Sociálno-ekonomická revue

Fakulta sociálno-ekonomických vzťahov,
Trenčianska univerzita Alexandra Dubčeka v Trenčíne

Vedecký časopis – Scientific Journal

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Alexander Dubček University of Trenčín

Ročník 23, Jún 2025, číslo 1
Volume 23, June 2025, no. 1

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MODERN HR APPROACHES IN RELATION TO THE FINANCIAL PERFORMANCE OF SMES

Dana JAŠKOVÁ

Abstract

Small and medium-sized enterprises (SMEs) are key drivers of wealth creation and employment across economies. In today's increasingly dynamic and uncertain business environment, SMEs must adopt modern human resource management systems to enhance financial performance and gain a competitive edge. This study explores the relationship between High Performance Work Systems (HPWS) and organizational financial performance (FP), with a specific focus on empirically validating mediating effects through a rigorous model comparison approach to strengthen the robustness of the findings. Beyond assessing the direct relationship between HPWS and FP, the study investigates the mediating roles of SME reputation (RE) and SME social value (SV). The primary objective is to quantify these relationships within the context of human resource management practices in Slovak SMEs. Data were gathered via a survey of 300 SME owners and managers. Partial least squares structural equation modelling (PLS-SEM), implemented using SmartPLS 4, was used to test the proposed hypotheses. The findings reveal a significant positive effect of HPWS on all three constructs—RE, SV, and FP. Furthermore, the study confirms that RE significantly mediates the relationship between HPWS and FP. However, the hypothesized mediating effect of SV between HPWS and FP was not supported.

INTRODUCTION

Small and medium-sized enterprises (SMEs) represent a fundamental driving force of economic development and are an essential component of most economies, particularly in developing and rapidly emerging countries (Ndiaye et al., 2018; Gherghina et al., 2020). Compared to large enterprises, SMEs are highly flexible, capable of adapting quickly to technological changes and responding to market fluctuations more effectively. Their flat organizational structure enables more efficient and faster decision-making (Baeshen et al., 2021). SMEs also play a key role as employers. According to several studies, they account for approximately 90% of all businesses and provide about 60% of global employment (Naradda Gamage et al., 2020). They are considered the most productive sector in terms of job creation (Qaydi et al., 2021; Auzzir et al., 2018), contributing to the reduction of unemployment and social inequality. Due to increasing market challenges, SMEs require a more skilled and competitive workforce, which places greater demands on effective human resource management (HRM). Contemporary HRM encompasses a wide range of processes, from recruitment and employee selection to onboarding, development, motivation, and eventually, separation. Building a positive work environment, strong organizational culture, and caring for employees are also essential components. Modern organizations are increasingly adopting innovative HR approaches, technologies, and best practices (Gibson et al., 2001; Wood et al., 2002). One such innovation is the High-Performance Work System (HPWS), a comprehensive set of HR practices designed to improve performance by fostering employee engagement, motivation, and capabilities. Over the past decade, HPWS has emerged as a prominent area of HRM research. Organizations implement HPWS to develop employee knowledge, skills, and abilities, while also enhancing motivation through training, empowerment, and performance-based rewards.

Empirical studies have demonstrated the positive impact of individual HPWS components on organizational outcomes. However, the implementation of HR practices alone does not guarantee improved financial performance. It is therefore essential to investigate this relationship through mediating and moderating variables, factors from the internal and external environment that influence business performance (Tzabbar et al., 2017; Rubio-Andrés et al., 2014). Studies have focused on the mediating effects of reputation, employee well-being, and perceived social value between HPWS and financial performance. For example, Garmendia et al. (2021) and Sheehan et al. (2022) emphasize that HPWS influences labour productivity through the moderating effect of HR strategic orientation. Rauch and Hatak (2016), as well as Harney (2021), suggest that the long-term relationship between HPWS and performance may depend on the demographic characteristics of SMEs, such as firm size or age. Reputation and social value are latent, unobservable constructs whose measurement depends on stakeholders' subjective perception. Nevertheless, their mediating role between HPWS and financial performance may be significant. These perceptions can vary across countries, what matters to SME managers in Spain (Rubio-Andrés, 2022) may differ from the expectations in Slovakia or the Czech Republic due to cultural and economic context. To date, the quantification of these relationships within the conditions of Slovakia and the Czech Republic is lacking. Therefore, this study contributes to understanding the importance of reputation and social value as mediators in the HPWS–performance relationship in the specific SME environment of these countries. The following research questions are formulated. What is the individual mediating role of reputation and social value in the relationship between HPWS and financial performance in Czech SMEs? What is the combined mediating effect of reputation and social value in this relationship? What are the cross-country differences in how reputation and social value mediate the HPWS–performance relationship in Slovak and Czech SMEs?

1. Literature Review and Hypothesis Development

1.1 The Direct Effect of HPWS on Financial Performance (FP)

The performance of small and medium-sized enterprises (SMEs) can be assessed from both quantitative and qualitative perspectives. From a quantitative perspective, performance indicators may include efficiency, financial results, production volume, customer base, and more (Anggadwita & Mustafid, 2014). From a qualitative perspective, SME performance may involve leadership style, employee behaviour (Anggadwita & Mustafid, 2014), customer satisfaction (Alpkan et al., 2007), product and process innovations, organizational and marketing innovations, etc. The implementation of HPWS in SMEs is considered a management innovation aimed at improving not only employee engagement but also financial performance. Financial performance is a complex indicator of a firm's ability to efficiently manage its resources and achieve its economic goals, particularly profitability. It is a key measure of a firm's financial health and stability, relevant to owners, managers, investors, financial institutions, and regulatory bodies. The relationship between human resources and financial performance is crucial, as HR practices can have a direct or indirect effect on a firm's economic outcomes. Wang et al. (2018) emphasized the role of HPWS in achieving organizational goals and improving performance. Their study confirmed a statistically significant moderate direct effect of HPWS on SME performance in China ($\beta = 0.425$). Siddique et al. (2019) demonstrated both direct and mediated effects of HPWS on certain dimensions of SME performance, supporting the utility of HPWS in enhancing firm outcomes. Lai et al. (2017) found a positive and statistically significant relationship between HPWS and financial performance in a sample of UK SMEs. Based on these findings, we propose the following hypothesis:

H1: HPWS have a direct positive effect on the financial performance of SMEs

1.2 The Mediating Effect of Reputation

A positive reputation is an effective and strategic asset in gaining competitive advantage and contributes directly to a firm's market value. Corporate reputation is shaped by various

internal and external factors and has become a key element of business strategy (Burke et al., 2011). Boon et al. (2019) found that customer expectations can influence SMEs' decisions to implement new HR practices. As a key stakeholder group, customers significantly affect a firm's reputation. Reputation is widely recognized as a strategic resource that supports sustained competitive advantage (Flanagan & O'Shaughnessy, 2005). Several empirical studies have identified a strong relationship between corporate reputation and firm performance. Kölbel et al. (2017) confirmed a significant association between business reputation and SME performance. Guerci et al. (2019) demonstrated the impact of corporate reputation on stakeholder behaviour and financial performance. Eberl and Schwaiger (2005) concluded that improved corporate reputation leads to long-term performance benefits. Reputation can thus serve as a mediator between internal HR practices and financial outcomes. He et al. (2016) and Nardella et al. (2020) also examined the consequences of poor corporate reputation and its role in shaping stakeholder perceptions. Positive reputations lead to higher profitability, more stable cash flows, and higher market capitalization (Kozáková, 2017). Lange et al. (2011) noted that the relationship between reputation and financial performance may be both direct and indirect. Nejati et al. (2017) suggested that SMEs that engage in responsible HR practices enhance both their reputation and financial outcomes. Reputation, therefore, increases the strength of the relationship between HPWS and firm performance. Based on the above, we formulate the second hypothesis:

H2: The effect of HPWS on financial performance is positively mediated by company reputation in SMEs.

1.3 The Mediating Effect of Social Value (SV)

For SMEs, performance is not only an economic measure but also includes the ability to generate social value. HPWS practices contribute to building human and social capital, which are essential resources for achieving competitive performance, financial success, and social value creation (Messersmith & Guthrie, 2010; Takeuchi et al., 2007). Several studies emphasize the importance of creating both internal and external social value. Internally, the quality of work and organizational culture are crucial factors in driving social value and improving firm performance. Externally, customer satisfaction plays an important role in business outcomes, as shown by Marinič (2016). Auerswald (2009) argued that creating social value enhances financial resources and that SMEs may be better positioned to generate social value due to their agility and local embeddedness. Compared to large corporations, SMEs often operate in closer proximity to their communities, making their social behaviour and responsibility more visible and impactful (Jenkins, 2004). Their reputational standing within the local community can directly affect their performance, and irresponsible behaviour can have immediate and lasting negative consequences. Ethical treatment of employees, transparency, product quality, and responsiveness to customer needs are all key factors that shape social value and influence organizational performance (Brammer et al., 2006). Juscius et al. (2013) identified five dimensions for quantifying social value: (1) SME's commitment to creating social and economic value, (2) product quality, (3) knowledge of customer satisfaction, (4) anticipation of environmental changes, and (5) process efficiency. We therefore propose the third hypothesis:

H3: The effect of HPWS on financial performance is positively mediated by social value in SMEs.

2. Materials and methods

The comprehensive model used to test the research hypotheses was initially developed by Jašková et al. (2024) in a study aimed at identifying key factors of successful human resource development management in Slovak SMEs. Based on their published findings, the model's applicability and predictive power were subsequently tested on a sample of SMEs in the Czech Republic. The conceptual model examines the interrelationships among High Performance Work Systems (HPWS), SME reputation (RE), social value (SV), and financial performance (FP), with the hypotheses derived from these expected linkages.
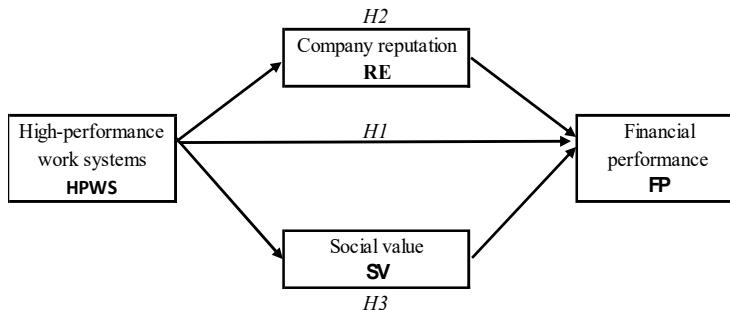
Figure 1: Conceptual model

From a theoretical perspective, the model is classified as a multiple mediation model (Hair, 2019). The objective of this study is to quantify the proposed relationships, empirically test the hypotheses, and compare the results with findings from prior scientific research.

2.1 Data Collection and Sample

To test the proposed conceptual model, we used selected data from a structured survey conducted in 2024 as part of a broader research project focused on the development of human resource management in Slovak SMEs. The operationalization of the constructs was based on validated measurement models from prior research, particularly Rubio-Andrés et al. (2022). The measurement instrument was a multi-item scale adapted from the literature. Each item was assessed by respondents using a standard five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Constructs were identified and refined through exploratory factor analysis conducted during a pilot study. The final analysed sample consisted of 300 respondents, corresponding to a response rate of 48%. To determine the minimum required sample size, we used G*Power software, as recommended by Hair et al., (2018a; 2018b; 2020; 2022). Based on the publications, a minimum sample of 120 observations is adequate for social science research with an expected large effect size and a maximum of six predictors per construct.

2.2 Data Analysis Technique

The data were analysed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS4. Due to its robustness and flexibility, PLS-SEM is a widely accepted method for estimating complex models (Peng & Lai, 2012). There are several justifications for using PLS-SEM in this study. First, the model includes mediating effects (i.e., the roles of RE and SV between HPWS and FP), aligning with recommendations from Nitzl et al. (2016). Second, the predictive nature of the study and the model complexity (multiple constructs and indicators) support the use of PLS-SEM. Third, the ordinal nature of the data and the non-normal distribution of observed variables further justify its use. Finally, PLS-SEM is particularly well-suited when the goal is to advance theory through exploring complex relationships in relatively small samples (Sarstedt & Mooi, 2019). The analysis included model fit assessment, construct reliability and validity checks, evaluation of path coefficients, and mediation testing through bootstrapping. The predictive accuracy of the model was also examined.

3. Results

The model, analysed in the SmartPLS 4 environment, was based on the conceptual framework shown in Figure 1. The analysis followed the procedures and recommendations outlined in Hair (2020) and Sarstedt (2021). The first step involved the evaluation of the measurement model. If the results were satisfactory, the analysis proceeded to the inner structural model, followed by the prediction of the endogenous variable. At each stage, the computed values of the relevant evaluation criteria were assessed against established threshold values. In line with best practices, the significance of the estimated path coefficients and model parameters was tested using

bootstrapping, as recommended by the cited literature. The model estimation was performed using the PLS-SEM algorithm, employing the path weighting scheme, with a maximum of 300 iterations and a stop criterion set to 10^{-7}. Equal indicator weights were used for initialization.

The algorithm successfully converged, and the stop criterion was met, confirming the stability of the model estimation process. The demographic characteristics of the respondents, with their respective frequencies, are shown in Table 1.

Table 1: Profile of respondents

What is your current position in the company	Frequency	Percent
company owner	87	29,00
co-owner of the company	43	14,33
managerial position	170	56,67
other		
Type of company		
micro enterprise	102	34,00
small enterprise	98	32,67
medium-sized enterprise	100	33,33
Gender		
male	155	51,67
female	145	48,33
Focus of the enterprise		
manufacture of products	92	30,67
provision of services	208	69,33
Market activity		
less than 1 year	14	4,67
1-5 years	54	18,00
6 - 10 years	57	19,00
11- 15 years	46	15,33
more than 15 years	129	43,00

Source: Own elaboration

3.1 Measurement model assessment

The nature of the constructs in the outer model, in terms of their operationalization through items, was reflective. The criteria for evaluating the measurement model differ for reflective and formative constructs. Examining the measurement model includes indicator reliability, internal consistency reliability, convergent validity (CV), and discriminant validity (DV). Indicator reliability is assessed using outer loadings and the Average Variance Extracted (AVE) coefficient. Internal consistency reliability assesses the extent to which the items measure a specific latent construct. Composite reliability (ρ_c) was assessed as a measure of internal consistency. The results, along with the threshold and recommended values, are presented in the following table 2.

Table 2: PLS-SEM assessment results of reflective measurement models

Latent variable	Indicators	Convergent validity		Internal consistency reliability		
		Loadings > 0.70	AVE > 0.50	Cronbach´s α 0.70 - 0.90	Reliability ρA > 0.70	Composite reliability ρC > 0.70
HPWS	HPWS_1	0.577	0.563	0.886	0.891	0.908
	HPWS_2	0.614				
	HPWS_3	0.810				
	HPWS_5	0.805				
	HPWS_6	0.753				
	HPWS_7	0.769				
	HPWS_8	0.737				
	HPWS_9	0.815				
	HPWS_10	0.571				
	HPWS_12	0.566				
RE	RE_1	0.834	0.707	0.793	0.797	0.878
	RE_2	0.849				
	RE_3	0.839				
SV	SV_1	0.852	0.654	0.821	0.825	0.883
	SV_2	0.864				
	SV_3	0.792				
	SV_4	0.720				
FP	FP_1	0.762	0.520	0.871	0.886	0.897
	FP_2	0.753				
	FP_3	0.685				
	FP_4	0.833				
	FP_5	0.514				
	FP_6	0.611				
	FP_7	0.579				
	FP_8	0.759				
	FP_9	0.585				

Source: Own elaboration

Convergent validity evaluates the extent to which indicators of a construct are positively correlated with alternative measures of the same concept. This assessment involves examining the outer loadings of indicators and the Average Variance Extracted (AVE). The recommended threshold for outer loadings is $\lambda > 0.708$, indicating that the construct explains more than 50% of the indicator's variance. As a result, the items HPW_4, HPW_11, and FP_5 were excluded from further analysis due to insufficient outer loadings (Hair, 2019). All AVE values met the minimum criterion of 0.50,

confirming that each construct explains at least half of the variance in its associated indicators. These results confirm the convergent validity of the measurement model.

Discriminant validity was assessed using three established methods: Fornell-Larcker Criterion, Heterotrait-Monotrait Ratio (HTMT), and Cross-loadings. According to Fornell and Larcker, the square root of the AVE for each latent construct should be greater than its correlations with other constructs. As shown in Table 3, all constructs satisfy this criterion.

Table 3: Fornell-Larcker Criterion for Assessing Discriminant Validity

	FP	HPWS	RE	SV
FP	0.753			
HPWS	0.486	0.729		
RE	0.535	0.700	0.887	
SV	0.376	0.693	0.714	0.778

Source: Own elaboration

The diagonal values (square roots of AVE) exceed the inter-construct correlations, confirming discriminant validity based on this method. Following Henseler et al. (2015), the HTMT ratio was used to provide a more rigorous assessment of discriminant validity. HTMT values were obtained through a bootstrapping procedure (1000 samples), using percentile confidence intervals and one-tailed testing at a 0.05 significance level.

Table 4: HTMT Criterion for Assessing Discriminant Validity

Construct Pair	HTMT (UB 95%)
HPWS ↔ FP	0.573 (0.702)
RE ↔ FP	0.631 (0.747)
RE ↔ HPWS	0.782 (0.872)
SV ↔ FP	0.483 (0.628)
SV ↔ HPWS	0.815 (0.899)
SV ↔ RE	0.871 (0.943)

Source: Own elaboration

Potential issues with discriminant validity arise when HTMT values exceed 0.90 (or 0.85 in more conservative approaches). In this case, all values remained within acceptable bounds. Notably, the HTMT ratio for SV → FP was relatively low, indicating a weaker association between these constructs. The cross-loading analysis further confirmed acceptable discriminant validity, as all indicators loaded more highly on their associated constructs than on others. Before testing the structural model, multicollinearity was assessed using the Variance Inflation Factor (VIF). According to Hair et al. (2014), the maximum acceptable VIF value is 3.0. All VIF values in the model were below this threshold: HPWS → FP: VIF = 2.306; RE → FP: VIF = 2.444; SV → FP: VIF = 2.401. These results indicate that multicollinearity was not present among the latent constructs, supporting the stability of path estimates in the structural model.

