanding of the environmental and societal impacts of technology. This study contributes to the ongoing discourse on industrial transformation toward Economy 5.0, emphasizing the importance of synergy between technology, people, and sustainable development.

Keywords: economy 5.0, packaging industry, digital transformation, sustainability, operational efficiency

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"Hey, it would be good to have such an oh and ah" - continuous improvement in the hospitality industry

Growing competition in the hospitality sector, resulting from both the increasing number of hotels and the development of the sharing economy, as well as the existence of online platforms where guests can easily exchange opinions about the quality of services, compels hotel managers to seek ever-improving solutions that not only meet guest requirements but also, whenever possible, exceed them. Quality management methods and techniques, which are still underappreciated in the hotel industry, could benefit this endeavour.
The study aimed to design and validate a model for ensuring continuous improvement in hotel operations. This model was developed through a literature review and interviews with managers from seven hotels, then verified based on a survey covering 280 hotels.

Keywords: continuous improvement, PDCA cycle, hotels, customer focus

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Perceptions of the Future of Work in Mobile and High-Commitment Professions in the Context of the BANI Framework

This article aims to examine how maritime students perceive their future work in the context of the changing environment described by the BANI concept. Particular attention was paid to analysing the impact of the COVID-19 pandemic on changes in career expectations.
Methodology: A questionnaire survey was conducted twice, in 2015 and 2024. The subjects of the study were students of the Gdynia Maritime University, Faculty of Mechanical Engineering and Faculty of Navigation. Frequency analysis, $\chi 2$ test, and Mann-Whitney U test were used to analyse the results.
Results: after the experience of the COVID-19 pandemic, students perceive future work at sea more in terms of the risks it entails than their peers surveyed in 2015. Significantly fewer people pay attention to the positive aspects of this work, and the risks to which seafarers are exposed are more frequently mentioned: mental health problems, instability, and uncertainty, which reflect the characteristics of the BANI worldview.
Originality of the research: The study compares young people's perceptions of future work before and after the COVID-19 pandemic. This may be an important contribution to the discussion on the education and emotional preparation of students for work in difficult, unnatural conditions. This is particularly important in the context of the growing shortage of officers in maritime shipping.

Keywords: BANI framework, higher maritime education, work at sea, European officer shortage.

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Lean Management in the World 4.0

Industry 4.0 technologies are increasingly supporting enterprises in maintaining competitiveness and improving operational efficiency. This also applies to organisations that have implemented the Lean Management concept, where modern technologies can prove beneficial across various operational areas. However, due to the specific nature of Lean Management – which is sensitive to unconsidered or poorly planned changes – the implementation of individual solutions must be preceded by careful preparation and thorough analysis of their potential consequences.

The aim of the article is to analyse the possibilities of applying selected Industry 4.0 technologies – such as the Internet of Things (IoT), robotics, and artificial intelligence (AI) – in one of the key pillars of Lean Management: the elimination of waste (jap. *muda*), including overproduction, waiting, transportation, overprocessing, inventory, motion, and defects. Based on a literature review, the paper highlights both the potential for implementing these solutions and the risks associated with their use, such as reduced employee engagement, excessive control, or destabilisation of the overall Lean Management system.

The article provides a theoretical basis for further field research aimed at evaluating the effectiveness of the indicated technologies in practical conditions. Its relevance is underscored by the continuous development of the analysed technologies, their broad variability – depending on the solution provider and the context of implementation – as well as the still limited knowledge about them.

Keywords: Lean Management, Industry 4.0, quality, waste, muda, World 4.0

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Risk Assessment as the Basis for Precautionary Allergen Labelling in Food

Food allergies are increasingly recognized as a major public health challenge, with significant social and economic implications. A food allergy is defined as an abnormal, reproducible, and adverse immune response to food, which can manifest in a variety of clinical symptoms. These symptoms may range from mild skin or gastrointestinal disturbances to severe systemic reactions that can be life-threatening.

Food allergens may be overt or hidden. Overt allergens are intentional ingredients of a food product, are easily identifiable, and must be clearly declared on the product label. Hidden allergens, by contrast, are not obvious to consumers as they may be components of technological additives or the result of cross-contamination during production. European Union regulations specify the list of allergens subject to mandatory labelling and define how such information should be communicated to consumers.

