POŠTA TELEKOMUNIKÁCIE A ELEKTRONICKÝ OBCHOD
elektronický časopis Katedry spojov

PRIMARY RESEARCH AND CONTENT ANALYSIS OF CURRENT EMPLOYER EXPECTATIONS

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Abstract: This paper examines the evolving landscape of digital competency requirements within the Slovak labor market. The primary objective is to identify and categorize specific digital skills. The research methodology is based on a quantitative content analysis of 384 job advertisements from major recruitment platforms.
Keywords: Digital Skills Gap, Labor Market, Slovakia, Employer Requirements, Digital Transformation

Introduction

Digital competencies constitute a fundamental pillar of the modern digital economy and society. The level of these skills directly influences the capacity of individuals, enterprises, and public institutions to adapt to technological changes, implement digital innovations, and operate effectively in an environment driven by data and connectivity. To quantify these capabilities, the European Commission developed the Digital Economy and Society Index (DESI), a complex analytical tool that enables the monitoring and benchmarking of digital progress across European Union member states. The index evaluates national performance through four primary dimensions: Connectivity, Human Capital, Integration of Digital Technology, and Digital Public Services. Since 2023, DESI has been integrated into the Digital Decade report, monitoring progress toward the EU's 2030 digital targets [1].

This study places particular emphasis on the second dimension - Human Capital. This category encompasses the digital proficiency of the general population and IT professionals, factors that are critical for strategic business management, innovation capacity, and economic competitiveness. Current data indicates that Slovakia faces significant challenges in this area. Since 2021, the share of citizens with at least basic digital skills has declined from 55 % to 51%, widening the gap with the EU average. Furthermore, in advanced digital skills, Slovakia reaches only 22%, falling short of the EU average of 27% and its own 2030 target of 30% [2,3].

The primary aim of this paper is to investigate the current demand for digital proficiency within the Slovak labor market through a quantitative content analysis of 384 job advertisements. By utilizing the European Digital Competence Framework (DigComp 2.2), this research seeks to delineate how digital requirements vary across key economic sectors - including manufacturing, ICT, and services and according to organization size. The resulting empirical data serves as a foundation for optimizing business models and bridging the divide between academic preparation and market expectations in the digital economy [4,5].

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Research Objectives and Problem Definition

The primary aim of this paper is to investigate the current demand for digital proficiency within the Slovak labor market. The research specifically focuses on the "competency gap", the persistent misalignment between the sophisticated requirements of the digital transformation era and the actual skill sets possessed by job seekers. This disparity is identified as a significant bottleneck, obstructing the seamless adoption of Industry 4.0 standards, and undermining the overall competitive edge of domestic enterprises.

Beyond identifying general trends, this study seeks to delineate how digital requirements vary across key economic sectors (including manufacturing, services, ICT, and commerce) and according to organization size. The resulting empirical data serves as a foundation for a comprehensive research framework dedicated to optimizing business models for the digital economy.

Methodology and Data Acquisition

This study employs a quantitative research design, utilizing systematic observation and rigorous content analysis of job vacancies. The data collection phase was conducted between July 15 and September 22, 2025, targeting a randomized selection of prominent recruitment portals active in the Slovak Republic.

To maintain theoretical and terminological rigor, the European Digital Competence Framework (DigComp 2.2) was adopted as the primary reference for skill categorization. Requirements were systematically coded into five core competency areas and further segmented into two distinct proficiency tiers:

- **Foundational Digital Literacy:** Representing the baseline requirements for participation in the digital workforce. This tier encompasses information management (e.g., productivity suites like MS Office or Google Workspace), digital collaboration (e.g., MS Teams, Slack), basic content generation, and essential cybersecurity protocols (e.g., GDPR compliance).
- **Strategic Digital Competencies:** Representing advanced skills necessary for driving organizational transformation. This includes complex problem-solving via digital tools (e.g., ERP systems, Power BI, Python), process automation (AI, Cloud computing, RPA), advanced cyber-defenses, and strategic digital leadership.

Statistical Validity and Sampling

To ensure the representativeness of the findings given the vast population of total job advertisements, the required sample size (n) was determined using Cochran's Formula:

$$n = \frac{Z^2.p(1-p)}{E^2}$$

The calculation utilized a confidence level of 95% (Z=1,96), an estimated population proportion of p=0,5 (to account for maximum variability), and a 5% margin of error (E=0,05). Consequently, the minimum threshold for a statistically significant sample was established at n=384 postings, providing a reliable reflection of market trends with a ±5%precision.