3.2 Structural Model Assessment

To assess the structural model, we evaluated path coefficients, t-statistics, and p-values using bootstrapping in SmartPLS 4. The model examines both direct and indirect effects of High-Performance Work Systems (HPWS) on financial performance (FP), with company reputation (RE) and social value (SV) as mediators. The direct effect of HPWS on FP was found to be strong and statistically significant (β = 0.494, t = 5.52, p < 0.001), thus supporting Hypothesis H1. HPWS also had significant positive effects on RE (β = 0.660, t = 13.47, p < 0.001) and SV (β = 0.668, t = 16.21, p < 0.001). However, the direct paths from RE to FP (β = 0.086, t = 0.97, p = 0.332) and from SV to FP (β = 0.030, t = 0.39, p = 0.699) were not

statistically significant. The results are summarised below:

Table 5: Results of the evaluation of direct relationships

Path	Coefficient (β)	t-statistic	p-value	Result
HPWS → FP	0.494	5.52	0.000	Significant (✔ H1)
HPWS → RE	0.660	13.47	0.000	Significant
HPWS → SV	0.668	16.21	0.000	Significant
RE → FP	0.086	0.97	0.332	Not significant (H2 weak)
SV → FP	0.030	0.39	0.699	Not significant (✘ H3)

Source: Own elaboration

The specific indirect effect of HPWS on FP via RE was β = 0.057, suggesting a weak but present mediating effect. Although the path RE → FP was not statistically significant on its own, the full mediation chain contributed to a small indirect effect. The indirect effect via SV was very weak (β = 0.024) and not statistically significant.

Table 6: Results of the evaluation of indirect relationships

Indirect Path	Coefficient (β)	Interpretation
HPWS → RE → FP	0.057	Weak mediation (H2 partially supported)
HPWS → SV → FP	0.024	Not supported (✘ H3)

Source: Own elaboration

The total effect of HPWS on FP, combining both direct and indirect effects, was β = 0.571, which confirms the overall strength of HPWS in influencing firm performance.

4. Discussion and Findings

The results of this study empirically confirm the significant role of High Performance Work Systems (HPWS) in enhancing financial performance (FP) in SMEs. The strong and statistically significant path from HPWS to FP supports Hypothesis H1, and aligns with previous research (e.g., Wang et al., 2022; Lai et al., 2017), which emphasizes that well-developed HR practices contribute directly to business outcomes. These findings are particularly valuable in the SME context, where resources are often limited and HR investments must demonstrate tangible returns. The findings also validate the mediating role of company reputation in the HPWS–FP relationship (H2).

Although the direct path from reputation to financial performance was not statistically significant (p = 0.33), the overall indirect effect was positive, indicating that reputation partially mediates this relationship. This suggests that the implementation of HPWS not only influences internal workforce effectiveness but also enhances the external perception of the firm, which can lead to long-term financial benefits (Eberl & Schwaiger, 2005; Gatzert, 2015). On the other hand, Hypothesis H3 proposing the mediating role of social value (SV) was not supported. While HPWS had a strong positive effect on SV, the path from SV to FP was weak and statistically insignificant. This finding highlights a possible disconnect between social value creation and financial outcomes in SMEs, at least in the short term. It may also reflect the difficulty of translating intangible social benefits into measurable financial returns, or it could point to contextual and cultural differences in

how social responsibility is perceived in Slovakia and the Czech Republic (Jenkins, 2004; Rubio-Andrés, 2022). The inter-comparison of the two studies is shown in Table 7.

Table 7: Peer comparison of studies

Relationship / Path	Present Study (2025)	Published Article (2024)
HPWS → FP (H1)	Strong direct effect ($\beta = 0.494$, $p < 0.001$)	Moderate effect ($\beta = 0.262$, $p < 0.01$)
HPWS → RE (H2)	Strong effect ($\beta = 0.660$, $p < 0.001$)	Very strong effect ($\beta = 0.700$, $p < 0.001$)
RE → FP (part of H2)	Weak effect ($\beta = 0.086$, $p = 0.33$)	Strong effect ($\beta = 0.433$, $p < 0.001$)
HPWS → SV (H3)	Strong effect ($\beta = 0.668$, $p < 0.001$)	Strong effect ($\beta = 0.693$, $p < 0.001$)
SV → FP (H3)	Very weak, not significant ($\beta = 0.030$, $p = 0.699$)	Weak, not significant ($\beta = 0.115$, $p = 0.141$)
HPWS → RE → FP (mediation)	Weak but supported mediation ($\beta = 0.057$)	Strong mediation ($\beta = 0.303$, $p < 0.001$)
HPWS → SV → FP (mediation)	Not supported ($\beta = 0.024$, $p = 0.699$)	Not supported ($\beta = 0.080$, $p = 0.145$)
Model Fit and PLS Quality	Good fit (GoF, R², reliability acceptable)	Medium predictive power confirmed (GoF = 0.854)

Source: Own elaboration

These findings provide several key insights for SME managers and HR professionals. First, even small firms benefit from investing in structured HR practices such as training and performance-based incentives, HPWS should be treated as a strategic necessity. Second, HR practices influence not only internal outcomes but also external perceptions; reputation, while intangible, can serve as a valuable competitive asset. Although social value did not directly impact financial performance, it remains important for non-financial outcomes such as employee engagement and stakeholder trust. In locally embedded SMEs, building social value may strengthen community relationships and long-term sustainability. The findings also highlight the importance of local context, what works in one country may not be directly transferable to another. Therefore, HR and CSR initiatives should be adapted to local norms and stakeholder expectations. These results largely align with Jašková et al. (2024), who also confirmed the positive role of HPWS and reputation. However, the reputation–performance link was weaker in the Czech sample, possibly due to cultural or temporal factors. Both studies reaffirm the strategic value of HPWS and the need for cross-country, longitudinal research on how HRM interacts with intangible assets to drive SME performance.

Conclusion, Limitations, and Future Research

This study provides empirical evidence for the positive impact of High Performance Work Systems (HPWS) on the financial performance (FP) of small and medium-sized enterprises (SMEs). The results confirmed a strong and statistically significant direct effect, emphasizing the strategic role of HRM in enhancing business outcomes. Additionally, the mediating role of company reputation (RE) was partially supported, suggesting that reputation can act as an important channel through which HPWS contribute to financial success. Conversely, the hypothesized mediating effect of social value (SV) was not supported, indicating that its relationship with financial performance may be more complex, delayed, or context dependent. These findings offer valuable insights for SME managers, policymakers, and HR professionals aiming to align human capital strategies with

financial objectives. Despite the robustness of the findings, several limitations must be acknowledged. The data were collected at a single point in time, which limits the ability to make causal inferences or observe long-term effects. The use of subjective measures, including financial performance, may introduce bias due to personal perception or social desirability. The sample, while adequate for PLS-SEM, was limited to SMEs in Slovakia and the Czech Republic. Results may not be generalizable to other countries or larger enterprises. Cultural attitudes toward reputation, social value, and HRM may vary significantly across countries, possibly influencing the observed effects.

Building on the current study, future research could address these limitations and further explore the HPWS–performance relationship in several ways: Longitudinal studies should be conducted to examine the causal pathways and long-term effects of HPWS on financial and non-financial performance. Mixed-method approaches combining quantitative analysis with qualitative interviews could provide richer insights into how reputation and social value are constructed and perceived. Comparative cross-country studies could help clarify the role of national culture, institutional frameworks, and economic context in shaping HRM effectiveness. Future models may also integrate additional mediators or moderators (e.g., strategic orientation, innovation capacity, employee engagement) to better understand the mechanisms through which HPWS affect performance.

Acknowledgments

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COMPETITIVENESS DIVERGENCE IN THE VISEGRAD FOUR COUNTRIES: TRENDS AND FORECAST UNTIL 2035

Eva KOIŠOVÁ

Abstract

The issue of competitiveness is currently a very topical subject, not only from the perspective of scientific studies, but also in the focus of European Union representatives´ attention and economic practitioners. The present article engages with the question of the competitiveness of the Visegrad Four countries. The objective of the study was to analyze the development of competitiveness, identify differences in the development of competitiveness between the Visegrad Four countries in the time series from 2007 to 2025, and forecast its development using the WCI index until 2035. The findings indicated that the Czech Republic continues to uphold and enhance its dominant standing within the region, while Slovakia exhibits a pronounced adverse trend, with the imminent risk of enduring underperformance. The development of the coefficient of variation has revealed a growing divergence in competitiveness among the Visegrad Four countries since 2020, which may negatively affect regional cohesion.

INTRODUCTION

The issue of competitiveness has emerged as a prominent theme in professional literature and has garnered significant attention from European Union representatives and economic practitioners. Several international institutions are involved in the monitoring and evaluation of the competitiveness of national economies. These include the World Bank, the Institute for Management Development, the World Economic Forum, and the European Union (Kalusová & Škriniar, 2018). The capacity to engage in competition is associated with the ability to utilize resources efficiently, promote innovation, and attract investment. In practice, indices such as the Global Competitiveness Index (GCI), the World Competitiveness Index (WCI), and, at the regional level, the Regional Competitiveness Index (RCI), are most used for monitoring, measuring, and comparing competitiveness. The utilization of indices is predicated on a range of factors, including but not limited to innovation, infrastructure, and digital readiness. The objective of the paper was to analyze the development of competitiveness, identify differences in the development of competitiveness between the Visegrad Four countries in the time series from 2007 to 2025,

and forecast its development using the WCI index until 2035. The Visegrad Four constitutes consist of the Central European countries: The countries under consideration in this study are Slovakia (SK), the Czech Republic (CZ), Hungary (HU), and Poland (PL). These countries, located within the Central European region, exhibit notable parallels in their historical development, cultural and intellectual values, and shared interests in the realm of pan-European integration. The Visegrad Group countries formally acceded to the European Union in 2004 (Kalusová, Škriniar, 2018). This research confirms the World Economic Forum's assertion regarding the growing disparities in the competitiveness of European countries. This study specifically examines this trend within the V4 countries.

Literature overview

The concept of competitiveness has emerged as a prominent focal point in contemporary economic discourse, political strategy formulation, and academic research. The term "sustainable economic growth" refers to the ability of a country, region, or business to create and maintain conditions that support long-term improvements in living standards and economic

productivity. The ability to use resources efficiently, promote innovation, and attract investment is linked to the concept of "smart growth." In professional discourse, the term "competitiveness" is employed across various levels, including national, regional, and local contexts. A substantial body of research has been conducted about competitiveness, with numerous studies drawing upon the foundational definition established by the OECD (1997). This definition stipulates that a nation's competitiveness is determined by its capacity to produce goods and services that align with the demands of international markets within a framework of free and fair competition. A central tenet of this definition is the promotion of increased real income for the population of a particular nation. As demonstrated in the research works of numerous authors (e.g., Durand, Madashi & Terribile, 1998; Aiginger, 1998), competitiveness is defined as a nation's capacity to attain elevated levels of productivity, technological innovation, and stability in pivotal macroeconomic indicators. This line of thinking is also supported by Kitson, Martin, and Tyler (2004). These scholars emphasize that competitiveness cannot be reduced to economic indicators alone; rather, it must include social and environmental aspects. Boschma (2004) also underscores the significance of innovation potential and geographical proximity as pivotal factors in the realm of regional development and competitive advantage.

In recent decades, the concept of competitiveness has also been disseminated at the regional level. The terms "regional competitiveness" and "systemic competitiveness" underscore the significance of local actors, innovation, and institutions. As Huggins and Thompson (2015) have demonstrated, a region's competitiveness is contingent upon the capacity of companies to compete and capture the value generated within a specific territory. However, according to Malecki (2007) and Békés (2015), the competitiveness of a region is also influenced by factors such as infrastructure, the quality of human capital, and the prevailing institutional environment. According to Chițea (2015) and Pelinescu et al. (2017), regional competitiveness is associated with the degree of specialization of regions, their capacity to attract investment, and

the creation of sustainable employment opportunities. However, as noted by certain authors (e.g., Krugman, 1997), the application of the concept of competitiveness to regions can be problematic and result in erroneous policy decisions. Conversely, Begg (1999) and Huovari, Kangasharju & Alanen (2000) posit that regional competitiveness is a legitimate concept, provided it is understood as the capacity to support economic activity and ensure the relative prosperity of the population. This approach underscores the distinction between determining factors (e.g., quality of human capital, innovation, accessibility, agglomeration) and competitiveness outputs (e.g., GDP per capita, taxable income). Concurrently, they emphasize that this is a comprehensive concept that extends beyond mere outcome measurement. It encompasses the prerequisites for development and the capacity of the regional system to function effectively.

A multitude of other factors must be considered, including but not limited to export performance, research and development activity, and the quality of public administration. In this case, the competitiveness of a nation or region is determined by a multitude of economic, social, technological, and institutional factors. The most frequently cited factors include labor productivity, technological innovation, institutional quality, infrastructure level, access to education and digital skills, and public administration efficiency (Postula & Raczkowski, 2020; Stančíková & Melecký, 2019). In his seminal theory of competitive advantage, Michael Porter (1985) distinguishes between external (price-cost) and internal (non-price) factors of competitiveness. The internal factors that contribute to the success of a business include the ability to innovate, the quality of human resources, research and development, and the business environment. As posited by Porter (1985) and Durand et al. (1998), external factors are associated with prices, wage costs, and export performance. Contemporary approaches tend to prioritize systemic competitiveness, defined as the capacity of a region or nation to operate as a cohesive entity, characterized by effective institutions, collaborative interactions among actors, a culture of innovation, and the intelligent utilization of resources. This approach

underscores the necessity to allocate resources into human capital, research, and digitization as pivotal elements for sustained growth (Sadki et al., 2020; Huggins & Thompson, 2015). In the present moment, it is imperative to direct attention toward the intelligent development of the nation, the enhancement of internal and external competitiveness, the assurance of economic inclusion through equitable distribution, and the mitigation of economic inequalities. These factors are critical in increasing income, reducing poverty and its associated risks, and enhancing the quality of life for the population (Timofti, Movileanu1 & Șargo, 2020).

Regrettably, it must be acknowledged that the European Union has consecutively underperformed in comparison to the major global economies over the course of two consecutive years. However, according to the European Commission, the EU possesses all the necessary resources to reverse this trend, including its educated workforce, capital, savings, single market, and unique social infrastructure, provided that it addresses existing barriers and structural deficiencies (TASR, 2025).

Measuring Competitiveness

The assessment of a nation's or region's competitiveness necessitates the utilization of multifaceted indicators that encompass diverse facets of economic, social, and institutional advancement. In practice, the most used indices are the Global Competitiveness Index (GCI), the World Competitiveness Index (WCI), and the Regional Competitiveness Index (RCI), or indices based on specific factors such as innovation, infrastructure, or digital readiness.

As Hrabovská (2018) observes, the prevailing methodologies employed to assess regional competitiveness are predicated on the formulation of a set of indicators, the evolution of which is intended to ascertain the competitiveness of the region in question. For instance, the analysis of the competitiveness of 17 regions in Spain (Navarro, 2017) is based on an analysis of 15 areas of competitiveness. Several studies have employed a modified Global Competitiveness Index (GCI), which is published by the World Economic Forum, to analyze competitiveness (Bucher, 2018; Popescu

et al., 2017; Perez-Moreno, Rodriguez, & Luque, 2016). The Global Competitiveness Index (GCI) is a tool used to assess the competitiveness of nations across various dimensions. These dimensions include, but are not limited to, institutions, infrastructure, macroeconomic stability, healthcare, education, labor market efficiency, technological readiness, and innovation capacity. The index offers a comprehensive representation of the state of productivity and growth potential of economies (World Economic Forum, 2017–2018). Due to the exigencies posed by the global pandemic of Coronavirus (SARS-CoV-2), the standard publication of the Global Competitiveness Index (GCI) was suspended from 2020 to 2022. Consequently, the World Economic Forum (WEF) published special reports on the resilience and transformation of economies.

The World Competitiveness Index (WCI) is a comprehensive metric that assesses nations across four primary domains: economic performance, government efficiency, business efficiency, and infrastructure. Within each of these factors, five sub-factors are identified. It is important to note that these sub-factors do not necessarily contain the same number of criteria. For instance, a greater number of criteria are required to assess the sub-factor Education than to assess the sub-factor Prices. Irrespective of the number of criteria they contain, the sub-factors have equal weight in the overall consolidation of results. Each sub-factor has a weight of 5% (20 x 5 = 100). The WCI is published by the International Institute for Management Development (IMD) in Switzerland. In contrast to the GCI, it places greater emphasis on management approaches, real economic performance, and expert opinions. The WCI integrates hard statistics and surveys of managers, encapsulating the practical reality of the business environment. It provides a comparison of countries' competitiveness for investors and entrepreneurs, while also offering analyses of the effectiveness of public administration, the education system, and infrastructure.

The Regional Competitiveness Index (RCI), administered by the European Commission, focuses on NUTS 2 regions within the European Union and assesses them in three areas: basic, efficient, and innovative factors of

competitiveness. It is imperative to consider the availability of education, technological sophistication, institutions, market size, and the level of the business environment (Stančíková & Melecký, 2019). The Global Competitiveness Index (GCI), particularly notable for its comprehensible structure, serves as the foundation for the development of regional competitiveness indices, including those that reflect the specific conditions of the Slovak Republic. For instance, the study by Širá, Kiseľáková, and Šofranková (2017) employs the Global Competitiveness Index to construct a regional competitiveness index for the Slovak Republic. The regional competitiveness index in the regions of the Slovak Republic, based on the European Commission's methodology, was also applied in a study by Jašková and Havierniková (2016). In the conclusions of their research, the authors noted the heterogeneous development of regional competitiveness in the regions of Slovakia.

Some authors argue that despite the increasing popularity of competitiveness indices, there is still no unified theoretical framework that would integrate all approaches, as some authors have noted. The concept of competitiveness is frequently employed as a "framework concept" without the presence of precisely defined methods or measurable boundaries (Békés, 2015; Chiţea, 2015).

Goal and Methodology

The objective of the study was to analyze the development of competitiveness, identify differences in the development of competitiveness between the Visegrad Four countries in the time series from 2007 to 2025, and prognosticate its development using the WCI index until 2035.

The World Competitiveness Index (WCI) was selected for monitoring competitiveness, despite the prevalence of the Global Competitiveness Index (GCI) within the scientific community. However, as previously stated, the occurrence of the novel strain of coronaviruses, known as SARS-CoV-2, which is responsible for the illness known as "covid-19," resulted in a cessation of the standard publication of the GCI in the period between 2020 and 2022. Secondary data published on an annual basis by the IMD World Competitiveness Center (World

Competitiveness Ranking) was used in the preparation of the present document. The IMD has been providing data and analysis in this area for 37 years. The study employs a multifaceted approach, encompassing global, regional, and subregional economic perspectives, complemented by insights from a domestic survey of top managers in 69 global economies.