The Precautionary Allergen Labelling (PAL) system is designed to warn consumers about the possible unintended presence of allergens in food products. Within the EU, PAL statements are neither standardized nor mandatory, and their use remains voluntary on the part of producers. Consequently, risk assessment becomes a critical component of food safety management and a key tool for determining when precautionary allergen labelling is justified.

The risk assessment process for food allergens should include four main stages: (i) hazard identification – recognizing potential sources of allergens (e.g., raw materials, food additives); (ii) hazard characterization – assessing the presence of allergens at all stages of the production chain (raw material intake, processing, packaging, storage, transport, and distribution), along with preventive measures; (iii) exposure assessment – estimating consumer exposure, taking into account threshold values and established reference doses; (iv) risk characterization – evaluating the likelihood and severity of adverse health effects, followed by effective risk communication, which forms the scientific basis for applying PAL statements.

Excessive and unjustified use of precautionary labelling, not supported by robust risk assessment, generates numerous negative consequences. It leads to consumer misinformation, undermines trust in food labelling, restricts the availability of products for allergic individuals, and shifts the responsibility for safe consumption from producers to consumers.

International organizations such as the EFSA and the WHO emphasize the necessity of implementing quantitative risk assessment (QRA) methods for allergens. QRA involves the integration of toxicological, epidemiological, and clinical data with information on allergen concentration in food and consumption patterns. This approach enables the determination of

eliciting doses (EDs) – threshold values at which a defined proportion of the allergic population is expected to exhibit a reaction.

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Keywords: food allergens, precautionary allergen labelling, risk assessment

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Study of the definitions of quality culture developed by Polish researchers: a scoping review

Quality culture has been the subject of unwavering interest of researchers for over three decades, but it still lacks a clear definition. The aim of this article is to review the definitions of quality culture developed by Polish researchers to verify whether they fit into the mainstream of defining the construct. The following research question was formulated: how is quality culture defined by Polish researchers?

Due to the complex nature of quality culture and the expected large number of publications by Polish researchers that may be relevant to the research question, the scoping review method was chosen. The literature review was conducted in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). The review included literature published in the years 1999–2024 and indexed in the following databases: BazEkon, Biblioteka Nauki, Web of Science, Scopus, Katalog Bibliotek Uniwersytetu Jagiellońskiego. 21 sources of evidence were considered.

The article identifies the names of three leading Polish authors and the journals in which publications on quality culture were published. Interestingly, in almost half of the analysed documents, the issue of quality culture was related to higher education institutions.

The analysis of quality culture definitions allows to indicate similarities and differences in the ways of defining the construct by Polish and foreign authors. Numerous similarities can be seen in the specified elements of quality culture. Both, Polish and foreign authors, most often referred to a set of values, slightly less often to norms, attitudes and beliefs and to management systems. These components of the construct can be presented in three categories as: management, cultural and connecting elements. While in the case of the mainstream definition, an evolutionary extension of the defined scope of quality culture from intra-organisational aspects to external issues is noticeable, in Polish works the attention is rather focused on the interior of the organisation. Thus, the way in which the construct is defined by Polish researchers does not fully fit into the development of the mainstream discourse.

Keywords: a scoping review, elements of quality culture, quality culture

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How to approach the journey of continuous improvement in organizations: the dynamics of engaging employees

While implementing continuous improvement methodologies such as Lean, Total Quality Management, or Lean Six Sigma, many companies face a range of challenges and obstacles. One of the most significant issues is engaging employees in improvement initiatives, encouraging them to propose ideas for enhancement, and organizing the workforce to effectively implement initiatives in a proactive manner. It might be stated that employee engagement is a measure of genuine continuous improvement within an organization.

The study examines the factors that influence employee engagement in the context of continuous improvement and provides a model outlining the stages of continuous improvement based on engagement. The survey sample comprises 380 large and medium-sized companies from Poland. The sample size meets the requirements of statistical representativeness for the country.

