Volume XXI, Issue (1) (2025) 162-172

International May Conference on Strategic Management

DOI: 10.5937/IMCSM25162G *Original Research*

RELATION OF QMS VISION AND STRATEGY AND BALANCED SCORECARDS ACHIEVEMENTS OF HEIs IN INDUSTRY 5.0 ENVIRONMENT

Maja Glogovac

University of Belgrade, Faculty of organizational sciences, Serbia

Abstract: The evolution from Industry 4.0 to Industry 5.0 reflects a growing recognition of the need to balance technological advancement with societal well-being. While Industry 4.0 primarily focuses on technological progress, Industry 5.0 introduces a more human-centered approach. For any industrial revolution to take root, it is important to be accepted by higher education, as the core pillar of any industry development. Accordingly, this paper aims to investigate the current achievements of higher education institutions (HEIs) related to their quality management system (QMS) vision and strategy in the context of the new industrial revolution. In this effort, the Balanced scorecards (BSC) model was used to assess the Industry 5.0 achievements of 374 HEIs in Serbia. ISO 9004:2018-based vision and strategy variable's relationship to BSC variables' were analyzed and proved using the regression analysis. The results can be significant for HEIs' management structures in creating a development path towards the adequate application of Industry 5.0.

Keywords: Industry 5.0, high education, Balanced Scorecards, QMS, strategy.

1. INTRODUCTION

Over time, the world has faced several transformations in industrial systems (Broo et al., 2022; Babkin et al., 2022). Industrial revolutions entail societal progress characterized by evolutionary leaps in technological advancement (Ahmed et al., 2024). Given the scarcity of literature on the current industrial revolution (Industry 5.0), which is still in its beginning, and little is known about its applications, it is important to explore the focus of its application (Garrido et al., 2024; Carayannis & Morawska-Jancelewicz, 2022).

Unlike Industry 4.0, which has been criticized by many authors, theorists, and academics (Garrido et al., 2024), the current industrial era surpasses technologies and expands into human-centricity (Ivanov, 2023). The idea of Industry 5.0 is to create sustainability and optimize production systems (Ahmed et al., 2024). The main guideline for Industry 5.0 is

[1] *Corresponding author: maja.glogovac@fon.bg.ac.rs*

Maja Glogovac, ORCID: 0000-0003-3268-8543

placing workers at the centre of educational services (Hashim et al., 2024). Given that Industry 4.0 did not address sustainability issues, Industry 5.0 emerged as the solution to sustainability concerns, with society viewing universities as the driving force. It is predicted that universities have to develop new strategies for integrating approaches to innovations and solutions for long-term sustainability (Hashim et al., 2024). Universities play a pivotal role in reshaping learning, thinking, and knowledge transmission, addressing the challenges of digital transformation, and constructing new societal paradigms for the current technological revolution (Taimur & Onuki, 2022). Many authors, academics, and researchers have displayed significant interest in researching and writing about Industry 5.0 (Babkin et al., 2022; Huang et al., 2022). However, there is still a lack of awareness of the benefits it brings, although the management of large organizational systems understands its potential value (Babkin et al., 2022).

Facing numerous challenges of the current industrial era, it is significant for all organizational systems to be adaptable and capable of measuring the effectiveness of their management systems. Thus, the sustainable success of quality management systems (QMS) requires the application of sophisticated management models (Glogovac et al., 2023). There is also room for integrated applications with some strategic models such as Balanced Scorecards (BSC) (Grabowska & Saniuk, 2022). Thus, this paper is aimed at investigating the BSC achievements of HEIs related to their quality management strategies in the Industry 5.0 environment.

After the introduction to Industry 5.0 in higher education, further literature review is dedicated to quality models in higher education: ISO 9004 and Balanced Scorecards, which were used for hypothesis development. Afterward, the methodology and results of the research were presented. Finally, the results, limitations of the study, and future research directions are discussed in the conclusions.