The coefficient of variation (CV) was employed to ascertain the disparities in WCI development across the V4 countries. The CV quantifies the extent of relative variability within the data set. Specifically, it calculates the ratio of the standard deviation to the arithmetic mean, thereby demonstrating the magnitude of the standard deviation in relation to the mean value. The coefficient of variation is a measure of the dispersion of data values relative to the mean. It is expressed as a percentage, with a high coefficient indicating a greater relative variability of the data. Within the framework of the WCI, it serves as a metric for assessing the degree of disparity in competitiveness among the V4 countries. As the coefficient of variation (CV) increases, the disparities in competitiveness among the individual V4 countries become more pronounced.

The variation coefficient is used to compare the variability of files with different diameters and is set as:

$$v_x = \frac{s}{\bar{x}}$$

Where $\bar{x}$ - average,

s - standard deviation, while the „s" has been set as follows:

$$s = \sqrt{s^2} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}}$$

The MS Excel spreadsheet program was employed to compile the forecast for the development of the WCI competitiveness indicator. The linear regression, upper confidence limit, lower confidence limit, and coefficient of determination R^2 are determined.

Findings and discussion

In this section, an in-depth analysis of the competitiveness of the Visegrad Four countries is conducted using the WCI index. In the initial phase, an analysis is conducted of the development of this index in individual countries in the time series 2007–2025. This is done in order to capture long-term trends and identify periods of growth or decline in competitiveness. Subsequently, the development of the coefficient of variation is determined to facilitate a comparison of the dispersion of values between countries. This enables determination of whether there is convergence or divergence. In the final phase, forecasts will be developed for the development of the WCI index by 2035. The aim of this forecasting activity is twofold: first, to provide a prediction of the future direction of competitiveness in the individual V4 countries, and second, to identify potential risks and opportunities for their economic policy.

Figure 1: WCI development in the V4 countries from 2007 to 2025
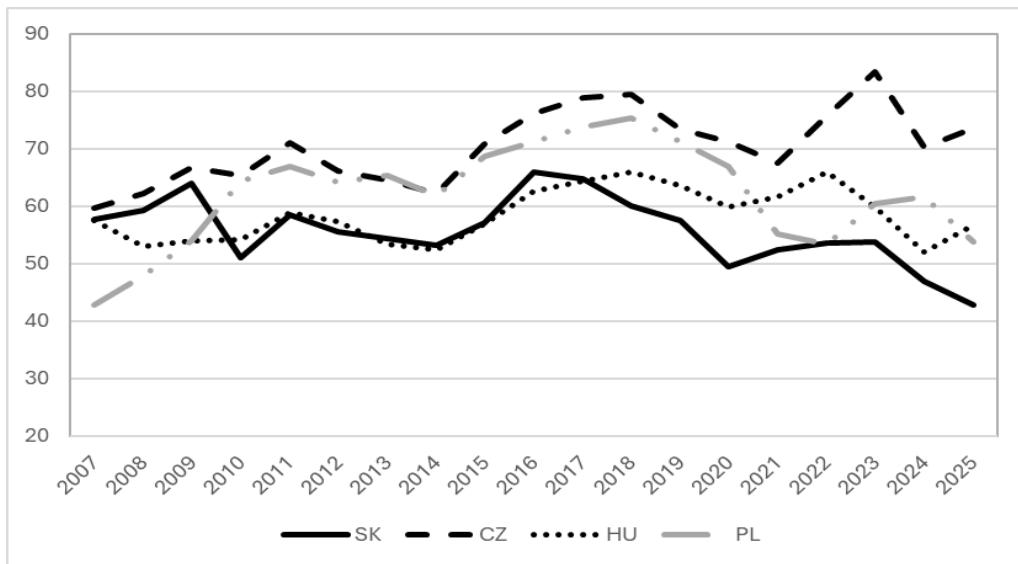
Source: Own processing based on data from the World Competitiveness Booklet 2007-2025 IMD

As demonstrated in Figure 1, the Czech Republic (CZ) has consistently exhibited the highest WCI values among the countries examined during the entire period under review, positioning it as the leader among the V4 countries. Since 2007, there has been a consistent growth trend, which culminated in the 2016–2018 period (values above 75), with an absolute maximum recorded around 2023 (above 80). This trend suggests a consistent enhancement in competitiveness, which is presumably facilitated by robust institutions and a superior business environment. A correction is anticipated in 2024–2025, yet CZ will continue to dominate as a leader among the V4 countries. Poland (PL) exhibits a weaker position during the 2007–2009 period, yet a substantial increase is observed in the subsequent 2010–2018 span, with WCI values stabilizing within the range of 65 to 75. This growth signifies an enhancement in competitiveness, primarily attributable to economic modernization and the amelioration of the business environment. However, following 2019, a decline was observed, accompanied by subsequent slight fluctuations, suggesting vulnerability to internal or external shocks. In Hungary (HU), the WCI has exhibited a consistent upward trajectory since the inception of the period under scrutiny, reaching its zenith between 2016 and 2018 (approximately 65–66). Since 2019, a slight decline has been observed, which is expected to turn into stagnation in 2021–2025. This may signal the exhaustion of growth potential or problems with the

sustainability of positive development. Among the V4 countries, Slovakia (SK) exhibits the most deficient values. During most of the period under review, WCI values remained below 60. Following a period of substantial growth in 2016, the index reached a peak value of 65.9. This was subsequently followed by a protracted decline, which ultimately led to a nadir below the 45-point threshold in 2025. This phenomenon is indicative of Slovakia's enduring challenges in enhancing competitiveness, particularly in the domains of public institution efficiency, innovation, and the business environment.

Subsequently, an analysis will be conducted to ascertain the development of the WCI variation coefficient for the V4 countries, with the objective of determining their convergence or divergence.

Figure 2: Development of the WCI variation coefficient in the V4 countries

from 2007 to 2025 in %
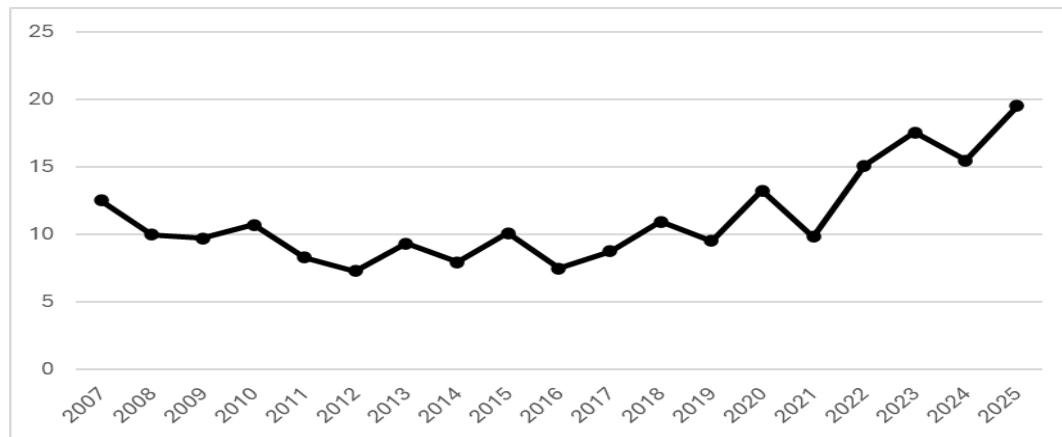
Source: Own calculations and processing

As illustrated in Figure 2, from 2007 to 2015, the variation coefficient demonstrated notable stability, fluctuating within the range of 7% to 12%. The initial value of VK in 2007 was 12.49%, and until 2012, a decline was observed, with the indicator reaching its minimum of approximately 7.29%. In recent years, the development exhibited volatility until 2019, when it reached a value of 9.51%. From 2016 to 2019, the variation coefficient remained within the range of 8-11%, indicating a slight increase in variability without significant fluctuations. This phenomenon may be interpreted as a period of relative stability in the competitiveness differential among the V4 countries. In the final period of 2020–2025, there was a substantial increase in the variation coefficient, from approximately 13.26% in 2020 to over 19.4% in 2025. This marked increase indicates an accelerating divergence in competitiveness, suggesting that the disparities between the V4 countries are rapidly expanding.

The increasing variation coefficient since 2020 indicates a divergence and suggests a decline in the homogeneity of the V4 region in terms of competitiveness. While the countries exhibited a certain degree of similarity at the onset of the period under examination, the disparities between them increased considerably by the conclusion of the period in question. This development may have significant consequences for the cohesion of the region and the coordination of economic policies in Central Europe.

Figure 3: WCI prognosis in CZ until 2035
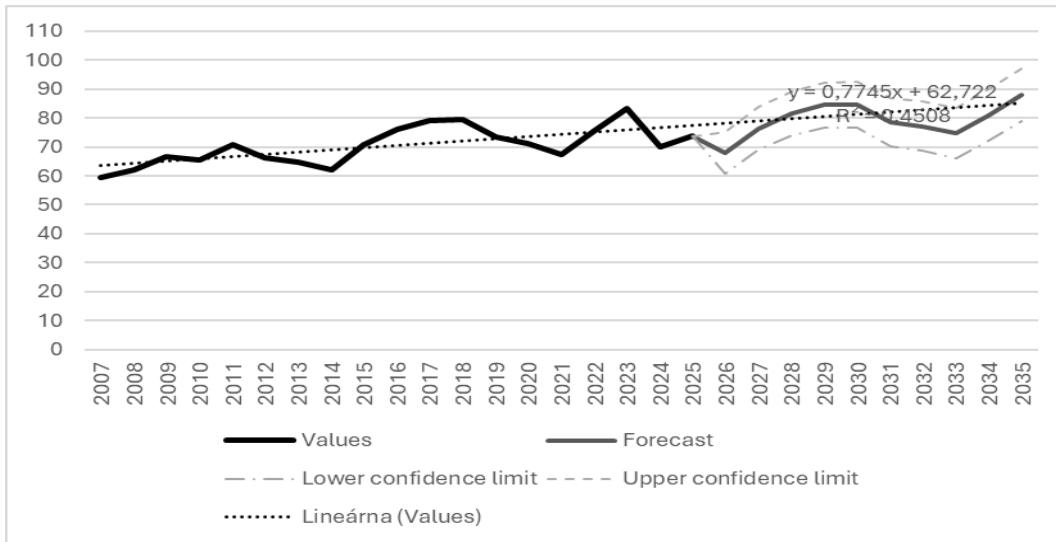
Source: Own processing based on data from the World Competitiveness Booklet 2007-2025 IMD

As illustrated in Figure 3, the WCI growth trend is anticipated to persist in the Czech Republic. By the year 2035, the index value is projected to range between approximately 90 and 100 points, with the upper confidence limit indicating the possibility of reaching around 105 points and the lower limit around 85 points. The projected growth of the WCI indicates that the Czech Republic should endeavor to maintain and potentially strengthen its leading position in the V4 region regarding competitiveness. However, to meet this optimistic scenario, it is imperative to persist in allocating resources to innovation, digital infrastructure, and the enhancement of public institutions.

Figure 4: WCI prognosis in HU until 2035
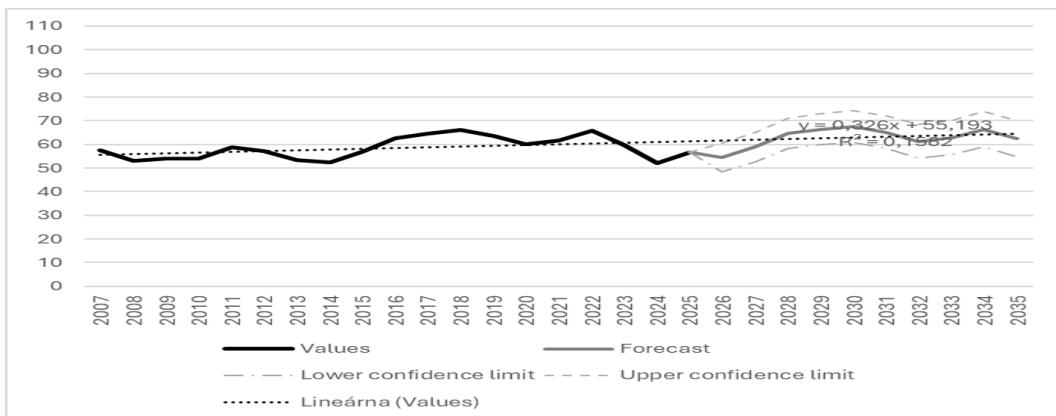
Source: Own processing based on data from the World Competitiveness Booklet 2007-2025 IMD

As illustrated in Figure 4, Hungary is projected to experience a negligible increase in competitiveness until 2035, with the WCI value anticipated to fluctuate within the range of 60 to 70 points. The lower and upper confidence limits indicate a broad spectrum of potential future scenarios, reflecting significant uncertainty regarding future developments. The coefficient of determination ($R^2 = 0.1027$) indicates that the linear trend accounts for a negligible portion of

the data variability, suggesting that the future evolution of Hungary's competitiveness is significantly influenced by external and internal factors that deviate from the prevailing trend. The prediction indicates stagnation or only a slight improvement in competitiveness, with no indication of dynamic growth. According to the prognosis, Hungary is likely to face the challenge of maintaining parity with the V4 countries by 2035 unless it undertakes more fundamental reforms to support the business environment, innovation, and the quality of public institutions. To overcome more pessimistic scenarios, Hungary must allocate resources specifically to education, digital technologies, and enhancing the efficiency of public administration.

Figure 5: WCI prognosis in PL until 2035
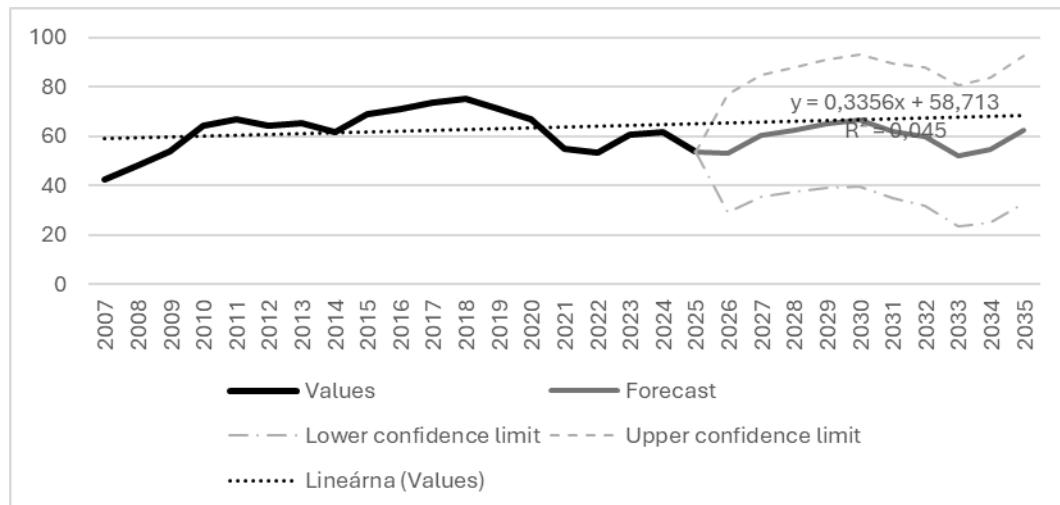
Source: Own processing based on data from the World Competitiveness Booklet 2007-2025 IMD

Poland is expected to experience moderate growth in competitiveness until 2035, with a projected WCI value of approximately 60–80 points. The upper confidence limit signifies the potential for attainment of up to 85 points, while the lower limit denotes the possibility of declining below 50 points. The low R^2 value (0.045) indicates the weak predictive power of the linear model, suggesting that the development of Poland's competitiveness is likely to be influenced by factors not captured by the linear trend. To achieve the upper scenario of the forecast and maintain its competitiveness growth, Poland must stabilize the business environment, improve the efficiency of public administration, and support innovation. Conversely, the absence of such measures would potentially compromise the nation's competitiveness when benchmarked against its regional counterparts.

Figure 6: WCI prognosis in SK until 2035
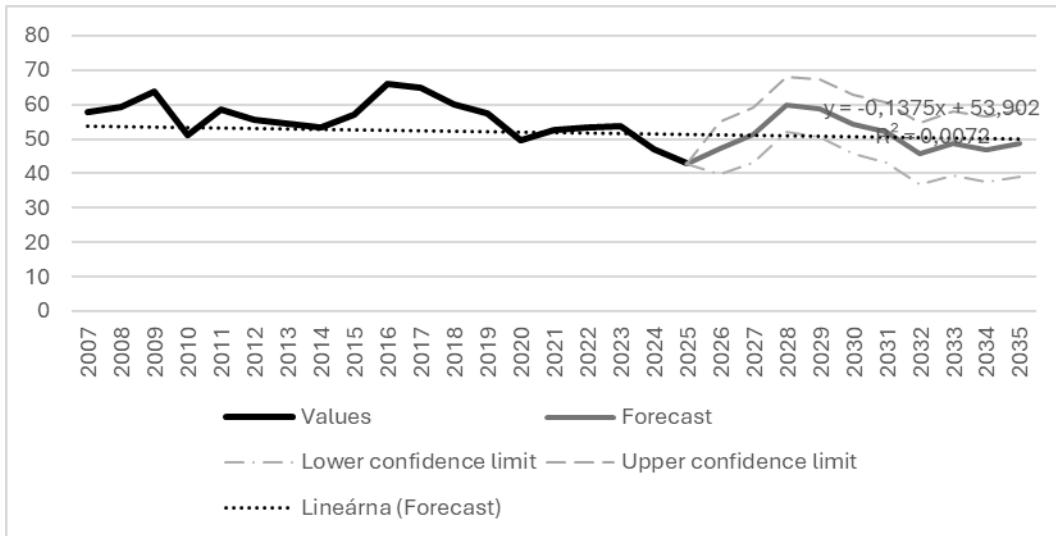
*Source: Own processing based on data from the World Competitiveness Booklet 2007-2025 IMD*

According to Figure 6, the prognosis for Slovakia indicates a slight continuing decline in the country's competitiveness. The WCI values could range between 40 and 55 points, with the upper confidence limit indicating the possibility of exceeding 60 points, while the lower limit predicts the risk of falling below 40 points. However, the R^2 value of 0.0072 indicates that the trend line possesses negligible explanatory power. The inherent volatility of these developments renders them unsuitable for reliable modeling using a linear forecast. The current forecast suggests that if Slovakia does not implement targeted measures to support the business environment, innovation, and institutional efficiency, it may continue to experience a decline in competitiveness compared to other V4 countries in the coming years. To stabilize and reverse the decline in competitiveness, it is imperative to address the systemic issues that underpin these fluctuations.