Sixteen factors influencing employee engagement are evaluated, with nine identified as essential for fostering engagement in continuous improvement initiatives. These factors are grouped and organized into a model resembling a ladder, which can be navigated step by step. The developed model highlights the most critical focal points that managers should prioritize when implementing continuous improvement from the outset, regardless of the methodology adopted by the organization.

While the factors mentioned do not encompass all possible elements that influence continuous improvement, they highlight the most significant ones. The sequential relationships among these factors are intended to assist practitioners who are beginning their continuous improvement journey. They may find valuable insights on navigating this long and challenging path toward widespread, employee-engaged, process improvement inner movement. The factors outlined here can assist in assessing a company's current level of advancement in the implemented methodology.

Keywords: continuous improvement, employee engagement, methodologies implementation

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Application of the Lean Management concept among participants of the 27th edition of the Pomeranian Quality Award

The aim of the article is to diagnose, evaluate, and assess the impact of applying the Lean Management concept on the success of the organization in the 27th edition of the Pomeranian Quality Award.
The research was conducted using a case study. An analysis of source materials from the 27th edition of the Pomeranian Quality Award was conducted, i.e., application forms containing the self-presentation of the organization taking part in the competition and reports from the self-assessment and external assessment of the organization prepared by external experts (auditors from a renowned certification body).
The analyses carried out show that the application of the idea of continuous improvement, by the Kaizen philosophy, as well as the implementation of Lean Management tools and techniques, significantly contribute to the high assessment of the organization in the Pomeranian Quality Award competition. All organizations that qualified as finalists in this edition of the competition demonstrate a systemic approach to improvement - they conduct activities for the standardization of processes, their optimization, and the consistent elimination of waste. These practices are consistent with the key assumptions of both the EFQM model and Lean Management. Three of the analyzed organizations directly referred in their application forms to the implementation of the lean philosophy as the foundation of their strategy. These organizations were awarded places on the podium in their competition categories, which is strong evidence that the consistent implementation of Lean Management principles, while maintaining compliance with the EFQM model framework, translates into measurable successes in quality competitions.
Selecting the best lean organizations among the finalists of the 27th edition of the Pomeranian initiative can be used to exchange good practices in this area, e.g., during meetings of the Pomeranian Quality Award Club and during industry conferences. The study can also be a guide for potential participants of such initiatives. The article indicates what lean methods and tools are used by the competition winners, which can enrich the pro-quality potential in the region.
The analysis of the use of the Lean Management concept by the finalists of the 27th edition of the Pomeranian Quality Award competition leads to the conclusion of how important the approach based on this concept is and that it has a real impact on success in the competition based on organizational excellence.

Keywords: Continuous improvement, EFQM, Pomeranian Quality Award, Lean Management, PDCA Cycle

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Workplace spirituality manifestations and their perceptions. The case study of a polish restaurant

This study explores workplace spirituality (WS) as a factor that enhances employee well-being, with a focus on the under-researched food service sector. Addressing a noticeable gap in the literature, this study presents a case analysis of a restaurant in Poland, examining manifestations of WS from both individual and organizational perspectives. Using a case study approach supported by a questionnaire survey, this study identifies key individual-level indicators of WS, including support in difficult situations, positive interpersonal relationships, openness, collaboration, and overall well-being. WS significantly influences employee motivation, satisfaction, and relationships with colleagues. The most prominent manifestation was the belief that employees could rely on one another, receive support, and experience mutual respect and care. Organizational factors such as work organization, employment conditions, and leadership attitudes and values were identified as crucial in shaping WS. The study also revealed correlations between selected sociodemographic characteristics and perceptions of WS, its manifestations, and its impact on various aspects of employee functioning. Despite its insights, this study has limitations. As a single case study, the findings are context-specific and cannot be generalized beyond the analyzed restaurant. Additionally, the cultural context was not considered, which could have provided a deeper understanding of WS dynamics. Future research should expand to include a broader sample of restaurants and food service providers, incorporate cultural factors, and use more representative data to validate and refine the findings. This study contributes to the growing body of literature on workplace spirituality by highlighting its relevance and potential benefits in the food service industry, and by identifying key areas for further exploration

Keywords: workplace spirituality, well-being, perception, manifestations, restaurant

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Is it possible to produce honey without microplastics?