2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

The contemporary development of society, intertwined with social development, has created milestones known as industrial revolutions (Ahmed et al., 2024). Industrial revolutions have transformed the world and contributed to making industries more modern and productive (Broo et al., 2022). In the sense of technological advancement, Industry 4.0 is spread in all industries (Grabowska & Saniuk, 2022). Driven only by technology and technological progress, Industry 4.0 does not consider social issues and thus has been criticized by many authors (Leng et al., 2024). Consequently, Industry 5.0 emerged to establish human-machine cooperation (Miao et al., 2024). As a result of today's advancement of technologies, the economy of modern society is driven by the current industrial revolution (Kumar & Mallipeddi, 2022). Industry 5.0 gives new value to balance economic progress, referring to industrial revolutions and society as two complementary concepts (Huang et al., 2022), transitioning from a technological approach to sustainable societal development (Leng et al., 2024). As such, Industry 5.0 promotes the adaptability of technologies to human needs (Hashim et al., 2024; Huang et al., 2022), aimed at meeting societal needs and contributing to human well-being by placing them at the centre of integration with technologies (Carayannis & Morawska-Jancelewicz, 2022).

2.1. Higher Education and Industry 5.0

Higher education, as the foundation of knowledge and a key driver of societal progress, is essential for any industrial revolution, which depends on HEIs' tendency towards the development of systematic approaches and theoretical domains, as well creation of innovative models for efficient practical application (Hashim et al., 2024). With the adoption of the new

concept of Industry 5.0, the significant changes in the global market pose a challenge for universities worldwide to create new methodological innovations and establish theoretical frameworks for the development of new models that can assist organizational systems and society as a whole (Carayannis & Morawska-Jancelewicz, 2022). In today's complex systems, technological and scientific progress is inevitable, with universities playing a key role in its development (Carayannis & Morawska-Jancelewicz, 2022). As a result, the considerable shifts in technological progress that have left their mark on the world have also impacted higher education, prompting it to address the emerging challenges arising from Industry 5.0 (Broo et al., 2022). Essentially, in adopting a wide range of knowledge exchange and information for the new challenge and changing mindset, HEIs must prioritize knowledge and skills (Broo et al., 2022). Implementation and use of new technologies, internet access, global databases in higher education, as well as self-learning, go beyond traditional methods of teaching and learning, bringing a range of potential benefits to students (Broo et al., 2022). Given the literature gap about the application of empirical evidence of Industry 5.0 in higher education, the paper of Hashim et al. (2024) contributes empirical insights and merges the theoretical and practical aspects of applying the concept of Industry 5.0 in higher education.

2.2. Quality models in higher education: ISO 9004 and Balanced Scorecards

Customers today have greater expectations than ever in the past, so to remain competitive in the current industrial era, organisations need to improve their processes, use some business excellence models and demonstrate a high level of quality and performance (Araújo & Sampaio, 2013). The importance of managing quality at a high level in today's digital transformation era is also pointed out by Nguyen et al. (2022). Current trends indicate that educational organizations are trying to find innovative methods to enhance the quality of education through modern quality management approaches (Sütoová et al., 2022).

In line with this, it is inevitable for all universities to incorporate adequate strategic and QMS tools into the development process. In this context, the ISO 9004:2018 standard can offer clear direction for attaining long-term success (Glogovac et al., 2022). Since ISO 9004:2018 is a proven and one of the globally recognized maturity models for QMS, the elements of this model could serve as a framework for assessing the quality maturity level in a new industrial environment (Glogovac et al., 2022).

On the other side, there is significant room for integrating quality maturity models with ones that can serve for performance achievement measuring. In addition to the successful implementation of models for excellence in higher education, the successful adoption of the BSC in higher education is also noted (Serdar Asan, 2007). BSC is a tool for business performance measuring, developed by Kaplan & Norton (1996), that has gained increasing popularity and application in various industries over time (Kiriri, 2022). It considers performances through four perspectives: customer, internal processes, learning and growth, and financial (Kaplan & Norton, 1996). To achieve sustainability, HEIs can apply this model to meet the requirements of all stakeholders (Makki et al., 2023; Al-Bahi et al., 2021; Nazari-Shirkouhi et al., 2020). Considering the dynamic environment, HEIs could adopt the BSC as a comprehensive tool for performance evaluation to enhance them accordingly (Kiriri, 2022).

2.3. Hypothesis development

Quality management requires the integration of mission, vision, values, and culture, and in that regard, it is necessary to identify a clear strategy (Serdar Asan & Tanyaş, 2007). On the other hand, strategic measurement based on the application of the BSC perspectives also involves linking goals, mission, and vision into a single entity (Serdar Asan, 2007). Therefore, the BSC can serve as a strategic framework for aligning strategy and vision into a comprehensive whole (Serdar Asan, 2007). Implementing the BSC can facilitate the achievement of strategic objectives and alignment with the vision and strategy of organizations (Kiriri, 2022). Adopting the BSC enables organizations to evaluate strategies through tangible outcomes and achievable goals (Serdar Asan, 2007). Kaplan & Norton (1996) pointed out that vision and strategy are in relation to the BSC perspectives (Figure 1).