Conclusion

The results of the analysis of competitiveness development measured using the WCI in the Visegrad Four countries in the 2007-2025 time series indicate that the Czech Republic maintains the highest and most stable competitiveness, with a significant lead over the other countries from 2016 to 2023. The Slovak Republic exhibits the most unfavorable development. Its downward trend since 2017 suggests the presence of systemic problems that may be related to the efficiency of public administration, innovation, or the business environment. This finding suggests a divergence in the development of the WCI in the V4 countries, a hypothesis that was subsequently confirmed by the values of the coefficient of variation. The increasing trend of the coefficient of variation since 2020 indicates a divergence and suggests a deterioration in the homogeneity of the V4 region in terms of competitiveness. While the countries exhibited a certain degree of similarity at the beginning of the period under review, significant disparities emerged by the conclusion of the study in 2019. These findings suggest potential ramifications for regional cohesion and the coordination of economic policies in Central Europe. The prognosis for competitiveness in the individual countries surveyed indicate that the trend in competitiveness is likely to continue in the period from 2026 to 2035. The Czech Republic is expected to maintain its leading position. The situation in the Slovak Republic is of concern, as evidenced by the expectation that the WCI will not exceed 50 points for a minimum of two years. These findings underscore the necessity for prompt responses from political and economic actors to forestall

the further widening of competitiveness gaps between V4 countries and to ensure sustainable prosperity for the entire region. To reverse this negative trend, it is essential to adopt systemic reforms in the areas of public administration, innovation, and the business environment.

The social contribution of this paper is primarily evident in the capacity of our findings to furnish pivotal insights and contextual information to economic policymakers, experts, and the business community. By identifying trends and risks, the study enables a better understanding of the causes of differences in competitiveness between Central European countries and the creation of targeted measures to support economic growth. The outputs of the study can contribute to more effective targeting of public investment, particularly in the areas of education, innovation, and digital infrastructure, which are key to reducing regional disparities and strengthening economic stability. Concurrently, these forecasts function as a cautionary indicator for nations experiencing a decline in competitiveness, thereby stimulating public discourse and expediting the

implementation of requisite reforms. At the supranational level, this work has the potential to promote cohesion among the V4 countries and contribute to better coordination of their economic policies, which is important for increasing the competitiveness of the entire region within the EU and the global market.

However, it is imperative to consider the limitations imposed by the use of a sole competitiveness index, which fails to encompass all the potential factors influencing competitiveness. A notable constraint pertains to the geographical scope, which is exclusively focused on Central European countries. This restriction precludes direct comparisons with other EU or OECD countries, thereby limiting the generalizability of the results.

Acknowledgments

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INTEGRATION OF AI IN ENTERPRISES AND ITS IMPACT ON EMPLOYEE SATISFACTION, ENGAGEMENT AND TRUST IN HUMAN RESOURCE MANAGEMENT. BIBLIOMETRIC ANALYSIS

Katarína KRÁĽOVÁ

Abstract

The aim of this paper is to summarize the current state, knowledge and research trends on artificial intelligence in the area of its impact on the well-being, satisfaction, trust and engagement of employees in the enterprise. Understanding these relationships between AI-based decision-making and the well-being and engagement of employees in the enterprise will be crucial in the near future in designing artificial intelligence systems that should be not only effective but also ethical. In this context, this study aims to reveal the current state and trends in published studies of publications on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in human resource management through a bibliometric review. For this purpose, 94 publications on this topic were identified in the Web of Science (WoS) database and bibliometric analyses were performed using the software tool VOSviewer. These analyses resulted in bibliometric data such as the number of publications and citations by year, most cited authors, countries, publications, their collaborations, WoS categories, and content information regarding the topics and objectives of the studies. It was found that publications on AI in human resource management in the context of employee well-being, satisfaction, and engagement started to appear as early as 2018, but a more intense increase was only seen in 2020, and they continued to develop into a new research area. The potential gaps indicated by the findings of this study will guide future research and development in the relevant sectors.

Key words:
artificial intelligence, human resource management, employee satisfaction, employee engagement, trust

INTRODUCTION

In the last decade, artificial intelligence (AI) has become a key tool for transforming business processes, including human resource management (HRM). The integration of AI into HRM systems brings new opportunities and challenges in the areas of recruitment, performance evaluation, employee development and predictive analysis of employee behavior. Despite technological progress, however, many open questions remain about how these changes affect the company's employees themselves, specifically their satisfaction, engagement and trust in management.

Literature overview

The term artificial intelligence has multiple definitions. Depending on the time and level of technological development achieved, different studies have focused on its different aspects of the term artificial intelligence. In the Turin test, it is defined as the ability to perceive intelligence with humans (using electronic output devices) without revealing the identity that they are not human, with the main criterion being binary. Marvin Minky, one of the pioneers of artificial intelligence, defined artificial intelligence as enabling machines to do things that human intelligence does (Jiang et al., 2022). The term AI was originally introduced by John McCarthy at the Dartmouth Artificial Intelligence Summer Research Project in 1956, and is therefore considered the father of artificial intelligence. He argued that AI is the science and engineering of creating intelligent machines, especially intelligent computer programs (McCarthy, 1956). Tambe refers to artificial intelligence as a wide range of technologies that enable the performance of tasks generally required by human cognition, including adaptive decision-making (Tambe et al., 2019). In any case, the current role of artificial intelligence in enterprises is, among other things, to improve the performance and

efficiency of human resource functions by making various management processes agile and accurate (Nankervis et al., 2021). Human capital is very important for an enterprise because it is a differentiating element of the organization, it is an intangible resource that is difficult for competitors to imitate, thus providing a potential competitive advantage to any organization (Kearney & Meynhardt, 2016). Among the various areas that make up the management of human resource management in an enterprise, where artificial intelligence is beginning to be applied are talent search and recruitment, employee training and development, performance analysis, career development, compensation and employee turnover. AI has been implemented in HRM in various organizations using the following techniques: expert systems, fuzzy logic, artificial neural networks, data mining, genetic algorithm, machine learning. Like any technological advancement, AI also brings both advantages and disadvantages, and its application in HRM is no different. The advantages and disadvantages of AI can be assessed from three perspectives: from the employees, the business, and society as a whole. The automation of repetitive and time-consuming tasks allows HR managers to focus on those tasks that add value and require unique skills and abilities (Pillai & Sivathanu, 2020). Reducing or minimizing errors through machine learning also helps managers improve decision-making by providing more information and better processed information. These AI capabilities can be used in time- and labor-intensive processes, such as when recruiting new employees, such as reading many resumes, sorting them and identifying the best candidates, or, for example, when detecting employees who need training (Team, 2019). For businesses as such, integrating AI means greater efficiency and effectiveness, as it streamlines management processes and reduces related costs (Nankervis et al., 2021). It allows for greater candidate reach, as it addresses passive candidates who are not actively looking for work but could be interested in the position (Black & van Esch, 2021). Another important element for companies is improving the possibilities of communication and interaction between employees. Although the implementation of artificial intelligence in a company is expensive,

its use can reduce costs for the company in the processes in which it is applied. Artificial intelligence as a highly effective tool contributes to the acceleration of work processes and thus to the reduction of operating costs. Some research, such as the research of Sweiss & Yamin (2024), has also pointed out that human resource management in a company supported by artificial intelligence contributes to higher employee satisfaction with tasks and also increases the creative engagement of employees. According to them, the key factor is the trust of employees in management and in the working environment, which then allows the use of AI in the company effectively (Sweiss & Yamin, 2024). Of course, the integration of artificial intelligence into business processes also brings with it a number of negative effects. The application of AI can contribute to employee burnout, or employees may worry about their career advancement because they may be replaced by machines, all of which causes anxiety and job insecurity among employees (Kong et al., 2021). As AI technologies become increasingly integrated into organizational environments, employees may face increased emotional exhaustion (Liang et al., 2022). Artificial intelligence can increase technological stress and work demands on employees (Chen et al., 2024). There is also a dehumanization of personal relationships, as some HRM processes can be performed exclusively by machines, such as the use of chatbots (Fritts & Cabrera, 2021). And as technology evolves rapidly, it is essential for employees to be up-to-date on learning and improving their professional skills. This means a constant need for employee training in technological matters. So then, employees develop "technostress", which is a consequence of excessive and continuous use of any type of technology (Malik et al., 2021). There are also significant psychological barriers for employees to implement modern technologies due to the fear of losing their jobs or the need for constant additional training to use such technologies. All of these facts reduce overall employee satisfaction, their work well-being, reduce their work engagement, trust and increase turnover.

Goal and Methodology

In this study, the bibliometric analysis technique was used to analyze publications on the

integration of AI in enterprises and its impact on employee satisfaction, engagement, and trust in human resource management. This technique has been widely used recently to determine the characteristics and trends in publications in a specific research area from a quantitative perspective (Mutlu Avinç & Yıldız, 2025). Bibliometric analysis is more objective and extensive than other types of reviews (Fan et al., 2022). Bibliometric analysis provides scientists with comprehensive coverage of the literature on a selected research topic (Li et al., 2023). Bibliometrics is an important method for evaluating scientific research. Bibliometrics, which takes the external characteristics of scientific literature as the research object, studies the distribution structure, quantitative relationships, and laws of variation of literature (Xie et al., 2020). Bibliometric analysis is a method that can decipher and analyze a certain volume of scientific data (number of citations and publications, occurrence of keywords and topics, etc.) by revealing performance indicators based on quantitative data and performing relational analysis (Donthu et al., 2021). In this study, bibliometric analysis of publications will be performed to find answers to the following main research questions of our study:

RQ1: How did publications develop quantitatively from 2020 to 2025 and what is the citation performance in the analyzed period on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management?

RQ2: What are the co-authorship relationships of the authors of publications on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management?

RQ3: What is the performance and citation performance of countries that publish studies on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management?

RQ4: What is the distribution of publications on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management by WoS categories?

RQ5: What are the most frequently used keywords by authors in publications on AI integration in enterprises and its impact on employee satisfaction, engagement and trust in HRM management, and what are the relationships of keyword co-occurrence by year?

RQ6: What are the most cited publications on AI integration in enterprises and its impact on employee satisfaction, engagement and trust in HRM management?

Search Strategy

The primary data source used in this analysis was the Web of Science (WoS) database due to its comprehensive coverage of peer-reviewed scientific literature. The WoS database was preferred as a searchable database in this study due to its advanced search and data extraction capabilities and its wide network of scientific publications covering various topics, categories and indices (SSCI, SCI-Expanded, AHCI, ESCI, etc.). WoS also includes journals scanned by many indices in the social sciences and multidisciplinary fields. In addition, WoS has been the most preferred data source for researchers in review studies conducted in the social sciences in recent years (Yan & Zhiping, 2023). A search string was created to identify relevant articles based on key terms corresponding to the study objective. The search included concepts related to artificial intelligence, satisfaction, engagement, employee trust in HRM management in the enterprise. The initial search was conducted in the WoS database using the query listed in Table 1. Using the advanced search function, two groups of keywords were searched in various combinations. The first group of keywords consisted of words that belong to or are related to the domains AI, chatbot, chatgpt, etc. The second group of keywords contained words that are related to the field of human resources, HRM, employee satisfaction, employee engagement, and employee trust in HRM management in the enterprise. The words were searched in both singular and plural forms as well as in abbreviated and expanded forms using an asterisk. The aim of such a wide range of keywords was to ensure that the scope of the literature was as broad and inclusive as possible.

Table 1: Search string to identify relevant studies in the WoS database

TITLE-ABS-KEY "AI" or "artificial intelligence*" or "generative artificial intelligence*" or "AI mentor*" or "chatbot*" or "AI coach*" or "chatgpt" or "AI integration"
AND
TITLE-ABS-KEY "employee satisfaction" or "human resource management*" or "employee engagement*" or "concerns about jobs displacement" or "trust in HR systems" or "employee well-being*" or "employee trust"

This initial search yielded 609 results. To refine the selection and ensure relevance, inclusion and exclusion filters were used to limit the search to articles published between 2020 and 2025, written in English, available in final versions. In addition, only studies containing precise keywords related to artificial intelligence, satisfaction, engagement, employee trust in HRM in the enterprise, generative AI, chatbots, etc. were considered. After applying these filters, the number of documents was reduced. The selection process took place in several stages (Figure 1).
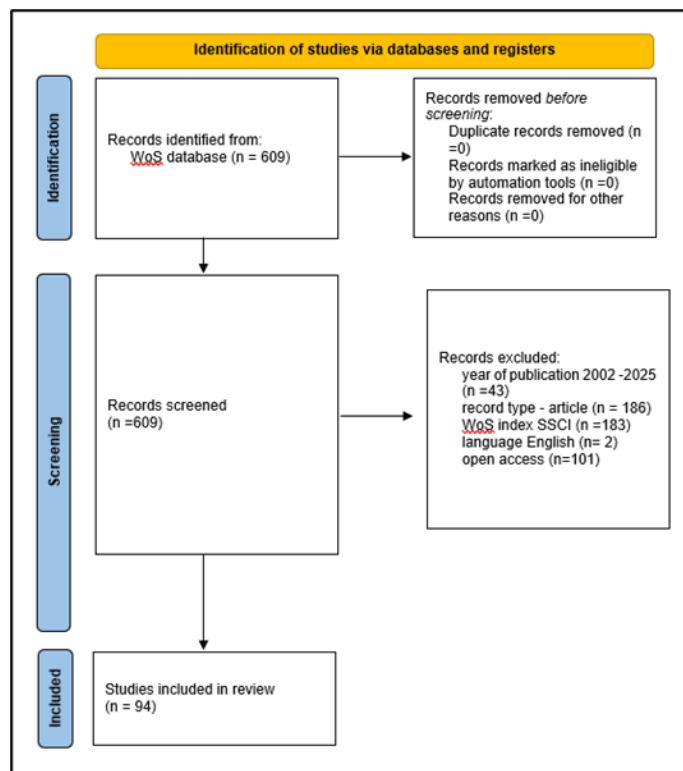
Figure 1: PRISMA flowchart

Source: https://www.eshackathon.org/software/PRISMA2020.html, (Haddaway et al., 2022)

First, a search string was used in the WoS database, taking into account titles, abstracts and keywords. Second, duplicate documents were removed and studies meeting the inclusion and exclusion criteria were filtered. Third, a detailed reading of the selected articles was carried out and those that specifically addressed the impact of artificial intelligence on employee satisfaction, engagement, trust in HRM management in enterprises were selected. Finally, the selected documents were organized in an Excel spreadsheet with relevant information recorded, such as code, title, journal, year of publication, DOI, area of application, AI techniques used and impact on organizational management. Finally, 94 documents were selected for inclusion in the study.

Findings

Distribution of publications and citations by year

The annual distribution and number of publications show the general state of the literature on a particular topic, research trends and pace of development (Xie et al., 2020). The search results in the WoS database after applying the exclusion criteria show that publications on artificial intelligence in human resource management and its impact on employee satisfaction, engagement and trust began at the turn of 2019 and 2020 (Figure 1), therefore we limited our further analysis to the years 2020 to July 2025. The average number of published documents per year is 15.7. It is noteworthy that the number of citations of publications on artificial intelligence, satisfaction, engagement and trust of employees in human resource management in an enterprise has a fluctuating development trend over the analyzed years. The total number of citations of such publications is 2,584, and excluding auto-citations it is 2,464, and the average number of citations per item is 27.49. This increase, which began in 2022, continued significantly until July 2025. Based on the graphical data, it can be concluded that the increasing trend of citations of publications in this area, which has become an important topic in recent years, will continue.
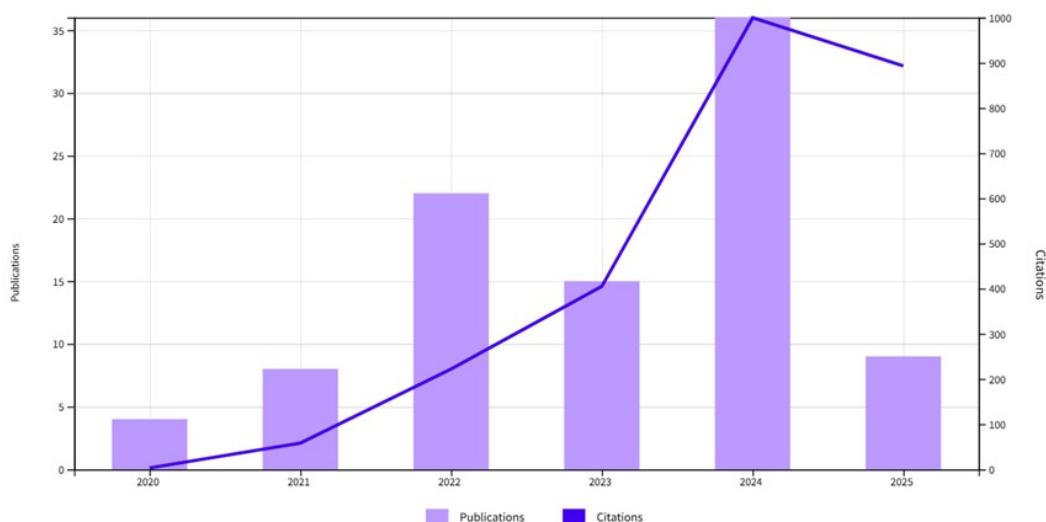
Figure 2: Times Cited and Publications Over Time
Source: https://www.webofscience.com/

WoS publication categories

Each journal included in the WoS core collection is divided into one or more WoS categories. When assigning categories, the subject and scope of the journal must match the scope of the WoS categories. WoS categories are considered an important reference source because they provide a basis for future research and use broad classification criteria (Milojević, 2020). Each journal included in the Web of Science core collection is assigned one or more Web of Science categories. A journal can have up to 6 categories assigned to it (https://support.clarivate.com/ScientificandAcademicResearch/s/article/Web-of-Science-Core-Collection-Web-of-Science-Categories?language=en_US).
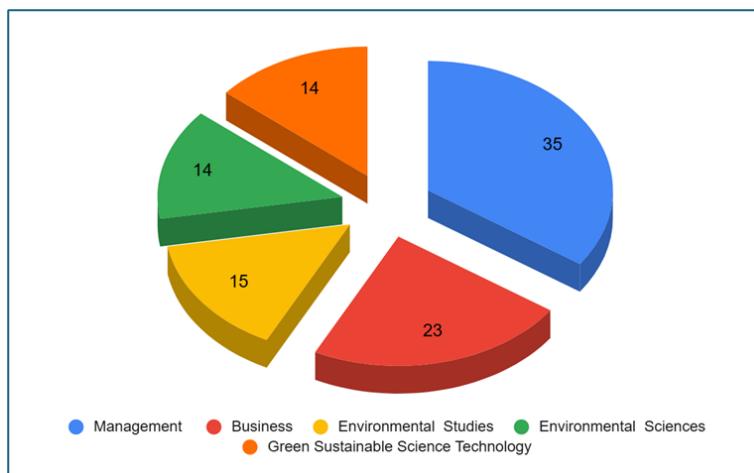
Figure 3: Web of Science Categories

Source: https://www.webofscience.com/

Figure 3 shows the WoS categories with fourteen or more publications in a pie chart. The dominant categories for the articles included in our analysis are business and management. Other important WoS categories are environmental sciences, environmental studies, and green sustainable science technology. It should be noted here that the published papers are multidisciplinary in nature.