Analytical Framework

The extracted data underwent systematic coding and was processed using Microsoft Excel. The analysis leveraged descriptive statistics to evaluate the frequency and distribution of specific digital competencies, allowing for a comparative study across various industries and enterprise scales. This research was conducted independently by the authors and was entirely self-funded.

Results

Data Sources for Primary Research via Recruitment Platforms

The initial phase of the primary research involved a systematic selection of recruitment platforms to ensure a diversified and representative sample of the Slovak labor market. As illustrated in Table 1, the data corpus was constructed to capture a wide array of economic segments, ranging from traditional industrial hubs to specialized technological niches. The primary objective was to achieve a balanced dataset reflecting the requirements of various economic sectors and enterprise sizes.

Table 1 Distribution of primary data sources

PLATFORM NAME	PLATFORM TYPE	NUMBER OF ANALYZED JOB POSTINGS	TARGET SECTORS	DATA ACCESS METHOD
PROFESIA.SK	National platform	150	Manufacturing, Services, Administration	Manual filtering and coding of postings
LINKEDIN JOBS	International platform	80	IT, Management, Finance	Export and categorization of positions by sector
PRACUJ.SK	National platform	70	Trade, Marketing, Logistics	Text analysis of job advertisements
KARIÉRA.SK	National platform	50	Industry, Manufacturing, Services	Manual data collection
JOOBLE.SK	Aggregation platform	34	Various sectors	Automated observation
TOTAL		**384**		

Source: Own processing based on systematic observation of job advertisements on recruitment platforms in the Slovak Republic between July 15 and September 22, 2025

The largest share of data originated from Profesia.sk (39%), which serves as the dominant benchmark for national labor trends in Slovakia, particularly in manufacturing, services, and administration. This was strategically supplemented by LinkedIn Jobs, which provided insights into high-tier managerial and specialized ICT positions requiring advanced digital competencies such as AI, data analytics, and cloud computing. To ensure a holistic view, portals such as Pracuj.sk, Kariéra.sk, and Jooble.sk were integrated into the research. These platforms expanded the database to include a higher representation of Small and Medium-sized Enterprises (SMEs), thereby enabling a robust comparative analysis of digitalization requirements across different size categories.

Ultimately, the total number of analyzed job postings was established at 384. This sample size was determined through a statistically representative calculation, ensuring a 95% confidence interval with a 5% margin of error, thus providing a reliable empirical foundation for the subsequent analysis of the digital skills gap.

The research evaluated the demand for digital proficiency through two primary lenses: economic sector and enterprise scale. As detailed in Table 2 (see on page 4), the findings illustrate how digital requirements are structurally distributed across the Slovak labor market.

Table 2 Sectoral vacancies by organization size

SECTOR	SMALL ENTERPRISES	MEDIUM ENTERPRISES	LARGE ENTERPRISES	TOTAL	SHARE (IN %)
IT SECTOR	22	35	41	98	25,5 %
INDUSTRY AND MANUFACTURING	28	46	36	110	28,6 %
TRADE AND SERVICES	25	30	25	80	20,8 %
FINANCE AND BANKING	10	26	30	66	17,2 %
LOGISTICS AND TRANSPORT	8	12	10	30	7,8 %
TOTAL	**93**	**149**	**142**	**384**	**100 %**

Source: Own processing based on systematic observation of job advertisements on recruitment platforms in the Slovak Republic between July 15 and September 22, 2025

The analysis indicates that the Manufacturing and Industry sector remains the largest contributor to job vacancies (28,6%). This segment acts as a primary driver of digitalization, where requirements are increasingly shaped by Industry 4.0 standards. It is closely followed by the ICT sector (25,5%), which is characterized by a high concentration of roles requiring advanced technical expertise, including programming, cloud architecture, and cybersecurity. In the Trade and Services sector (20,8%), digitalization manifests through the automation of sales and customer-centric platforms (CRM and e-commerce), while the Financial and Banking sector (17,2%) prioritizes data analytics and Business Intelligence (BI). Although Logistics and Transport represents the smallest share (7,8%), a gradual shift toward intelligent warehouse and route optimization systems is evident.

A significant finding of this study is the high concentration of demand within larger organizational structures. Medium (39%) and large enterprises (37%) collectively generate 76% of the analyzed postings. This suggests that the "digitalization momentum" is predominantly driven by entities with the capital capacity and strategic infrastructure necessary to implement complex digital transformations, such as ERP system administration and large-scale process automation.