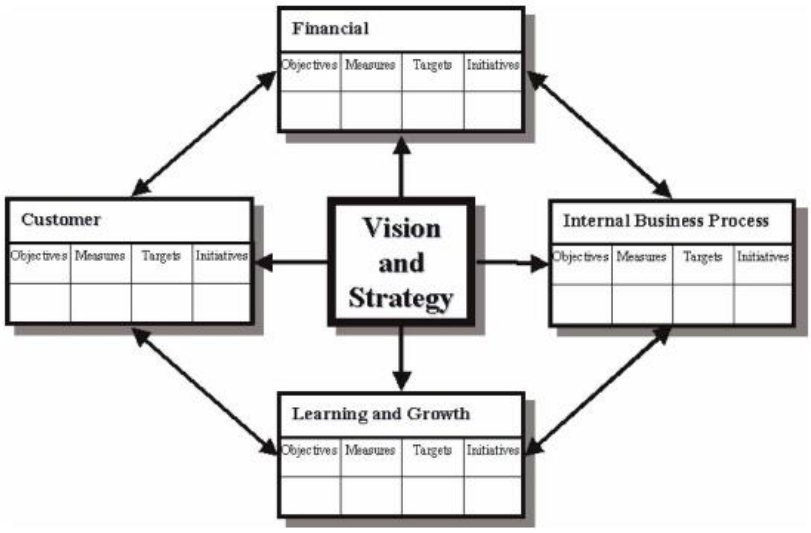

Figure 1. Vision and Strategy in relation to the BSC perspectives (Kaplan & Norton, 1996)

In achieving the strategic goals of HEIs, paying attention to customers and their satisfaction ranks at the top of the hierarchical ladder within the BSC perspectives (Stejskal et al., 2020). The customer perspective is seen as strongly related to the vision (Kiriri, 2022). Innovation, learning, and growth of HEIs also take one of the leading positions within the BSC perspectives (Stejskal, et al., 2020). This perspective entails innovation in the work of HEIs (Al-Bahi, et al., 2021), encompassing organizational knowledge, innovation in work, professional growth, and development of employees (Al-Bahi, et al., 2021). In the field of higher education, internal business processes also play a significant role in following the strategic map (Nazari-Shirkouhi, et al., 2020). The perspective of internal business processes focuses on coordinating business activities with the mission, vision, and strategic goals of higher education institutions (Kiriri, 2022). Translating mission and strategy into operational objectives in financial terms can contribute to increased financial resources (Kiriri, 2022). The financial perspective in HEIs can encompass funding sources, including government funding and student tuition fees (Serdar Asan, 2007). According to the recognised relations among HEIs quality strategies and Balanced Scorecard perspectives, the following hypotheses are addressed:

- H (1) QMS Vision and Strategy is correlated with the Customer Perspective of HEIs in the era of Industry 5.0.
- H (2) QMS Vision and Strategy is correlated with the Learning and Growth Perspective of HEIs in the era of Industry 5.0.

- H (3) QMS Vision and Strategy is correlated with the Internal Business Processes Perspective of HEIs in the era of Industry 5.0.
- H (4) QMS Vision and Strategy is correlated with the Financial Perspective of HEIs in the era of Industry 5.0.

3. DATA AND METHODOLOGY

The research method used to collect data is an online questionnaire for employees in HEIs. It was conducted from November 2023 to March 2024 in 374 HEIs in the Republic of Serbia. The questionnaire is intended for employees at both public and private faculties and academies, established through the merger of high education institutions.

The first part of the questionnaire covers the demographic features of respondents, while the second part focuses on the ISO 9004:2018 QMS vision and strategy variables and the BSC perspectives in the context of Industry 5.0. Elements of the ISO 9004:2018 standard that stand for the QMS Vision and Strategy variable are: Relevant interested parties and their needs; External and internal organisational issues; Mission, vision, values, and culture; Leadership; Policy and strategy; Objectives; and Communication about policies and strategies. BSC perspectives that are covered in the research are: Customer; Learning and growth; Internal business processes; and Financial perspective.