Analysis of the most frequently cited authors and co-authorship

Citation counts are considered an objective quantitative indicator used to measure the performance and success of scientific publications, authors and institutions. For this reason, citation counts are often used in bibliometric analysis studies to reveal the performance of elements in a given field. The citation counts of the top 10 authors who received the most citations in publications on artificial intelligence, satisfaction, engagement and trust of employees in the management of human resources in the enterprise are shown in Table 2, which also shows us the ten most cited countries in the world.

Table 2: Most cited author and countries/regions

Authors	Record count	Countries/regions	Record count	number of publications	ANC* according to publication
Malik, A.	19	Peoples China	474	24	19,75
Budhwar, P.	10	USA	228	9	25,33
Jetha, A.	10	England	186	23	8,09
Wu, TJ.	10	India	178	7	25,43
Lim, WM.	9	Australia	154	15	10,27
Zhang, L.	9	Italy	108	5	21,6
Ali, I.	8	Germany	90	2	45
Gignac, MAM.	8	France	85	7	12,14
Liu, X.	8	Malaysia	84	7	12
Chowdhury, S.	7	Spain	84	1	84

Source:https://www.webofscience.com/wos/woscc/analyze-results/bbf28e43-4ba9-44e9-a258-4012a56df544-017302f10c, https://www.webofscience.com/wos/woscc/analyze-results/ff9d8777-c323-4046-ac61-b32647864c01-01733aa470,

* ANC= average number of citations

When examining the data on the number of citations from the 10 most cited countries, it is clear that China, which is in first place, is far ahead of the USA, which is in second place with the closest number of citations. Among the 10 most cited countries, European countries are represented by 50% exactly as countries from other continents. And despite the same ratio of countries, the number of citations of publications published in European countries is much smaller, representing only 33.01%, than in Asian and other countries, where this share is 66.91%. When examining the data on ANC values, the highest ANC values are achieved by Spain, India and the USA, despite the fact that they published fewer articles than other countries (China, England or Australia). This means that each publication published in these three countries receives more citations, which is then expressed through the ANC indicator (ANC is calculated by dividing the total number of citations by the total number of publications).

The following table shows the five most cited articles. Article citations show the information output that is referred to by other publications. Citation analysis allows us to determine how many times a document is cited by other publications, and based on this, an impact assessment can be made (Ercan et al., 2025). The journals in which the articles are published and their indexes are also listed as other important criteria in assessing the impact of publications.

The most cited article in this field was published in 2023 and received a total of 272 citations, and its average citation value per year is the highest compared to other articles. The most frequently cited publications discuss topics such as:
• what are the key organizational resources needed for the successful adoption and implementation of artificial intelligence in human resource management in an enterprise (Chowdhury et al., 2023),
• what is the potential impact of artificial intelligence on employees, whether there is a relationship between artificial intelligence and burnout at work (Kong et al., 2021),
• what is the impact of the introduction of artificial intelligence on employee engagement and trust in the work environment (Braganza et al., 2021),
• analyzing the interaction between robots powered by artificial intelligence and human workers from the perspective of human resource management (Arslan et al., 2021),
• how employee experiences with human resource management practices mediated by

artificial intelligence affect employee attitudes and behavior (Malik et al., 2022).

Table 3: Most cited publications and author

Publications	citations		magazin
	average per year	total	magazin index
Chowdhury, S;Dey, P;(...);Truong, L: *Unlocking the value of artificial intelligence in human resource management through AI capability framework* (2023)	68	272	Human resources mangement review / SSCI
Kong, HY;Yuan, Y;(...);Wang, KP: *Influences of artificial intelligence (AI) awareness on career competency and job burnout* (2021)	38,2	191	International journal of contemporary hospitality management/ SSCI
Braganza, A;Chen, WF;(...);Sap, S *Productive employment and decent work: The impact of AI adoption on psychological contracts, job engagement and employee trust* (2021)	34,2	171	Journal of business research / SSCI
Arslan, A;Cooper, C;(...);Ali, I: *Artificial intelligence and human workers interaction at team level: a conceptual assessment of the challenges and potential HRM strategies* (2022)	24	120	Manpower international magazine / SSCI
Malik, A;Budhwar, P;(...);Srikanth, NR *May the bots be with you! Delivering HR cost-effectiveness and individualised employee experiences in an MNE* (2022)	18,5	111	International journal of human resource management/ SSCI

Source:https://www.webofscience.com/wos/woscc/citation-report/ebd2833e-c1e9-499e-b7e3-d6980a8d9da9-0172f33811

By setting the minimum number of publications and citations (minimum publications per author 1, minimum citations per author 1) in the co-authorship analysis using the VOSviewer software tool, only 299 authors out of 318 met the given criteria. Subsequently, in our co-authorship analysis, the total strength of co-authorship ties of 299 authors of publications on artificial intelligence, satisfaction, engagement and trust of employees in human resource management in a company with other authors was calculated. The largest set of connected items consisted of 38 items (Figure 4). The resulting map consisted of a total of 7 clusters and a total number of connections of 96. These clusters also include the most cited authors such as Malik or Chowdhury.
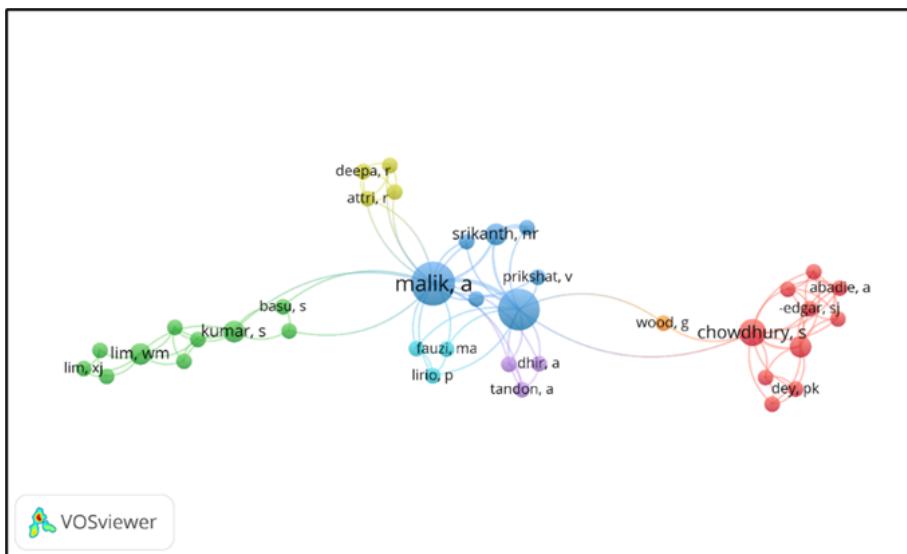
Figure 4: Co-authorship analysis
Source: processed using the VOSviewer software tool

The map shows a complex network of co-authorship, where the author Malik, A. plays a key role in connecting research groups. Malik, A. has a large node (blue) and is strongly connected (19 links) to several authors, making him a central figure in the network. The author Chowdhury, S. is also a major author, but with fewer links (11 links) than Malik. The third most important author is Lim, WM, who belongs to another smaller cluster (green), in which collaborations are less widespread. The analysis suggests that authors like Malik and Chowdhury may be important players in shaping future research directions in the field.

Most productive countries and number of publications

Among a total of 49 countries, the countries with the highest number of publications on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM are China (24), the United Kingdom (23) and Australia (15). These countries are followed by the United States with nine publications; France, India and Malaysia with seven publications; Finland, the Netherlands, Italy and the Republic of Korea with five publications; Canada, Russia, Poland and Scotland with four publications; Japan, Northern Ireland, Croatia, Portugal, Saudi Arabia, Slovenia, South Africa and Turkey with three publications; and Vietnam, Romania, Pakistan, Norway, Kazakhstan, Indonesia, Germany, Denmark and the Czech Republic with two publications. Seventeen countries have one publication each on this topic. 24 of these countries (Portugal, Italy, Spain, United Kingdom, Romania, France, Netherlands, Germany, Czech Republic, Finland...) come from the European continent, sixteen countries (China, Japan, Singapore, Vietnam, Malaysia, Thailand, Pakistan, Republic of Korea, Bangladesh, United Arab Emirates, Cyprus, Indonesia, India, Saudi Arabia...) come from the Asian continent, three countries (Russia, Turkey and Kazakhstan) come from the Asian/European continent and two countries (Morocco and South Africa) come from the African continent.
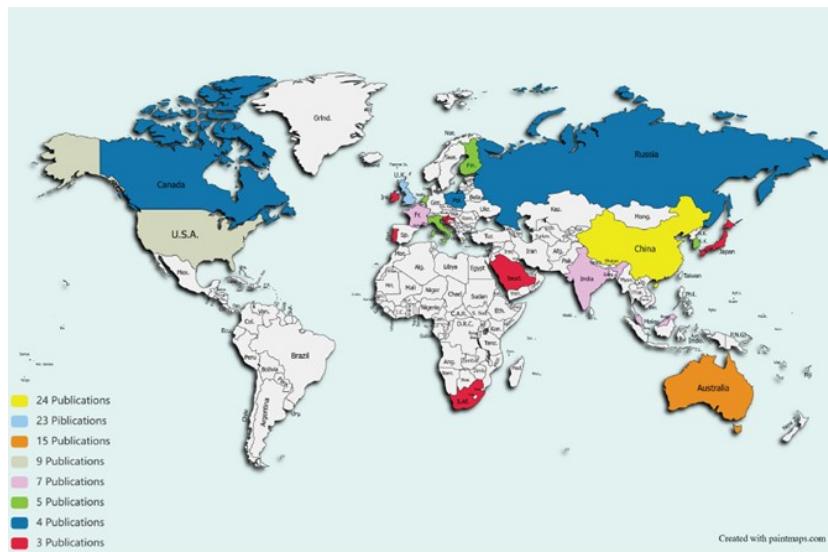
Figure 5: Map of the most productive countries in the world
Source: map created via https://paintmaps.com/map-charts/293/World-map-chart

One country (Peru) is from the South American continent, one (Australia) from Oceania, and two (United States and Canada) from North America. Therefore, it can be stated that the frequency of publications in the region is highest in European and Asian countries.

Most used keywords

Keywords are technical terms that reflect the main content of the article. Keyword analysis helps to identify important and current topics in a particular research area (Mutlu Avinç & Yıldız, 2025). Therefore, we decided that keyword frequency analysis would be useful in understanding the significant topics in publications on artificial intelligence in human resource management and its impact on employee satisfaction, engagement and trust.
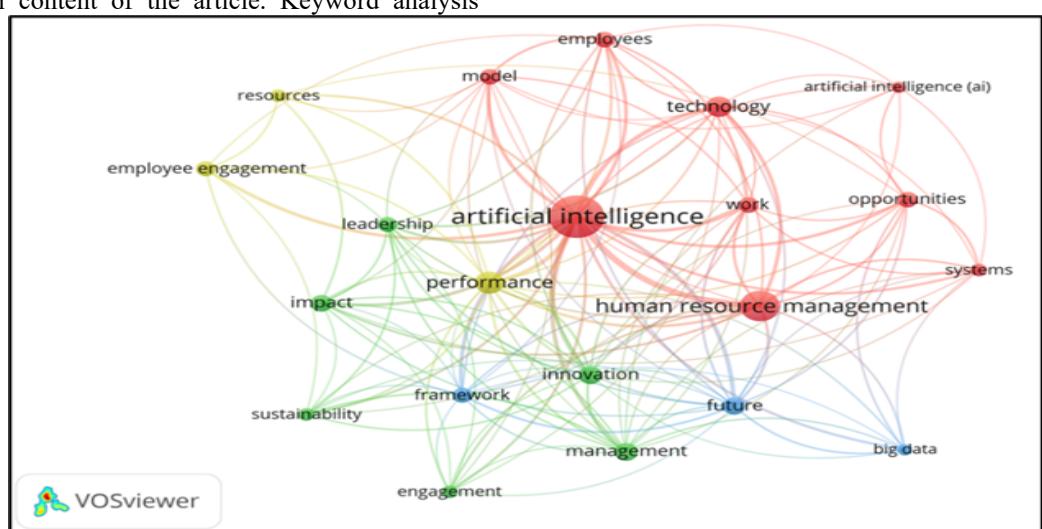
Figure 6: Visualization of relationships between keywords - thematic areas of research
Source: processed using the VOSviewer software tool

Figure 6 shows us an analysis of thematic areas and their connections. It allows us to understand the thematic structure, i.e. how keywords are grouped and what areas of research exist. Our graph contains four clusters (red, green, blue and yellow) i.e. four thematic areas of research. The red cluster, in which the central term artificial intelligence is connected to other cluster terms such as employees, model, technology, work, human resource management, opportunities, systems, points to the thematic area of research on the integration of artificial intelligence into human resource management processes in a company, e.g. employee behavior modeling, work automation, technological innovation. The second significant cluster is the green cluster, where the main terms are innovation and impact and these are connected to other cluster keywords leadership, sustainability, management, engagement. The thematic area of research within this cluster is directed at how the integration of AI in a company affects the leadership of people in a company, the evaluation of the performance of company employees, the innovation process and the innovative activity of employees in a company. The yellow cluster, which is significantly smaller than the previous two and also further from the center of the red cluster, and whose central concept is performance and is linked to the keywords employee engagement and resources. Thematically, this cluster examines how technologies affect employee motivation, satisfaction and involvement in the company. The last blue cluster, where the keywords framework, future, big data are grouped, thematically deals with the concepts of the future of HR, the use of big data and frameworks for the implementation of AI.
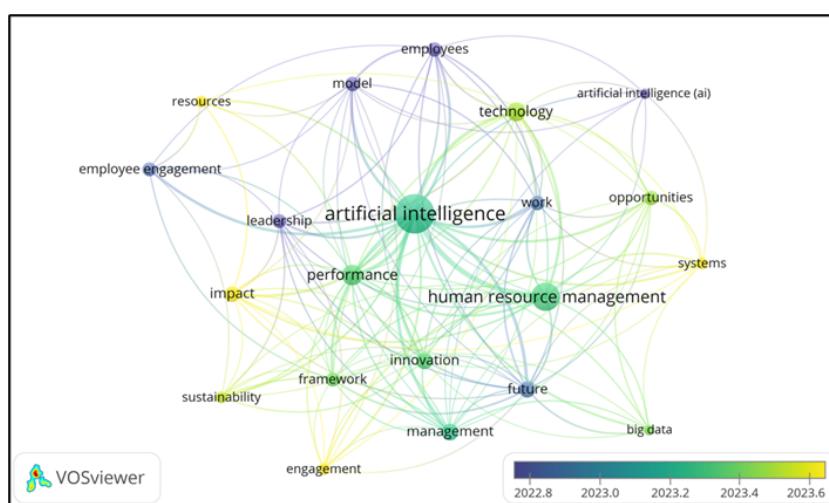
Figure 7: Visualization of network relationships between keywords with timeline
Source: processed using the VOSviewer software tool

Artificial intelligence and human resource management are central concepts in our keyword analysis. The graph in Figure 7 shows that these keywords are closely related and form the basis of research. These concepts are connected, which indicates that they are often studied together, for example in the context of the use of AI in HR processes. The yellow connections in the map indicate new emerging topics (systems, opportunities, engagement) and future research directions. These terms have started to appear more frequently in articles recently, which may indicate new research directions such as AI and new opportunities in HR systems and employee engagement. Traditional topics such as leadership and employee engagement (blue color) are still important, but their research interest is shifting slightly.

Discussion

The aim of our study was to summarize the current state and research trends on the

integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management by analyzing existing research findings. Our study used bibliometric analysis to assess the impact of the integration of AI in enterprises on employee satisfaction, engagement and trust in HRM management, as well as to provide a comprehensive picture of the current state of scientific production. The study examined the development of publications on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management based on the WoS database for the period 2020 to 2025. The analyses performed found that the first studies on the topic began to be published in 2018, but it was not until 2020 that we recorded a significant increase in the number of publications and citations. This means that the interest in integrating AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management has been gaining importance in recent years, which may be the reason why research has recently focused on this topic. Business and management, environmental sciences, environmental studies and green sustainable science technology are the WoS categories in which studies on this topic are mostly published. Therefore, we can conclude that these categories in the WoS database are the largest source of academic publications on integrating AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management. The most cited article is "Uncovering the value of artificial intelligence in HRM through an AI capabilities framework" and the authors of this article are Chowdhury, Soumyadeb; Dey, Prasanta; Edgar, Sian Joel; Bhattacharya, Sudeshna; Rodriguez-Espindola, Oscar; Abadie, Amélie; Truong, Linh. This article was published in 2023 in the journal "Human resources management review", which is indexed by SSCI in the Q1 quartile. Through analysis, we found that the most cited articles on this topic are published in journals that are indexed by SSCI in the Q1 or Q2 quartile. Therefore, it can be concluded that publishing in indexed journals can increase the visibility of research studies on the analyzed topic. Among all 49 countries that published articles on the analyzed topic in the analyzed period, China, the United Kingdom and Australia are the most productive. The analyses show that the number of publications on this topic has increased recently, especially in Asian countries, among which China stands out in terms of the total number of citations and India stands out in terms of the average number of citations per publication. The USA and Italy are other countries that attract attention in terms of the average number of citations per publication. When examining the network of co-authors, we found that countries such as the United Kingdom, China, the USA and Australia are the countries with the strongest relationships and ties in the field of co-authorship. This means that we should consider these countries in terms of cooperation in the field of co-authorship. Collaboration between authors from different countries is important for the international development of the literature on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM. This data is particularly important for researchers and authors of publications when planning collaborations for future research. In connection with current issues about the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM, international and interdisciplinary cooperation can be considered desirable and necessary for the successful development of this scientific field. Keywords are one of the important indicators that provide an idea of the content of research in a certain field. The frequency and co-occurrence of keywords reveal research trends and the main focus of research. Analyses of the occurrence and co-occurrence of keywords in publications in our analysis show that, in addition to the main keywords (artificial intelligence and human resource management), keywords such as leadership, sustainability, management, engagement, framework, future, big data are frequently used in publications. Changes in the field of research on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM will continue, as artificial intelligence technologies are constantly evolving. Therefore, it is possible that the nature and content of research in this area will change as technological developments continue. This study can be considered an important resource for researchers in terms of providing further theoretical information on this topic and laying the foundation for future research. The most cited studies and authors,

countries, keyword occurrences and co-occurrence trends in publications on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management provide an idea of the current state of the literature. Theoretical development will continue with new academic studies, and the task of integrating AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management will become better understood. This study will help both novice researchers who are new to academic research and experienced authors to better understand the theoretical framework of this topic. Thanks to the suggestions developed based on the findings of this study, it will be possible to increase national and international collaboration and to explore this topic on an interdisciplinary theoretical basis. In this way, awareness of studies on this topic in all fields of science can be increased. The results obtained from this study can provide researchers with quantitative information on the current state of publications on the topic of integrating AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management and can form the basis for further research. However, this study has some limitations. Only publications from the WoS database were included in this study, and other databases were not included. More detailed analyses of this topic can be performed in the future by including other databases. More detailed analysis can also be applied by combining VOSviewer with other bibliometric analysis software (R 4.4.2 Bibliometrix, Citespace 6.4.R1, etc.).