Microplastics (MP) are plastic fragments smaller than 5 mm in size, ubiquitous contaminants commonly identified in various environmental media: aquatic, terrestrial, and atmospheric. Microplastics have attracted global attention due to their accumulation in living organisms and potential toxicity. Microplastics can enter the human body through food consumption or the use of everyday products, posing a health risk. In recent years, bee products, including honey, as an important source of health-promoting substances, have become increasingly exposed to microplastic contamination, which reduces their quality and safety. There are a few publications in the global literature regarding microplastic contamination in honey and other bee products. However, there is currently a lack of comprehensive reviews on this topic. Therefore, the aim of this study was to gather information on the degree of microplastic contamination in honeys from various production systems and environments with varying degrees of contamination. An analysis of research conducted in various countries around the world has shown that honey is contaminated with various microplastics, regardless of whether it is produced in organic apiaries or sourced from urban areas. Given the potential health risks associated with microplastics, producers should improve their production processes, and policymakers should develop and implement urgent strategies and controls to eliminate the ingestion of microplastics in food.

Keywords: microplastics, honey, production systems

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Quality control using NIR technology in the context of sustainable development – the case of plant-based milk alternatives

The growing consumer interest in plant-based milk alternatives encourages companies in the food sector to expand their market offerings. In the Polish market, the most popular products are soy, oat, almond, and rice drinks. Along with the dynamic development of the plant-based beverage market, the need to implement effective methods of quality control is increasing. One promising tool is near-infrared spectroscopy (NIR), which enables fast and precise non-destructive measurements and can be applied to quality control throughout the supply chain. It is an environmentally friendly technique that does not require sample preparation or the use of chemical reagents, but requires the use of machine learning techniques to extract relevant quality information.

The aim of the study was to assess the quality of plant-based milk alternatives using near-infrared spectroscopy and partial least squares regression (PLS) analysis. The research material consisted of 23 beverages available on the Polish market, including coconut, oat, almond, rice, soy, and hazelnut-based drinks. Transmission measurements of spectra in the near-infrared range (12,500–4000 cm^{-1}) were carried out with an MPA FT-NIR spectrophotometer from Bruker. Using reference methods, the content of total extract, dry matter, as well as density and turbidity were determined in the tested products. To investigate the possibility of predicting the values of these parameters for new products based on rapid non-destructive NIR spectrum measurement, PLS models were developed to establish the correlation between the NIR spectrum and physicochemical data. The best predictive ability was shown by the model for predicting turbidity (R^2 = 0.88; RMSE = 7.42 NTU). Similar parameters characterized the models for predicting density (R^2 = 0.84; RMSE = 0.0039 g/cm^3), total extract content (R^2 = 0.84; RMSE = 1.06%), and dry matter content (R^2 = 0.93; RMSE = 0.62%).

The obtained results indicate a great potential of NIR technology, which offers both ecological and technological benefits. NIR sensors supported by IT systems can be used for online and inline analyses in order to monitor various quality parameters of the product in real time, with minimal impact on the environment through resource savings and waste minimization.

Keywords: NIR technology, machine learning, quality, food, plant-based milk alternatives

Quality and its applications. Towards a sustainable future. In the world of BANI.

The concept of BANI concerns the future functioning of:

- B (Brittle)
- A (Anxious)
- N (Non-linear)
- I (Incomprehensible)

To meet these challenges, specific activities and solutions must be undertaken that will make the functioning of the organization and the organization focused on quality and sustainable development easier and less chaotic in many aspects.

During our conference, we will try to discuss whether and what solutions, concepts, methods and management tools, including quality management, will be helpful in this respect.

The conference topics include the following:

1. Quality 5.0 – products and services oriented towards sustainable development goals
2. New concepts, methods and tools for organizational improvement
3. New values and paradigms in organizational improvement
4. Quality and sustainable development from the perspective of:

    - Organizational fragility and resilience
    - AI and digital transformation
    - Disinformation, uncertainty and chaos
    - Economic conditions and finances
    - Stress, resilience and well-being of employees and change leaders
    - Culture of quality, excellence, safety and a climate of spirituality

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