ISO 9004:2018-based vision and strategy variable's relationship to BSC variables were analyzed using the Regression analysis.

4. RESULTS AND DISCUSSION

Exploratory factor analysis was applied to reduce and structure a large number of observable variables into a smaller number of latent constructs, thereby achieving greater analytical clarity. KMO and Bartlett's tests are used to assess the suitability of the data for factor analysis. The results of the KMO test (0.984) and Bartlett's test (χ^2=25672.999; $p<0.001$) confirm that the data are very suitable for factor analysis. The results of the factor analysis showed that a certain number of observable variables were reduced and structured into a smaller number of latent constructs. All values obtained by Exploratory factor analysis are given in Table 1. Subsequently, a Regression analysis was conducted on a sample of 374 respondents, which satisfies the recommended ratio of 10:1 between the number of respondents and the number of included observable variables, of which there were a total of 56 in this study. The independent factors investigated in the study are QMS vision and strategy. Factors such as Customer perspective, Learning and growth perspective, Internal business process perspective, and Financial perspective are treated as dependent variables in this model.

Cronbach's alpha coefficient (Nunnally, 1978) was used to determine the internal consistency of the instrument. The results of the reliability coefficients for all five groups of questions show values above 0.7, which meets the recommendations of authors such as Nunnally (1978) and Deng & Chan (2017), and are presented in detail in Table 2. These results indicate good internal consistency and reliability of all examined constructs. Correlation analysis was applied to examine the relationship between the two groups of questions. To quantitatively represent the relationship between these two constructs, the correlation coefficient was calculated. The obtained results show a high level of mutual correlation, which indicates a strong statistical relationship between the examined constructs. The values of the correlation coefficients are also presented in Table 2.

Table 1. Exploratory factor analysis (EFA)

Observable variables	Component				
	1	2	3	4	5
Customer perspective (CP)					
Q1	0.617				
Q2	0.626				
Q3	0.665				
Q4	0.676				
Q5	0.614				
Q6	0.646				
Q7	0.573				
Q8	0.569				
Q9	0.556				
Q10	0.617				
Q11	0.630				
Q12	0.616				
Learning and growth perspective (LGP)					
Q6		0.503			
Q7		0.524			
Q8		0.547			
Q9		0.591			
Q10		0.503			
Q11		0.530			
Q12		0.536			
Q13		0.531			
Q14		0.571			
Internal business processes perspective (IBPP)					
Q1			0.550		
Q2			0.614		
Q3			0.701		
Q4			0.678		
Q5			0.627		
Q7			0.618		
Q14			0.552		
Q15			0.568		
Q16			0.578		
Financial perspective (FP)					
Q1				0.530	
Q2				0.634	
Q3				0.587	
Q4				0.662	
Q5				0.734	
Q6				0.738	
Q7				0.638	
Q8				0.589	
QMS Vision and Strategy (QMS_VS)					
Q1					0.739
Q2					0.765
Q3					0.688
Q4					0.665
Q5					0.710
Q6					0.703
Q7					0.624

Table 2. Coefficient of Cronbach Alpha and the Correlation coefficient

Variables	Cronbach Alfa	CP	LGP	IBPP	FP	QMS_VS
CP	0.958	1				
LGP	0.959	0.884**	1			
IBPP	0.949	0.921**	0.917**	1		
FP	0.936	0.810**	0.848**	0.797**	1	
QMS_VS	0.958	0.817**	0.812**	0.796**	0.815**	1

After the Correlation analysis, Regression analysis was performed, which goes a step further and focuses on predicting the value of one variable based on the value of another (Ho, 2006). In other words, if the value of one independent variable is known, Regression analysis allows one to predict the behavior or value of the dependent variable with a certain degree of accuracy. The Regression analysis was applied in this study to determine the existence and strength of relationships between multiple variables. Specifically, the impact of QMS vision and strategy as independent variables on multiple dependent constructs that reflect different perspectives of HEIs was analyzed: Customer perspective, Learning and growth perspective, Internal business processes perspective, and Financial perspective. These constructs represent key dimensions of the performance of HEIs following the concept of the Balanced Scorecards.