Conclusion

This research provides a bibliometric review of the literature on the integration of AI in enterprises and its impact on employee satisfaction, engagement and trust in HRM management. The results of the analysis show that academic interest in this area has been increasing recently, as evidenced by the increase in publications and citations. The diversity of countries represented by the research participants highlights the importance of international cooperation and knowledge sharing in the field of AI integration in enterprises and its impact on employee satisfaction, engagement and trust in HRM management.

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COMPARISON OF REGIONAL DISPARITIES IN WAGE DEVELOPMENT IN THE SLOVAK REPUBLIC AND THE CZECH REPUBLIC

Jana SOCHUĽÁKOVÁ

Abstract

Significant disparities in the socio-economic level of regions represent a current challenge for most European Union member states, including Slovakia. Regional differences may have adverse consequences for economic efficiency, lead to underutilized potential, and hinder the overall economic growth of a country. Reducing these disparities is one of the main objectives of regional and structural policy. Monitoring regional disparities makes it possible to identify less developed regions and to redirect regional development efforts toward them.
This article examines regional wage disparities and their development in the Slovak Republic and the Czech Republic over the period 2013–2023. Using data from the Statistical Office of the Slovak Republic and the Czech Statistical Office, the analysis focuses on the dynamics of average gross nominal monthly wages across NUTS 3 regions, with particular attention to the processes of regional convergence. The method of beta-convergence is applied to assess whether less developed regions have been catching up with economically stronger ones.

INTRODUCTION

Regional disparities have long been regarded as a major and persistent issue, particularly in the socio-economic sphere. Slovakia, like other countries that underwent the transformation process, significantly began internally differentiate in terms of economic performance and potential of individual regions. (Klamár, 2016)

Monitoring regional disparities makes it possible to identify less developed regions and redirect regional development efforts toward them. In this paper, we focus on one of the most visible forms of inequality—wage inequality. This particular inequality results in the underutilization of the economically active population, contributes to rising unemployment, and stimulates labor migration abroad, which indicates shortcomings in the state's wage policy. Wage-related demotivation acts as a barrier to the faster development of society. Sociologists interpret the growth of wage inequalities as a consequence of broader social inequalities, whereas economists and geographers attribute it to differences in economic conditions and regional opportunities.

Slovakia is composed of heterogeneous regions in which wage levels display a considerable degree of differentiation. The most pronounced disparities can be observed between Bratislava and the other regions of Slovakia. The capital city holds the position of an economically dominant region, whereas several regions of central and eastern Slovakia lag behind economically. Economically weaker regions exhibit a higher degree of vulnerability, as wage levels are accompanied by phenomena such as social dependence, low purchasing power, or poverty.

Income inequality is a phenomenon that significantly affects the functioning of society. What matters is not only the absolute level of income but also its distribution across different segments of the population. Income disparities arise from multiple causes: they may result from natural developmental processes, but they are often shaped by the structure of society, redistribution rules, the tax system, or access to education and employment. Equally important is the way in which society perceives these inequalities—whether they are considered justifiable or evoke resistance. Rising income disparities also negatively influence individuals' satisfaction with their own lives. The perception of having no opportunity to improve one's circumstances diminishes motivation, reduces

willingness to engage actively in social life, and increases the risk of social tensions. The impact of income inequalities therefore extends far beyond the economic dimension, as it also affects values, behavior, and interpersonal relations (Michálek, 2021).

Significant disparities in the socio-economic level of regions represent a pressing issue in most European Union member states, including Slovakia. Reducing these disparities constitutes one of the primary objectives of the EU's regional and structural policy.

Literature overview

In regional economic analysis, a region is understood as a subnational unit, meaning that it constitutes a part of the national economy. It possesses its own internal structure as well as various interconnections with its surroundings, including adjacent regions and the national economy as a whole (Geciková, Papcunová, 2011). A region is defined as a "territorial unit delimited according to the classification of statistical territorial units," which represents a formal (administrative) definition (Act No. 539/2008 Coll. on the Support of Regional Development). A region can also be conceptualized as a spatial unit, delineated on the basis of one or more characteristics. From the perspective of functionality and relations, a region can be identified by grouping together homogeneous areas according to selected attributes.

According to Habánik and Koišová (2011), the term region refers to a territory or a geographical unit organized into hierarchical levels, and it is simultaneously embedded within the structure of regional policy. The identification of less developed regions and the redirection of regional policy measures toward them is made possible by monitoring regional disparities. Regional disparities are the outcome of uneven regional development, that is, differences in the level of socio-economic development across regions within the territorial-administrative structure (Matlovič, Matlovičová, Klamár, 2011). Baláž (2004) defines regional disparities as the existence of multiple differences arising between regions, which subsequently manifest themselves in the living conditions and development opportunities of individuals residing in those regions. From an economic perspective, regional

disparities are a reflection of the degree of economic cohesion, which exists when all segments are integrated into the national economy in such a way that they are able to withstand international competition. The degree of economic cohesion increases as disparities in the components of competitiveness decrease (Gozora, 2010).

The topic of regional disparities is frequently addressed in works with both economic and sociological orientations. Buček, Rehák, and Tvrdoň (2010) state that "different natural and geographical conditions, the scope and quality of the socio-economic potential of regions, as well as the influence of diverse historical and socio-economic factors, reflect the fact that the structure of the national economy encompasses regions characterized by distinct economic, ecological, and social conditions." They further note that "individual regions, due to their differing historical, geographical, socio-economic, and societal conditions, possess varying initial capital, quality of human potential, and infrastructure, and accordingly experience divergent patterns of growth and development." Many countries are characterized by significant regional disparities in economic performance and living standards, as reflected in income, education, or health outcomes. These regional disparities raise equity concerns: they contribute to overall within-country inequality, and they are linked to inequality of opportu-nity, as measured by, say, intergenerational mobility. Regional disparities mayalso have harmful implications for economic efficiency. (Floerkemeier, Spatafora, Venables, 2022)

Koven and Lyons (2010) identify instruments of regional policy aimed at mitigating regional disparities, including financial incentives such as subsidies and loans, as well as tax policy measures encompassing tax reliefs or deferrals of tax payments. They also highlight non-financial support, such as the expansion of infrastructure.

One of the most visible regional disparities is income inequality. Charles-Coll (2011) distinguishes the causes of income inequality into internal factors (related to the individual) and external factors (at the state level). Chaudhary (2009) argues that one of the main causes of wage inequality is the labor market, which determines wages within the market.

Inequalities are driven by differences in the supply of and demand for various types of labor.

Goal and Methodology

The objective of this article is to analyze and compare regional disparities in wage development between the Slovak Republic and the Czech Republic. The focus is placed on identifying differences in the level of average gross monthly wages across individual NUTS 3 regions in both countries and their evolution over time. The primary aim is to determine whether regional disparities are deepening or diminishing, and to identify the factors contributing to these differences. The main sources of data are the Statistical Office of the Slovak Republic and the Czech Statistical Office. The period under review is 2013–2023.

To evaluate the process of wage convergence across regions, the method of beta convergence (β-convergence; a concept assessing whether less developed regions grow faster than more developed ones) is applied. This method makes it possible to assess whether regions with lower initial wage levels exhibit faster wage growth compared to more developed regions. The concept of beta convergence is based on the assumption that less developed regions with lower wages should grow at a faster pace than

economically stronger areas, thereby gradually reducing regional disparities. The analysis examines whether this phenomenon is present in both Slovakia and the Czech Republic, and whether wage differences between regions are gradually narrowing. As part of the analysis, the chain index of gross wages (an indicator measuring the year-on-year dynamics of wage growth) is also calculated, enabling the observation of the development of annual wage growth rates.

Findings and discussion

Throughout the entire period under review, wages in Slovakia exhibited steady growth. Their development across the individual regions is presented in Table 1. Although all regions recorded a continuous increase in the average gross nominal wage, pronounced regional disparities have persisted. The Bratislava region has consistently and significantly outperformed the other regions, maintaining the highest average wages throughout the observed period, exceeding €2,000 in 2023. Nevertheless, the Bratislava region also displayed the slowest wage growth. The lowest wages were observed in the regions of eastern Slovakia. Based on the index, it can be concluded that the highest wage growth was recorded in the Nitra region.

Table 1: Average Gross Nominal Monthly Wage in the Slovak Republic (Eur)

	2013		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Index 23/13
Slovak Republic	912		964	997	1 044	1 101	1 175	1 262	1 333	1 405	1 501	1 628	1,785
Bratislava Region	1 205		1 294	1 322	1 377	1 449	1 533	1 641	1 704	1 767	1 906	2 066	1,714
Trnava Region	860		900	938	982	1 052	1 116	1 197	1 278	1 328	1 421	1 512	1,758
Trenčín Region	821		872	909	960	1 020	1 095	1 180	1 240	1 317	1 393	1 509	1,838
Nitra Region	789		835	860	915	955	1 031	1 122	1 191	1 262	1 359	1 469	1,862
Žilina Region	839		877	920	960	1 015	1 084	1 174	1 238	1 308	1 400	1 540	1,835
Banská Bystrica Region	798		845	866	908	956	1 019	1 108	1 180	1 250	1 340	1 432	1,794
Prešov Region	736		771	800	833	883	931	1 024	1 091	1 157	1 223	1 342	1,823
Košice Region	883		925	947	986	1 039	1 110	1 168	1 237	1 344	1 415	1 536	1,739

Source: Statistical Office of the Slovak Republic

The index values of the average gross wage (Table 2) indicate a year-on-year increase in wages across all regions. This trend is expected, as wages typically rise under the influence of inflation, increasing labor productivity, and the

overall economic development of the country. The most significant pace of wage growth was recorded between 2018 and 2020. This dynamic increase may have been driven by a combination of several factors. During this period, Europe

experienced an economic boom, which created pressure on employers to raise wages. At the same time, labor shortages became evident, forcing companies to offer more attractive financial conditions. Legislative interventions also played an important role, particularly the increase in the minimum wage, which subsequently influenced the overall level of average wages.

Table 2: Chain Index of the Average Gross Nominal Monthly Wage in the Slovak Republic

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Slovak Republic	1.057	1.034	1.047	1.055	1.067	1.074	1.056	1.054	1.068	1.085
Bratislava Region	1.074	1.022	1.042	1.052	1.058	1.071	1.038	1.037	1.079	1.084
Trnava Region	1.047	1.042	1.056	1.071	1.061	1.073	1.068	1.039	1.070	1.064
Trenčín Region	1.062	1.042	1.064	1.062	1.073	1.078	1.051	1.062	1.058	1.083
Nitra Region	1.058	1.029	1.064	1.044	1.079	1.088	1.062	1.059	1.077	1.081
Žilina Region	1.045	1.049	1.043	1.057	1.068	1.083	1.055	1.057	1.070	1.100
Banská Bystrica Region	1.059	1.025	1.048	1.052	1.066	1.087	1.065	1.059	1.072	1.069
Prešov Region	1.048	1.038	1.041	1.060	1.054	1.099	1.065	1.061	1.057	1.097
Košice Region	1.048	1.024	1.041	1.054	1.068	1.052	1.059	1.086	1.053	1.086

Source: Own elaboration

In 2021, wage growth experienced a slight slowdown, which can be attributed to the consequences of the COVID-19 pandemic. Following a period of intensive wage increases, the economy entered a phase of deceleration, accompanied by uncertainty in the labor market. During this period, inflationary pressures also temporarily eased, which may have contributed to wage stabilization. In the final two years of the observed period, wage growth accelerated once again. This development can primarily be explained by high inflation, which placed pressure on employers to adjust wages in order to maintain employees' real purchasing power. In addition, the post-pandemic economic recovery, accompanied by increased demand for labor, further contributed to this trend.
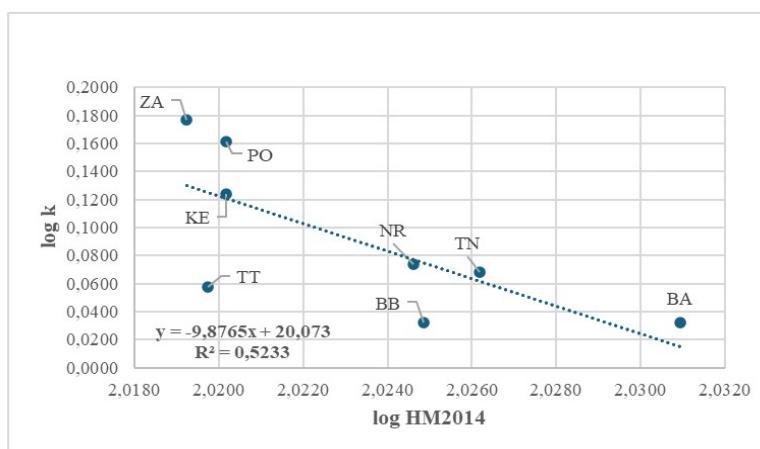

Figure 1: Convergence of the Chain Index in the Slovak Republic
Source: Own elaboration

Figure 1 illustrates the convergence of the chain index of gross wages across the regions of the Slovak Republic. The regression analysis captures the relationship between the initial value—the logarithm of the average gross wage in 2014 (log HM2014)—and the logarithm of its average growth (log k) in the subsequent period. The negative slope of the regression line indicates that regions with higher initial levels of gross wages experienced slower wage growth, while regions with lower wages recorded faster growth. This phenomenon is a typical manifestation of beta-convergence, meaning that less developed regions tend to catch up with more economically advanced areas. The fastest wage growth was observed in the Žilina Region (ZA) and the Prešov Region (PO), which are positioned well above the trend line. This implies that wages in these regions grew faster than could be expected based on their initial level in 2014. The Košice Region (KE) is located slightly above the trend line, also signaling faster wage growth.

At the opposite end of the spectrum, the Bratislava Region (BA) lies significantly below the regression line. This region initially recorded the highest average wage, but its wage growth was slower compared to other regions. Such a pattern is typical for economically more advanced areas, where the scope for dynamic wage growth is less pronounced. The Banská Bystrica Region (BB) and the Trnava Region (TT) are also positioned below the trend line, indicating weaker wage growth than would have been expected.

The coefficient of determination, at 0.5233, suggests that the regression model explains approximately 52.33% of the variability in the data. This implies that, although a convergence process is present, it is not as pronounced as in the case of the Czech Republic. Significant regional differences in the dynamics of wage growth remain, likely influenced by additional factors such as investment, infrastructure, demographics, and the sectoral structure of regions.

Overall, the results indicate a partial narrowing of wage disparities among Slovak regions, with less developed regions such as Prešov and Žilina experiencing faster growth than the Bratislava Region. Nevertheless, wage convergence is not entirely unambiguous, as some economically weaker regions, such as Banská Bystrica, exhibit slower growth than would be expected.

In the Czech Republic, the average gross nominal monthly wage recorded continuous growth across all regions throughout the analyzed period. The highest wage level has consistently been maintained in the Capital City of Prague; however, similar to Bratislava in Slovakia, Prague reported the lowest wage growth over the observed period. The highest wage increase was recorded in the Hradec Králové Region.

Table 3: Average Gross Nominal Monthly Wage in the Czech Republic (CZK)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Index 23/13
Capital City of Prague	35155	35343	36371	37387	39782	42502	45888	47602	50494	54015	57275	1.639
Central Bohemia Region	26302	27046	27997	29170	31457	34390	37151	39104	40585	43536	46035	1.750
South Bohemia Region	23429	24239	25246	26537	28093	30620	32821	35301	37715	39728	42028	1.794
Plzeň Region	24698	26004	27013	28182	30700	33020	35264	37613	39400	41436	44099	1.785
Karlovy Vary Region	22333	23008	24119	24893	26999	29236	31710	33354	35611	37512	39746	1.779
Ústí nad Labem Region	23886	24331	25301	26538	28369	30802	33375	36088	38027	40223	42013	1.759
Liberec Region	24381	25114	26358	27126	29121	31615	34169	36127	37855	39746	42029	1.724
Hradec Králové Region	23639	24348	25192	26578	28580	31373	34357	36693	38772	41187	43417	1.837
Pardubice Region	23187	23879	24856	26087	28006	30358	32612	34814	36642	38866	41036	1.769
Vysočina Region	23745	24347	25258	26626	28568	31002	33422	35694	37693	39864	41969	1.767
South Moravia Region	25587	26079	27051	28319	30311	32639	35439	37687	40308	43071	45316	1.771
Olomouc Region	23203	24081	24584	25643	27486	30073	32695	35049	37074	39079	41084	1.771
Zlín Region	23117	23755	24554	25953	27565	30317	32759	34928	36641	38869	41328	1.788
Moravia-Silesia Region	24397	24667	25475	26388	27991	30364	32826	35260	37265	39631	41866	1.716

Source: Czech Statistical Office

Table 4 presents the chain indices of wage development across the regions of the Czech Republic. From a long-term perspective, a stable positive trend in gross wage growth can be observed. The most pronounced growth was recorded in 2017 and 2018, when several indices exceeded the value of 1.09, representing a year-on-year increase of more than 9%. Conversely, in 2020 and 2021, wage growth slowed down, which may have been caused by the effects of the COVID-19 pandemic on the economy and the labor market. In 2023, the chain indices once again reached around 1.06, indicating a renewed, moderate increase in wages.