In contrast, small enterprises account for 24% of the total sample. Their demand remains more conservative, focusing largely on foundational digital competencies, including office productivity tools (MS Office), online communication, and basic e-shop administration. This disparity underscores a significant gap in digital maturity: while larger corporations pursue transformative, data-driven strategies, smaller firms remain in a transitional phase, focusing on essential operational digitalization.

Main Part of Primary Research on Recruitment Platforms

The granularity of digital requirements varies significantly across industries, as detailed in Table 3 (see page 5). The ICT sector displays a near-saturation of demand for advanced technical skills (92%) and cybersecurity (75%), highlighting its role as the technological vanguard.

Table 3 Matrix of digital skill requirements by industry (in %)

SECTOR	BASIC DIGITAL SKILLS	ADVANCED DIGITAL SKILLS (BI, AI, CLOUD)	CYBERSECURITY AND DATA	DIGITAL COMMUNICATION (CRM, ERP)	AUTOMATION AND ROBOTICS
IT SECTOR	45%	92%	75%	65%	40%
INDUSTRY AND MANUFACTURING	70%	50%	25%	60%	65%
TRADE AND SERVICES	85%	40%	20%	70%	15%
FINANCE AND BANKING	60%	80%	70%	55%	25%
LOGISTICS AND TRANSPORT	75%	45%	30%	50%	35%

Source: Own processing based on systematic observation of job advertisements on recruitment platforms in the Slovak Republic between July 15 and September 22, 2025

As evidenced by Table 4, there is a linear correlation between the size of an enterprise and the complexity of required digital competencies. Small enterprises predominantly seek "Foundational Literacy" (88%), with negligible requirements for AI or advanced data analytics (10 - 12%).

Table 4 Proficiency levels relative to enterprise size

ENTERPRISE SIZE	BASIC SKILLS	ADVANCED TECHNICAL SKILLS	DIGITAL MANAGEMENT (ERP, CRM, BI)	AI AND DATA ANALYTICS	CYBERSECURITY
SMALL ENTERPRISES	88%	25%	35%	10%	12%
MEDIUM ENTERPRISES	75%	45%	55%	20%	25%
LARGE ENTERPRISES	60%	70%	80%	40%	45%

Source: Own processing based on systematic observation of job advertisements on recruitment platforms in the Slovak Republic between July 15 and September 22, 2025

In contrast, the Manufacturing sector exhibits a specialized demand profile where "Automation and Robotics" (65%) outpaces general "Advanced Digital Skills" (50%), reflecting the sector's focus on physical-digital integration. The Finance and Banking sector shows a high correlation between advanced analytics (80%) and data security (70%), emphasizing the sector's reliance on Business Intelligence and risk management.

Table 5 (see page 6) synthesizes the relationship between industry type and company size, acting as a proxy for the "digitalization index" of the Slovak economy. The IT and Finance sectors emerge as leaders in digital adoption regardless of company size. However, the most profound "digital divide" is observed in Trade, Services, and Logistics, where small firms significantly lag their larger counterparts. This disparity underscores the need for size-adaptive business models that facilitate digital entry for smaller market players.

Table 5 Digitalization density matrix (sector vs. size)

SECTOR	SMALL ENTERPRISES	MEDIUM ENTERPRISES	LARGE ENTERPRISES
IT SECTOR	65%	80%	95%
INDUSTRY AND MANUFACTURING	30%	55%	75%
TRADE AND SERVICES	25%	40%	60%
FINANCE AND BANKING	50%	70%	85%
LOGISTICS AND TRANSPORT	35%	45%	65%

Source: Own processing based on systematic observation of job advertisements on recruitment platforms in the Slovak Republic between July 15 and September 22, 2025

The "Digital Leap" occurs in the transition to medium and large enterprises, where requirements for Digital Management (ERP, CRM, BI) jump to 55% and 80%, respectively. This data confirms that large-scale organizations have moved beyond basic productivity tools toward strategic, data-driven management ecosystems.

The final analysis, presented in Table 6, categorizes the findings according to the standardized DigComp 2.2 framework. The results indicate a "pyramid structure" of skills:

1. **The Base:** Information and Data Literacy (72%) remains the most universal requirement.
2. **The Middle:** Communication and Content Creation (65% and 43%) are standard for administrative and marketing roles.
3. **The Apex:** Problem Solving and Safety (37% and 21%) represent the specialized tier.