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.817	0.667	0.666	0.546	0.667	7450.710	1	372	0.000
2	0.812	0.660	0.659	0.585	0.660	7210.085	1	372	0.000
3	0.796	0.634	0.633	0.576	0.634	6440.581	1	372	0.000
4	0.815	0.664	0.663	0.544319	0.664	7340.724	1	372	0.000

a. Predictor: (Constant), QMS_VS
b. Dependent Variables: CP, LGP, IBPP, FP

The result of the change in the coefficient of determination (R^2) indicates the degree to which the variations in the dependent variables can be explained by the influence of the independent variable. In this case, as shown in Table 3, the independent variable QMS vision and strategy statistically significantly explains the variations in the dependent constructs, such as Customer perspective with 66.7%, Learning and growth perspective with 66.0%, Internal business process perspective with 63.4%, and Financial perspective with 66.4%.

Table 4. Coeficients beta regression

Model	Unstandardized Coefficients		Stand. Coef.	t	Sig.
	B	Std. Error	Beta		
CP	0.743	0.027	0.817	27.308	0.000
LGP	0.784	0.029	0.812	26.853	0.000
IBPP	0.728	0.029	0.796	25.389	0.000
FP	0.735	0.027	0.815	27.106	0.000

a. Dependent Variable: BMP

Further, the formulated hypotheses were tested using Regression analysis, to examine the impact of the QMS vision and strategy construct on four perspectives of the BSC: the Customer perspective, the Learning and growth perspective, the Internal business process perspective, and the Financial perspective. Table 3 and Figure 2 show the values of the beta

coefficients and the path of influence. The results of the analysis indicate a strong and statistically significant impact of the QMS vision and strategy on all four perspectives, with the most pronounced impact observed on the Customer perspective.

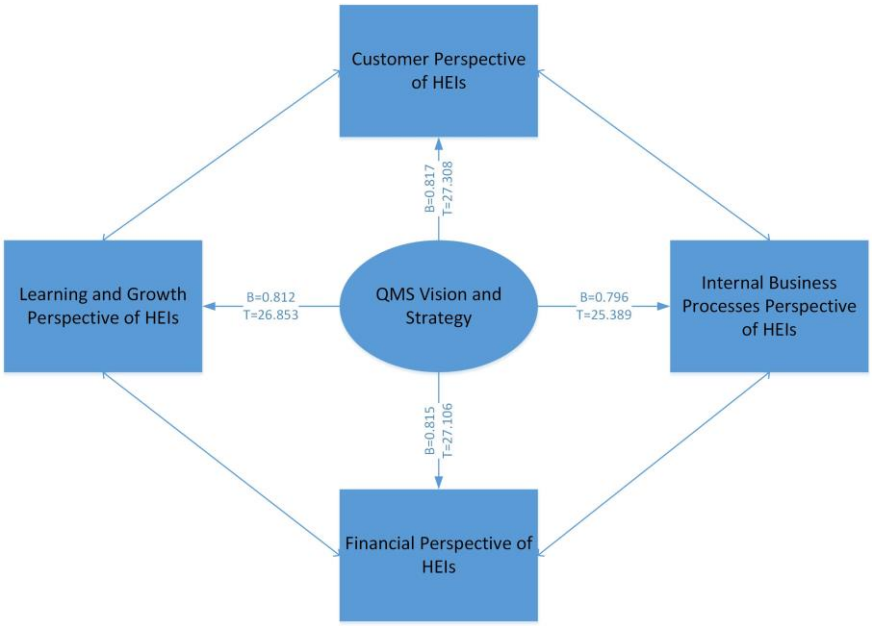

Figure 2. Results of Regression Analysis

5. CONCLUSION

The paper aimed to investigate the relationship between the QMS vision and strategy and the measurable performance of HEIs in the Industry 5.0 environment. On this occasion, the QMS vision and strategy were defined through the variables of the ISO 9004:2015 standard that relate to Relevant interested parties and their needs; External and internal organisational issues; Mission, vision, values, and culture; Leadership; Policy and strategy; Objectives; and Communication about policies and strategies. On the other hand, the achievements were categorized according to the BSC perspectives: Customer perspective, Internal business perspective, Learning and growth perspective, and Financial perspective.