In most regions, the average growth rate is approximately 1.44, signaling relatively even wage growth across regions. This may suggest a certain degree of convergence, meaning that less developed regions are catching up with wealthier ones, although spatial disparities continue to persist.

Table 4: Chain Index of the Average Gross Nominal Monthly Wage in the Czech Republic

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Capital City of Prague	1.023	1.037	1.045	1.071	1.083	1.080	1.062	1.055	1.064	1.058
Central Bohemia Region	1.005	1.029	1.028	1.064	1.068	1.079	1.037	1.060	1.069	1.060
South Bohemia Region	1.028	1.035	1.042	1.078	1.093	1.080	1.052	1.038	1.073	1.057
Plzeň Region	1.035	1.041	1.051	1.058	1.090	1.072	1.075	1.068	1.053	1.058
Karlovy Vary Region	1.053	1.038	1.043	1.089	1.075	1.068	1.066	1.047	1.052	1.064
Ústí nad Labem Region	1.030	1.048	1.032	1.084	1.083	1.084	1.052	1.067	1.053	1.059
Liberec Region	1.019	1.039	1.049	1.069	1.085	1.083	1.081	1.054	1.058	1.045
Hradec Králové Region	1.030	1.049	1.029	1.073	1.085	1.080	1.057	1.048	1.050	1.057
Pardubice Region	1.030	1.035	1.055	1.075	1.098	1.095	1.068	1.057	1.062	1.054
Vysočina Region	1.029	1.041	1.049	1.073	1.084	1.074	1.067	1.052	1.061	1.056
South Moravia Region	1.025	1.037	1.054	1.072	1.085	1.078	1.068	1.056	1.057	1.053
Olomouc Region	1.019	1.037	1.047	1.070	1.077	1.085	1.063	1.069	1.068	1.052
Zlín Region	1.038	1.021	1.043	1.072	1.094	1.087	1.072	1.058	1.054	1.051
Moravia-Silesia Region	1.028	1.034	1.057	1.062	1.099	1.080	1.066	1.049	1.061	1.063

Source: Own elaboration

Figure 2 analyzes the convergence of the chain index of gross wages across the regions of the Czech Republic. It illustrates the relationship between the logarithm of the average gross wage in 2014 (log HM2014) and the logarithm of its growth (log k) in the subsequent period. The clearly visible negative slope of the regression line indicates that regions with higher initial levels of gross wages experienced slower wage growth in the following years, whereas regions with lower wages grew at a faster pace. This phenomenon is a typical manifestation of beta-convergence, meaning that less developed regions tend to catch up economically with wealthier areas.

The highest wage growth was recorded in the Central Bohemia Region (SČK), which is positioned well above the regression line, indicating that wages in this region increased more rapidly than would have been expected based on its initial level. Similarly, the Vysočina Region (KV), the Olomouc Region (OK), and the Liberec Region (LK) are located above the trend line, suggesting faster wage growth compared to the average trend. In contrast, the Karlovy Vary Region (KK) lies significantly below the regression line, meaning that wages there grew more slowly than could be anticipated given its initial level. This region has long been among the economically weakest in the Czech Republic, which may be attributed to lower

levels of investment, weaker infrastructure, and reduced attractiveness for highly qualified labor. The Zlín Region (ZK) also experienced slower wage growth, placing it below the regression line. Other regions, such as the Capital City of Prague (HMP), the Moravia-Silesia Region (MSK), the Hradec Králové Region (KHK), and the Ústí nad Labem Region (ÚK), are distributed closer to the trend line, indicating that their wage development corresponded to the expected convergence trend.
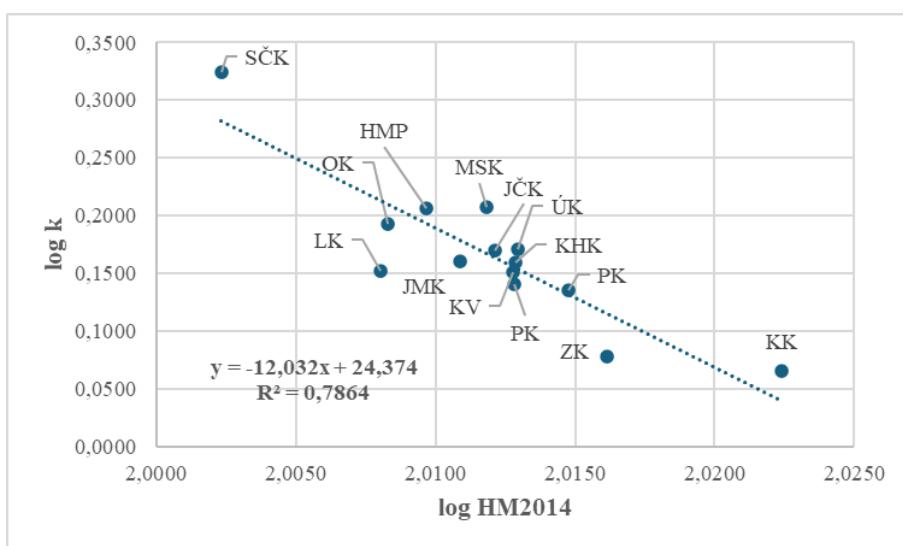

Figure 2: Convergence of the Chain Index in the Czech Republic
Source: Own elaboration

The value of the coefficient of determination at 0.7864 indicates that the regression model explains 78.64% of the variability in the data. This suggests that the convergence process in the regions of the Czech Republic is relatively strong and systematic. The high value of the coefficient of determination confirms that the relationship between the initial level of gross wages and their growth is well captured by this model, although certain deviations exist across individual regions.

Overall, the results indicate a gradual narrowing of wage disparities between regions, with less developed regions growing at a faster pace than economically more advanced areas. Nevertheless, some regions, such as the Karlovy Vary Region and the Zlín Region, continue to lag behind, with wage growth below the average, which may present a challenge for future regional policies and investment in these areas

Comparison of Wage Convergence in Slovakia and the Czech Republic

The analysis of wage development in the Slovak Republic and the Czech Republic reveals both similarities and notable differences in the dynamics of regional convergence. In both countries, average gross nominal monthly wages exhibited a continuous upward trend throughout the observed period (2013–2023), accompanied by persistent regional disparities. The capital cities—Bratislava in Slovakia and Prague in the Czech Republic—maintained the highest wage levels, but simultaneously recorded the slowest wage growth. This pattern is typical for economically advanced regions, where the scope for further dynamic growth is limited.

In Slovakia, the convergence process proved to be relatively modest. The coefficient of determination ($R^2 = 0.5233$) indicated that only about half of the variability in wage growth could be explained by the regression model. While certain less developed regions, such as Žilina (ZA) and Prešov (PO), exhibited above-average growth, other weaker regions, notably Banská Bystrica (BB), lagged behind expectations. These findings suggest that the

convergence process in Slovakia is only partial and remains uneven across regions.

By contrast, in the Czech Republic, the convergence process appeared stronger and more systematic. The coefficient of determination (R^2 = 0.7864) demonstrated that nearly 79% of the variability in wage growth was explained by the model. Several less developed regions, including Central Bohemia (SČK), Vysočina (KV), and Olomouc (OK), recorded faster wage growth than expected, indicating substantial catch-up dynamics. Nevertheless, some economically weaker regions, particularly Karlovy Vary (KK) and Zlín (ZK), continued to fall behind, suggesting that regional disparities have not been fully eliminated.

Overall, the comparison highlights that while both Slovakia and the Czech Republic demonstrate elements of wage convergence, the process is more pronounced and consistent in the Czech Republic. Slovakia continues to face significant challenges, as certain lagging regions have not fully benefited from catch-up growth. These findings emphasize the importance of targeted regional policies and investment strategies, particularly in economically weaker regions, in order to foster more balanced and sustainable development.

Conclusion

Based on the analyses conducted, it can be concluded that while both the Slovak Republic and the Czech Republic face similar challenges in terms of regional wage disparities, the scope and dynamics of these inequalities differ significantly between the two countries. A comparison of regional wage developments over the period 2013–2023 shows that the Czech Republic has a more balanced wage structure overall and achieves faster convergence among its regions. By contrast, Slovakia demonstrates a higher concentration of wage levels in a single region—specifically the Bratislava Region—where disparities between the center and the periphery persist and are more pronounced. Whereas in the Czech Republic wages are more evenly distributed among several regions, such as Prague, Central Bohemia, South Moravia, and Plzeň, Slovakia remains highly centralized. Wages in the Bratislava Region exceed the average of other regions, distorting the national average and reducing the explanatory value of country-level indicators.

In terms of wage convergence across regions, a favorable trend was observed in both countries. The results of the regression analysis confirm that less developed regions grew faster than more advanced ones, indicating the presence of beta-convergence. However, this trend proved stronger in the Czech Republic, suggesting that Slovakia exhibits a slower and less consistent process of narrowing regional disparities.

Ultimately, it may be stated that the Czech Republic is in a more balanced position in terms of regional wages and their development, while the Slovak Republic faces a more pronounced polarization between the center and the periphery. If Slovakia is to reduce regional disparities and ensure more even growth across the country, it will be necessary to intervene more decisively in the structure of regional policy, diversify economic activities, and more effectively integrate lagging regions into the process of economic development.

Overall, the findings suggest that the Czech Republic is in a more favorable position regarding regional wage development, whereas Slovakia faces greater polarization. These results carry important implications for regional policy, highlighting the need for Slovakia to diversify economic activities and strengthen the integration of less developed regions into national economic growth.

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PROPOSAL OF A MANAGEMENT MODEL TO PROMOTE BUSINESS DEVELOPMENT IN RURAL AREAS OF JALISCO

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Abstract

This document presents a management model to support rural producers, designed from the study of the problems faced by producers in rural areas of Jalisco, who traditionally cannot be defined as entrepreneurs because they have very low or almost no sales and in addition, lack resources and entrepreneurial capacities. The first approach to this problem was to evaluate productive development programs in rural areas for a few years, observing considerable challenges and areas of opportunity. For this reason, work began on a management model that includes diagnosis, design, intervention, evaluation and continuous improvement. The objective of this document is to present its design in general and explain the different stages that makeup it, in addition to presenting the theoretical approaches on which it is based, which have been of great help in working with the groups. Some of the conclusions presented are the expected results of the group, the strategic alliances needed for the model to be successful, and the potential to be implemented in other areas of the country.

INTRODUCTION

Jalisco is Mexico's second most populous state, accounting for approximately 7% of the national population with over 8 million inhabitants, according to INEGI (2020). While the state is known for its industrial and technological advancements, particularly in the Guadalajara Metropolitan Area (ZMG), its rural areas face significant socioeconomic challenges. About 30% of Jalisco's rural population lives in poverty, experiencing higher rates of marginalisation and lagging in education, health care, and access to essential services (CONEVAL, 2020).

Economic activity in these rural areas primarily revolves around the primary sectors of agriculture and livestock. However, this sector has low productivity and limited diversification (SAGARPA, 2019). As a result, support programs for rural areas often focus on production and, in some cases, improving productivity within these sectors without adequately addressing their inherent limitations (ANDE, 2021; Aguilar-Gallegos et al., 2015;

Rodríguez & Emanuel, 2018; Aguilar-Gallegos et al., 2016). This oversight results in a neglect of these regions' profitability and broader business potential, which are crucial for generating job opportunities, establishing formal enterprises, creating productive chains, and fostering a multiplier effect in local communities.

It is essential to prioritise business potential and competitiveness in Jalisco's rural areas to promote balanced and sustainable territorial development. The team responsible for this document has been collaborating since 2008 on various rural development strategies. The initial years focused on understanding the issues faced in rural areas, emphasising production. However, it became clear that the programs lacked business vision, leading to repetitive support each year with minimal differences. Although the programs achieved their objectives, significant improvements in the livelihoods of the beneficiaries were not evident.

This observation led to the recognition of the need for a new management model to transform the approach to promoting business in rural development. The goal is to assist producers in becoming entrepreneurs, thereby generating benefits for their localities and, in the longer term, for the region. This document outlines the model's design, the stages involved, and some results derived from its implementation and monitoring among various groups of producers.

Literature overview

According to INEGI, in Mexico, a population is considered rural when it has less than 2,500 inhabitants, while urban is one where more than 2,500 people live. However, this quantitative approach varies from country to country. In Mexico, 21% of the population lives in rural areas (INEGI, 2010; INEGI, 2020), and 30% of companies are in them (ANDE, 2021).

"In the peripheral countries of Latin America and the rest of the world, a large part of the rural areas shows climates, reliefs, soils or vegetation that are restrictive for agricultural activities, along with restricted accessibility and poor connectivity" (Burgos & Bocco, G., 2020: 222). In the case of Mexico, rural areas can be considered economically vulnerable due to the socioeconomic characteristics that prevent the construction of a competitive business base within them and towards other regions; some of these characteristics are explained below:

They lack access to technology and information (Aguilar-Gallegos et al., 2015), increased migration and population ageing (Arias, 2013), higher prevalence of poverty and inequality (Damián, 2016), food insecurity (Mundo et al., 2013), environmental degradation and climate change (Conde & Saldaña, 2007), limited access to public services (García et al., 2020), weak community organisation and participation (Cernea, 1991; and, Fernández, 2011) by highlighting the role played by community bases in rural areas to carry out collective social enterprises.

The main problems faced by companies in rural areas are the following:

Formality and informality (Aguilar-Gallegos et al., 2015; Rodríguez-Sperat & Emanuel, 2018; Levy, 2008; Loayza & Sugawara, 2009; and

Loayza, 2018) agree that informality is both a cause and a consequence of a low level of economic and institutional development that should be seen as a problem since companies in the informal sector face the costs and risks of not having the protection and services that the law and the State can provide, which generates high levels of inefficiency. It is encouraging to observe a concentration on enhancing business capabilities. Nonetheless, challenges such as identifying qualified human resources and effectively integrating environmental resources can significantly impact organisations. Key areas such as strategic planning, innovation management, commercialisation, and technology adoption offer substantial opportunities for growth. By employing the appropriate strategies, businesses can transform these challenges into strengths, thereby driving success. It is encouraging to observe a concentration on enhancing business capabilities. Nonetheless, challenges such as identifying qualified human resources and effectively integrating environmental resources can significantly impact organisations. Key areas such as strategic planning, innovation management, commercialisation, and technology adoption offer substantial opportunities for growth. By employing the appropriate strategies, businesses can transform these challenges into strengths, thereby driving success.

We are pleased to present our design for a management model intended to enhance business development in rural areas. This model was founded on several important concepts, including rural innovation, associationism, resource and capability theory, and the five-helix innovation theory. Below, we provide a detailed explanation of each of these essential components.

Rural innovation. Rural innovation refers to processes in rural areas which involve the generation, dissemination and adoption of innovative ideas, artefacts, procedures, social relations, or institutional agreements to address economic, social, or environmental problems that affect rural territories (Burgos & Bocco, 2020). Innovation in rural areas responds to various problems and needs with new products, services, working methods and social linkages with a view to long-term social, environmental,

and economic development. (Khairullina et al., 2023).

Associationism. It refers to creating organisations and cooperation networks between different actors (producers, companies, institutions, government, etc.) to promote rural communities' development and competitiveness**.** It relates to collaborative work, cooperation, virtuous environments, innovation and knowledge transfer, and advocacy on public policies, among many other actions (Garner & De la O, 2014; Berdegué et al., 2001).

In this sense, associations become the scene of strategies aimed at obtaining benefits from public institutions and a space for struggles for the capacity to represent and define collective identity (Gadea & Albert, 2011).

Theory of resources and capabilities. In the late 1980s and early 1990s, the focus of competitive advantage analysis (Porter (1980) shifted to the internal aspects of the firm, focusing primarily on the exploitation of unique internal resources and capabilities (Penrose, 1958), (Nelson & Winter, 1982), (Wernerfelt, 1984), (Hamel & Prahalad, 1990), (Mahoney & Pandian, 1992), (Peteraf, 1993). These studies conceptualise the company based on resources, organisational competencies, and capabilities. Wernerfelt (1984) points out that resources can be identified as inputs into the company's operations, either in manufacturing or personnel and are identified as the intellectual capital reflected in the capabilities or competencies of employees. The important thing is to recognise that on their own, they do not generate value except through the interaction between them and organisational capabilities if they meet the following characteristics: they are difficult to imitate by the competition, they are valuable, rare and difficult to replace (Barney, 1991).

As for dynamic capabilities, these originate in Schumpeter's spirit of innovation-based competition. While Teece et al. (1997) are the pioneers in proposing this concept, they argue that dynamic capabilities allow the company to reconfigure its competencies, focusing on those capabilities, skills, competencies, routines or processes that organisations carry out to make internal changes, responding to the outside, to adapt to the environment. Thereby generating innovative sources of competitive advantage and

achieving an increase in the value of the company. On the other hand, Rueda et al. (2022) state that their importance is because they are a tool that takes the company from the present to the future.

The Quintuple Propeller. This model of the fivefold helix is an updated version of the triple helix model of Etzkowitz & Leydesdorff (1995), which can be identified as industry, academic and government, to which the ecological sensitivity of the population was added. This model describes the interactions between five main spheres: University: Responsible for research and development of new knowledge. Industry: In charge of the production and marketing of innovations. Government: In charge of regulating, financing and promoting innovation. Media and public culture as elements of civil society: Responsible for disseminating and accepting knowledge and innovation. Ecological sensitivity: considers the impact of innovation on the environment and sustainability (Carayannis et al., 2022)

The five-helix innovation model is an exciting approach designed to address today's challenges by harnessing knowledge and expertise while prioritising social exchange and knowledge transfer. This innovative model beautifully intertwines knowledge, expertise, and the natural environment within a collaborative, interdisciplinary, transdisciplinary framework (Barrera & Wilwa, 2018). It displays how rural innovation strategies can flourish through partnerships among diverse stakeholders. This cooperative spirit strengthens business resources and capabilities and emphasises dynamic adaptability. We aim to cultivate a positive feedback loop that enhances business efficiency and enriches community well-being. You can explore this inspiring concept further in Figure 1!