Table 6 Frequency of digital areas according to DigComp 2.2

DIGITAL AREA (DIGCOMP)	DESCRIPTION	INCIDENCE RATE (IN %)	MOST FREQUENTLY REQUESTED SKILLS
INFORMATION AND DATA LITERACY	Working with digital information and data	72%	MS Office, Excel, Google Workspace
COMMUNICATION AND COLLABORATION	Digital communication, CRM, and collaboration	65%	Teams, Outlook, Slack, CRM systems
DIGITAL CONTENT CREATION	Working with documents, presentations, and content	43%	WordPress, PowerPoint, Canva
SAFETY	Data protection and cybersecurity	21%	GDPR, password management, antivirus systems
PROBLEM SOLVING	Digital innovations, data analysis, automation	37%	ERP, Power BI, Python, SQL

Source: Own processing based on systematic observation of job advertisements on recruitment platforms in the Slovak Republic between July 15 and September 22, 2025

The relatively low emphasis on Safety (21%) is a critical finding, suggesting a "security awareness gap" in the Slovak labor market, which could pose long-term risks for national digital resilience.

Discussion

The empirical evidence gathered from the content analysis of Slovak job advertisements confirms a deepening structural imbalance in the labor market. While employer expectations are rapidly advancing toward the "Strategic Tier" of digital proficiency, the general workforce development (as indicated by the DESI index) appears to be stagnating or even declining.

- **The Sectoral Divide (Digital Dualism):** Our research identifies a clear "double speed" digital economy in Slovakia. On one hand, the ICT and Finance sectors are already operating within the paradigms of Industry 4.0, requiring sophisticated skills in AI and cloud architecture. On the other hand, traditional sectors like Manufacturing and Trade are still struggling to bridge the gap in foundational information literacy.
- **SMEs as a Vulnerable Segment:** A critical observation is the "readiness gap" in Small and Medium-sized Enterprises (SMEs). With only 12% of SME job postings requiring advanced data analytics compared to 44% in large corporations, there is a significant risk that smaller firms will be excluded from the benefits of digital transformation due to a lack of human capital.
- **The Security Awareness Deficit:** Despite the rising frequency of cyber threats, the area of "Safety" (according to DigComp 2.2) remains underrepresented in job requirements (21%). This suggests that Slovak employers may be underestimating the importance of cybersecurity as a cross-cutting competency, focusing instead on immediate operational productivity.

Conclusion

This study provides a comprehensive mapping of the digital skills demand in the Slovak Republic, utilizing a representative sample of 384 job vacancies across various economic sectors. The findings confirm that digital competency has transitioned from a specialized asset to a universal prerequisite for labor market participation.

The research successfully identified that enterprise size and sectoral affiliation are the primary determinants of digital requirement complexity. Large enterprises in technologically intensive industries act as the main drivers of digital innovation, while the SME sector remains focused on basic operational tools. The "mismatch" identified between market needs and the actual proficiency of the workforce (as highlighted by the decline in basic skills to 51% in recent DESI reports) represents a significant barrier to Slovakia's long-term economic resilience and its competitive position within the European Digital Decade 2030 framework.

Recommendations

Based on the empirical findings and subsequent analysis, the following strategic recommendations are proposed:

- **Alignment with DigComp 2.2 Framework:** Educational institutions and vocational training providers should harmonize their curricula with the European Digital Competence Framework. This shift should move beyond teaching specific software (e.g., MS Excel) toward fostering broader digital problem-solving and critical data management.
- **Targeted Upskilling for SMEs:** Policymakers should design, and fund digital transition programs specifically tailored for Small and Medium-sized Enterprises. These programs should focus on lowering the barrier to entry for advanced tools like CRM, ERP, and basic data analytics.
- **Cross-Sectoral Cybersecurity Integration:** Cybersecurity should be promoted not just as a technical skill for IT specialists, but as a "basic hygiene" requirement for all administrative and managerial roles, given the increasing data exposure of all business processes.

- **Strengthening Business-Academia Partnerships:** To mitigate the "skills mismatch," a more dynamic feedback loop is required between major employers (especially in the Industrial and IT sectors) and universities to ensure that graduates possess the "Strategic Digital Competencies" identified in this research.

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Grant Support

This article was published as part of the grant project No. 051ŽU-4/2025, titled *"Implementation of innovative methods into the educational process of the E-commerce and Management study program in the context of digital transformation".*