The results of the statistical processing of the collected data indicate a significant relationship between the QMS vision and strategy and all four observed BSC performance perspectives. This indicates that even in today's context, which is directed towards Industry 5.0, the QMS vision and strategy can be a significant factor in the success of HEIs. It is important for higher education to follow the industrial revolution from its beginning and to adapt to it to ensure success in the new environment. Based on the results of this research, HEIs' management can be aware of the importance of adequately managing QMS vision and strategy in a new industrial era. Considering that this research has proved their connection with a large number of HEIs' performances, the importance of adequately defining and managing QMS in HEIs in the era of Industry 5.0 is highlighted. In addition to highlighting the relevance of QMS vision and strategy in the Industry 5.0 context, this research contributes to the existing body of knowledge by connecting quality management frameworks with organizational performance models in a new industrial context. It could serve as a practical basis for HEIs to strategically align their quality management initiatives with evolving industrial trends. Furthermore, the study provides a foundation for future empirical research aiming to deepen the understanding

of how integrated management approaches can enhance institutional resilience and competitiveness.

The limitations of this research relate to the territorial scope, so future research could include and compare results between countries depending on their degree of alignment with Industry 5.0. In addition, this research is limited only to the QMS vision and strategy as an independent variable, while future research could include other QMS elements. Also, future research could include ranking the impact of QMS elements on different performance achievements.

REFERENCES

Ahmed, I., Hossain, N. U. I., Fazio, S. A., Lezzi, M., & Islam, M. S. (2024). A Decision Support Model for Assessing and Prioritization of Industry 5.0 Cybersecurity Challenges. *Sustainable Manufacturing and Service Economics*, 100018. https://doi.org/10.1016/j.smse.2024.100018

Al-Bahi, A. M., Abd-Elwahed, M. S., & Soliman, A. Y. (2021). Implementation of sustainability indicators in engineering education using a combined balanced scorecard and quality function deployment approaches. *Sustainability*, *13*(13), 7083. https://doi.org/10.3390/su13137083

Araújo, M., & Sampaio, P. (2013). Total Quality Management & Business Excellence. The path to excellence of the Portuguese organisations recognised by the EFQM model, *Total Quality Management & Business Excellence, 25(5-6), 427-438,* https://doi.org/10.1080/14783363.2013.850810

Babkin, A., Shkarupeta, E., Kabasheva, I., Rudaleva, I., & Vicentiy, A. (2022). A Framework for Digital Development of Industrial Systems in the Strategic Drift to Industry 5.0. *International Journal of Technology*, *13*(7). DOI: 10.14716/ijtech.v13i7.6193

Broo, D. G., Kaynak, O., & Sait, S. M. (2022). Rethinking engineering education at the age of industry 5.0. *Journal of Industrial Information Integration*, *25*, 100311. https://doi.org/10.1016/j.jii.2021.100311

Carayannis, E. G., & Morawska-Jancelewicz, J. (2022). The futures of Europe: Society 5.0 and Industry 5.0 as driving forces of future universities. *Journal of the Knowledge Economy*, *13*(4), 3445-3471. https://doi.org/10.1007/s13132-021-00854-2

Deng, L., & Chan, W. (2017). Testing the difference between reliability coefficients alpha and omega. *Educational and Psychological Measurement*, 77(2), 185–203. https://doi.org/10.1177/0013164416658325

Garrido, S., Muniz Jr, J., & Ribeiro, V. B. (2024). Operations Management, Sustainability & Industry 5.0: A Critical Analysis and Future Agenda. *Cleaner Logistics and Supply Chain*, 100141. https://doi.org/10.1016/j.clscn.2024.100141

Glogovac, M., Ruso, J., & Maricic, M. (2022). ISO 9004 maturity model for quality in industry 4.0. *Total Quality Management & Business Excellence*, *33*(5-6), 529-547. https://doi.org/10.1080/14783363.2020.1865793

Glogovac, M., Ruso, J., Arsić, S., Rakić, A., & Milošević, I. (2023). Leadership for quality 4.0 improvement, learning, and innovation. *Engineering Management Journal*, *35*(3), 313-329. https://doi.org/10.1080/10429247.2022.2108668

Grabowska, S., & Saniuk, S. (2022). Assessment of the competitiveness and effectiveness of an open business model in the industry 4.0 environment. *Journal of Open Innovation: Technology, Market, and Complexity*, *8*(1), 57. https://doi.org/10.3390/joitmc8010057

Hashim, M. A. M., Tlemsani, I., Mason-Jones, R., Matthews, R., & Ndrecaj, V. (2024). Higher education via the lens of industry 5.0: Strategy and perspective. *Social Sciences & Humanities Open*, *9*, 100828. https://doi.org/10.1016/j.ssaho.2024.100828

Ho, R. (2006). *Handbook of Univariate and Multivariate Data Analysis and Interpretation with SPSS*. Boca Raton, FL: Chapman & Hall/CRC.