Goal and Methodology

As mentioned above, a group of researchers began in 2008 to carry out linkage actions with different instances related to rural development. The first actions focused on evaluating different programs implemented in the state. We observed that, in general, there were common problems in terms of the design of the program; an absence was identified towards

the profitability of the producer-entrepreneur, and in most cases, the support in infrastructure or machinery was not carried out thinking about the capacities and resources of the group but was based on a desk design; On the other hand, although most of this support included training for the group, it was not precisely focused on improving their resources or on the profitability of the project. As for those identified in the group, problems related to teamwork, discouragement when participating in a strategy with few results and, in some cases, annoyance at having to contribute with an economic contribution to cover the maintenance costs of that infrastructure, as in the case of covering public services such as electricity, were detected. We are excited to share our project to create a dynamic intervention model for business development! This innovative approach focuses on empowering rural communities, enhancing yields, and maximising benefits for all members. Check out Figure 1 to explore the model's strong theoretical foundation.
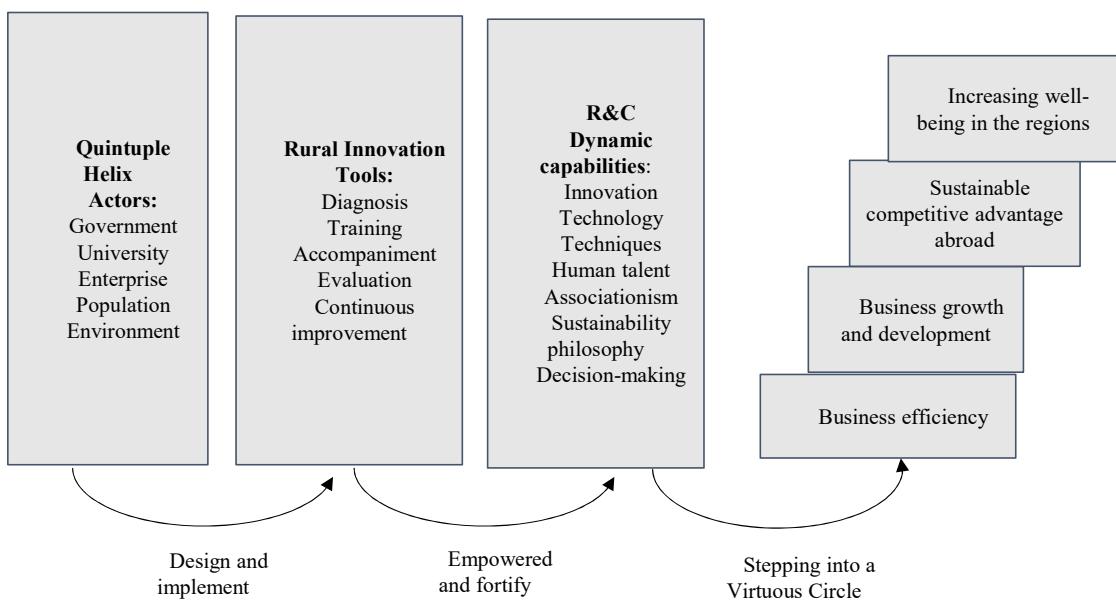
Figure 1: Strategy for Business Strengthening in Rural Areas

Source: Own elaboration

Design of the management model. Five stages were formed (see Figure 2), each with different methodologies, purposes, and goals. The duration of each intervention with the group is different. It depends mainly on the stage's results and the complexity of implementing and processing all the tools combined with the group's profile.
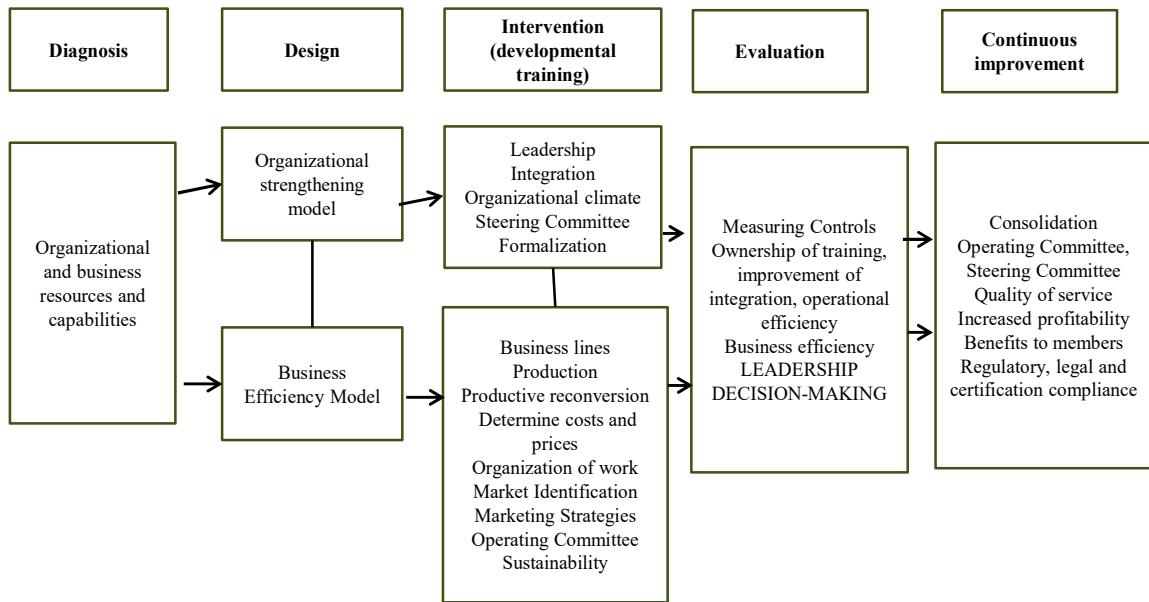
Figure 2: *Business Development Intervention Model for Rural Producers in Jalisco*

Source: Authors' elaboration with data from the Model Operating Manual

Stage 1, which corresponds to the diagnosis, is carried out based on the design and implementation of tools to identify the level of resources and capacities available to the group, both of the organisation (legal entity) and of the company, with these results it is possible to know the level of organisational maturity and the degree of business efficiency, which will also show the areas of opportunity in both directions. In the first section, the level of integration of the group is reviewed, the resources they have (human, economic and infrastructure), if they are formalised and if they comply with their obligations, in addition to validating if they have a group of leaders and identifying their capabilities (steering committee), a diagnosis of the potential for teamwork is also applied. A work environment and satisfaction with the results obtained in the past. Concerning the company, the infrastructure and its level of appropriation are identified, as well as the capabilities of each member, in addition to determining the potential to transform the product, sell it or distribute it. It is identified if they have a company structure, if it is efficient and if they obtain results and profitability from it. In this stage, different questionnaires are given to the entire group and others to the leaders, and a focus group session is also carried out to determine the level of satisfaction with the project and their expectations for it. After this, all the tools are processed, and the general diagnosis of the project and the group is obtained; with this, the model's baseline is elaborated, presented to the group and the authorities, and stage 2 is designed.

In stage 2, derived from the general diagnosis of the project and the group, an operational manual of the model is prepared with two different approaches, one towards the model of operability and the other towards the model of business efficiency. From the baseline, the expected goals are designed, and from these, the procedures are written in writing. Up to this point, strategic planning tools are used. The main challenge is to determine the business lines to be implemented and identify the productive reconversion necessary to use the infrastructure and machinery owned by the group. From the established business lines, the process of each of them is elaborated: production, transformation, added value, sale or distribution. From there, the business efficiency tools are developed for the next stage.

In stage 3, here we work with elements of rural innovation, quintuple helix and associationism. First of all, the group is separated by work teams for training, for example, the teams of each line of business, the team of managers, and the entire team for the issues of teamwork, integration, and decision-making, as foreseen in stage 2, in such a way, that at the same time, different teams can be attended, as well as the manager for the formalisation of the group, the operational for the implementation of the business lines. At this point, it is important to take up the results of stage 1 regarding the profile of human resources and its capabilities to place them in the most appropriate work team and to obtain the best results. It also requires considerable investment in time and resources on the part of the implementing team (here comes the collaboration and strategic alliances between the actors of the fivefold helix), in addition to developing the market approach to be able to identify the marketing strategies to apply to each of the lines of business. This is where the group is intervened and accompanied, using traditional training tools, mirror training, role-playing, representations and comics; Regarding the operation of the lines of work, the rules and regulations that must be complied with are included and strategies are made to accompany the implementation of the processes of each of the lines until the learning is appropriated by the members of the lines of business; It is important to highlight that at this stage the financial, fiscal and decision-making issues represent a significant challenge for all groups and for the support and intervention team, significant limitations have been found such as the lack of educational training of the leaders, but with a lot of patience and accompaniment it has been possible for those responsible to do what is necessary to report the financial results of the lines of business and at the same time, present to the groups the financial results of the project and that the group can make decisions for the best benefit of the members and their families.

In stage 4, the same diagnostic instruments as in stage 1 should be used to determine growth concerning baseline. Other measures must be identified to ensure members appear more active, happier, motivated, and committed to their initial skills. Based on these outcomes, we can identify improvements to the original design. It is also essential to acknowledge that growth should occur within annual or operational cycles, allowing for the staggered developments mentioned in Figure 1.

In Stage 5, we kick off an exciting focus group to share the valuable insights from Section 4. This brainstorming session invites everyone to collaborate on refreshing our strategic planning and setting inspiring goals for the next cycle. Together, we will create indicators that align with industry standards, prioritising top-notch service quality, boosting our efficiency, and elevating our external reputation. It is also an excellent opportunity to connect with stakeholders from the fivefold helix to craft action plans for meaningful improvements and devise innovative strategies that enhance our dynamic capabilities. Let us embrace this journey of growth and collaboration!

Findings and Discussion

It is essential to emphasise that several key factors influence the outcomes of implementing the model. These include the initial working group profile, the available infrastructure, partnerships with various stakeholders (the "n" helixes incorporated into the model), and the resources and capabilities that can be added during the model's implementation.

Over the years of working with various groups and applying the model in different geographical contexts, we have developed capabilities at multiple levels, particularly those defined by Teece et al. (1997) as dynamic. These improvements include:

1. Enhanced organisational skills, teamwork, integration, and collective decision-making.
2. Improved technical and service capabilities across business lines.
3. Strengthen administrative capacities to implement controls, ensuring efficiency within business operations and collaboration with management.
4. Developed leadership capabilities to monitor financial performance, cost management, and profit flows within individual lines of business and on a global scale.

5. Enhanced decision-making skills, particularly in determining investment priorities, reinvestment options, and employee support.

It is important to highlight the incredible advantages of prioritising family members and close friends in the labour force! This strategy strengthens local economies and helps break the cycle of challenges often faced in rural areas. By working together, we can create a positive momentum that leads to even more excellent opportunities for the future. Let us embrace this approach and watch it transform our communities for the better!

Conclusion

Companies in rural areas face unique yet exciting challenges! They are on a mission to shift their focus from just productivity to achieving actual profitability while positively impacting their communities. Thankfully, the innovative five-helix model offers a fantastic way to foster collaboration among key decision-makers across its five elements. By enhancing resources and capabilities, these companies can build dynamic skills over time, creating an incredible cycle that boosts the quality of life in these regions. From our working group's experience, engaging with producer-entrepreneur groups for about five years is essential to unlocking this virtuous cycle. While hurdles are to overcome, the journey is filled with potential and promise, paving the way for vibrant, thriving communities.

One significant constraint in implementing the model is the time required to establish a precise diagnosis, which is crucial for designing and executing subsequent phases. Additionally, there is a challenge related to maintaining the sustained commitment of the stakeholders within the five-fold helix model over time. Investment priorities often shift from year to year, and changes in government can further affect this commitment, as new administrations may introduce different goals and initiatives.

The intervention aspects that involve training and support for development provided by university experts also face several limitations. Although involving students in these projects benefits their professional growth, the high turnover rates associated with university programs can disrupt continuity. This requires a substantial investment in resources to manage the training process effectively. Additionally, academics often encounter institutional bureaucracy, which can impede their ability to engage in these projects effectively.

Bringing business development to rural areas poses a significant challenge, particularly for producers. However, promoting strategic alliances among the stakeholders in the fivefold helix can help mitigate these limitations, ultimately leading to a more significant impact in a shorter time frame.

Acknowledgements

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REVIEW OF UNIVERSITY TEXTBOOK

Ladislav MURA

The study of public affairs is not the sole preserve of the professional community. Quite the contrary. Since public affairs affect absolutely everyone, it is important to examine and study this area of life as well. Social, economic, financial. One of the important components of public life or public policy is public finance. This is a very broad and demanding sphere of society's economic, social, and political spectrum. Public finances are essential for the proper functioning of any state. The basic mission of public finances is to keep the country running in an operational, payment, and redistribution process. Public finances concentrate, cumulate and subsequently allocate financial resources across the country, across sectors of the national economy and across individual sectors. Public finances work to a significant extent to maintain the financial stability of the state and for the implementation of various public policies. They support economic growth, economic stability but also social redistribution.

For the key reasons mentioned above, it is clear that there is a great need to address the area of public finance. It is therefore essential to include a subject devoted to public finance in the training of future experts in the field of public policy and public administration. Studying public finance in the form of a university semester course gives students the opportunity to learn about the mechanisms of the financial world, with a particular focus on the mechanisms of public finance. In addition to the mechanisms, it also explains the individual actors, their status, functions, competencies, and tools through which they perform their public function. Knowledge of these laws is also necessary for public administration bodies, whether they are state administration institutions, regional or local self-government, or self-government of interest. The role of public administration is to help implement the provision of public services and also the all-round development of the state and regions for the benefit of the citizens of the country.

From the perspective of public administration, public finance is an important area, because its individual instruments can be used to implement specific public policies. The area of public finance must be implemented with an emphasis on the efficient use of public funds, which is reflected in the responsible and, today, so often discussed, transparent approach to managing public affairs. Understanding this important and at the same time challenging issue is important already during the preparation of new experts within higher education.

In line with these ideas, we welcome the efforts and work of an academic from the Faculty of Social Sciences at Ss. Cyril and Methodius University in Trnava, who have prepared a teaching aid in the form of a university textbook with the same title in Czech, "Veřejné finance" (Public Finance). The author was the renowned Czech-Slovak expert and professor of finance, Prof. Ing. Václav Vybíhal, CSc. The textbook is being published these days (in 2025) under the auspices of the academic department of the University of St. Cyril and Methodius in Trnava. The publication of a university textbook was a planned pedagogical output, which was also approved by the Editorial Board of the University of Ss. Cyril and Methodius in Trnava and also by the management of the Faculty of Social Sciences of the university of the same name. Making knowledge available in the form of teaching aids, whether scripts or textbooks, is an integral part of the pedagogical and scientific work of academic staff. Economic life has unprecedented dynamics, therefore the preparation of a current teaching aid, in this case

from the field of public finance, is very welcome.

The university textbook "Veřejné finance" (Public Finance) is divided into eight separate chapters, which are thematically linked. Each chapter is divided into smaller subchapters, in which the authors explain specific topics. In the first comprehensive chapter, the authors focus on public finance in a market economy. They explain in detail the position and role of public finance in the event of market failure, describe the characteristics of public finance as such, and in the rest of the first chapter, they describe the functions and structure of public finance. After an introductory explanation of the basic concepts, the authors devote the second separate chapter to the public sector and public goods. This is because there is a significant connection between public finances and the public sector as such. Finances represent its background, financial security for the possibility of implementing individual policies (for example, fiscal, monetary, etc.). The space is devoted to a relatively detailed explanation of the closer characteristics of the public sector as such, followed by the characteristics and clarification of classification approaches to public goods. A separate subchapter is devoted to externalities, which already have their important place in general economic theory. The third chapter is relatively extensive and is devoted to the entire constitution of public budgets. It is a demanding and broad topic, which the author team has logically divided into up to nine separate subchapters. The starting point is an explanation of the position and functions of the state budget, the budgetary process, budgetary rules, principles, followed by the budget balance, budget deficit, and public debt. A separate subchapter is even devoted to the specific topic of the interconnection between the European Union budget and the Slovak state budget. The authors then explain state special-purpose funds and their significance, local government budgets, higher territorial unit budgets, and municipal budgets.

The fourth chapter deals with public revenues as a significant source of funds. The chapter is quite extensive, which required the authors of the university textbook to divide it into twelve smaller subchapters. Partial topics such as the functions and structure of public revenues,

budgetary determination of taxes, and tax quotas are explained. Quantification is presented using the Laffer curve, which follows on from the explanation of the tax system as such. The other subchapters deal with the object, subject, and subject matter of taxation, the tax base, non-taxable portions, the tax period, tax collection techniques and methods of tax payment, tax administration, and tax incidence. The fifth chapter deals with the other side of the coin: public expenditure. The structure is similar, but it reflects the other side of public finances. Partial space is devoted to the characteristics and classification of public expenditure, the theory of growth, and the factors of public expenditure growth. From the perspective of public policy, it is gratifying to include a separate, sixth chapter devoted to fiscal federalism. In this chapter, the authors address four partial problems: spatial aspects of public finances, models of fiscal federalism, fiscal decentralization and the specifics of fiscal decentralization in the conditions of the Slovak Republic. The penultimate chapter of the university textbook is again closely linked to the field of public policy, as it explains public choice and its consequences for public finances. The space is again devoted to four partial problem areas, such as the essence of public choice and the specifics of decision-making, the procedures applied in public choice, the subjects and the mutual relations between them, and the significant problems of public choice. The last separate chapter of the reviewed textbook is the chapter devoted to theories, models, principles and financing of social security. In this case too, it is a relatively extensive chapter, which is divided into seven subchapters. In them, the authors continuously approach the explanation of models, methods, ways and systems of social security, financing of social security (including continuous and fund financing), the principle of multi-source financing of social security, the pension system, benefits and also health care from the perspective of public finances are explained.

In conclusion, it can be said that the new university textbook entitled "Veřejné finance" (Public Finance) provides up-to-date knowledge and information, supported by current legislation, thereby helping students in the fields of public policy and public administration, finance, national economy, and other

specializations to acquire the latest knowledge in the field. It is written in a highly professional manner, but at the same time comprehensibly, with examples and graphic support. The subject matter is also explained with the help of mathematical apparatus, which increases the quantitative level of economic knowledge. This peer-reviewed university textbook is a successful work and we recommend it to students, practitioners, and the general public.

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Body of main text: *Introduction* (establish the existing state of knowledge of your research topic, identify the specific focus of your work, include relevant citations from primary literature, justify how this topic requires additional study, state specific objectives/hypotheses, methods, describe the meaning of your research); *Goal and Methodology; Findings; Discussion*; *Body of main text* should be divided into chapters and subchapters. Chapter titles are to be numbered, 11-point font size bold, align left; *Conclusion*; *Notes.*

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Name SURNAME of the authors (Arial italics font 11)

Abstract Times new roman Italics Body text (9)

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Introduction (Times new roman Body text 10)

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Goal and Methodology (Times new roman Body text 10)

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Findings (Times new roman Body text 10)

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