Huang, S., Wang, B., Li, X., Zheng, P., Mourtzis, D., & Wang, L. (2022). Industry 5.0 and Society 5.0—Comparison, complementation and co-evolution. *Journal of manufacturing systems*, *64*, 424-428. https://doi.org/10.1016/j.jmsy.2022.07.010

Ivanov, D. (2023). The Industry 5.0 framework: viability-based integration of the resilience, sustainability, and human-centricity perspectives. *International Journal of Production Research*, *61*(5), 1683-1695. https://doi.org/10.1080/00207543.2022.2118892

Kaplan, R. S., & Norton, D. P. (1996). Strategic learning & the balanced scorecard. *Strategy & Leadership*, *24*(5), 18-24. https://doi.org/10.1108/eb054566

Kiriri, P. N. (2022). Management of performance in higher education institutions: The application of the balanced scorecard (BSC). *European Journal of Education*, *5*(1), 141-154. http://dx.doi.org/10.26417/158crg70k

Kumar, S., & Mallipeddi, R. R. (2022). Impact of cybersecurity on operations and supply chain management: Emerging trends and future research directions. *Production and Operations Management*, *31*(12), 4488-4500. https://doi.org/10.1111/poms.13859

Leng, J., Zhu, X., Huang, Z., Li, X., Zheng, P., Zhou, X., ... & Liu, Q. (2024). Unlocking the power of industrial artificial intelligence towards Industry 5.0: Insights, pathways, and challenges. *Journal of Manufacturing Systems*, *73*, 349-363. https://doi.org/10.1016/j.jmsy.2024.02.010

Makki, A. A., Alqahtani, A. Y., Abdulaal, R. M., & Madbouly, A. I. (2023). A novel strategic approach to evaluating higher education quality standards in university colleges using multi-criteria decision-making. *Education Sciences*, *13*(6), 577. https://doi.org/10.3390/educsci13060577

Miao, J., Wang, Z., Wang, M., Garg, S., Hossain, M. S., & Rodrigues, J. J. (2024). Secure and efficient communication approaches for Industry 5.0 in edge computing. *Computer Networks*, 110244. https://doi.org/10.1016/j.comnet.2024.110244

Nazari-Shirkouhi, S., Mousakhani, S., Tavakoli, M., Dalvand, M. R., Šaparauskas, J., & Antuchevičienė, J. (2020). Importance-performance analysis based balanced scorecard for performance evaluation in higher education institutions: an integrated fuzzy approach. *Journal of Business Economics and Management*, *21*(3), 647-678. https://doi.org/10.3846/jbem.2020.11940

Nguyen, T. A. V., Tucek, D., & Pham, N. T. (2022). Indicators for TQM 4.0 model: Delphi Method and Analytic Hierarchy Process (AHP) analysis. *Total Quality Management & Business Excellence*, *34*(1-2), 220–234. https://doi.org/10.1080/14783363.2022.2039062

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York: McGraw-Hill.

Serdar Asan, Ş., & Tanyaş, M. (2007). Integrating Hoshin Kanri and the balanced scorecard for strategic management: The case of higher education. *Total Quality Management*, *18*(9), 999-1014. https://doi.org/10.1080/14783360701592604

Stejskal, K., Sayed, N., & Lento, C. (2020). Mapping stakeholder expectations of a publicly funded post-secondary institution: a balanced scorecard perspective. *Accounting and the Public Interest*, *20*(1), 104-137. https://doi.org/10.2308/api-19-002

Sütoová, A., Teplická, K., & Straka, M. (2022). Application of the EFQM Model in the Education Institution for Driving Improvement of Processes towards Sustainability. Sustainability, 14 (2022), 7711. https://doi.org/10.3390/su14137711

Taimur, S., & Onuki, M. (2022). Design thinking as digital transformative pedagogy in higher sustainability education: Cases from Japan and Germany. *International Journal of Educational Research*, *114*, 101994. https://doi.org/10.1016/j.ijer.2022.101994