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WAGE TRANSPARENCY, SKILL DEMAND AND LABOUR MARKET STRUCTURE IN TOURISM: A COMPARATIVE ANALYSIS OF ONLINE JOB ADVERTISEMENTS IN HUNGARY, ROMANIA AND SLOVAKIA

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Abstract: The study aims to examine the structural characteristics of tourism labour demand in three Central and Eastern European countries through online job advertisements. The main objective is to identify how wage transparency, occupational composition, digital skill requirements, and spatial concentration differ across national tourism labour markets and which factors explain numerical wage disclosure in tourism job postings. The empirical analysis is based on 1,551 publicly available tourism-related job advertisements collected through web scraping from the leading online job platforms of the three countries: Profession.hu (Hungary), eJobs.ro (Romania), and Profesia.sk (Slovakia). The study applies descriptive statistics, logistic regression, multinomial classification, text mining, and territorial concentration indicators (HHI, Gini coefficient) to examine wage disclosure, sectoral composition, skill demand, and spatial distribution. The results show significant cross-country differences in wage transparency: Slovak tourism job advertisements display substantially higher numerical wage disclosure, while Romanian postings show lower effective salary transparency under strict numerical criteria. Senior positions and English language requirements significantly reduce the likelihood of salary disclosure, whereas hotel, food and beverage, and multi-location advertisements increase it. Digital skills appear frequently in postings but do not generate a stable wage premium, suggesting that digitalization in tourism is primarily operational rather than strategic. The findings indicate that wage transparency in tourism labour markets is shaped not only by human capital requirements but also by organizational standardization, negotiation logic, and platform–institutional context. The study contributes to tourism labour market research by demonstrating that online job advertisements provide a robust comparative source for identifying labour market segmentation, digital transformation, and regional concentration patterns in tourism employment.

Keywords: tourism labour market, wage transparency, online job advertisements, digital skills, tourism employment, labour market segmentation, platform economy, Central and Eastern Europe

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INTRODUCTION

The labour market in tourism and hospitality simultaneously exhibits the characteristics of a “traditional” service-sector labour market (labour-intensive operations, strong interpersonal interaction, geographical embeddedness) and a “new-type” digital labour market (platform-based recruitment, data-driven selection, and digitised workflows). The coexistence of these two dimensions implies that publicly available online job advertisements are playing an increasingly important role in analysing tourism labour demand. Such “real-time” employer-side demand signals enable the identification of which positions dominate the market, which skills and language requirements are most frequently requested, and how often remuneration is explicitly communicated (Ladkin et al., 2023; Marrero-Rodríguez et al., 2020).

Within tourism labour market research, the concepts of fair and decent work, job quality, precarity, seasonal fluctuation, and skills shortages have become central themes, all of which have been further intensified in the post-COVID-19 period (Giousmpasoglou, 2024; Sun et al., 2022). Secondary and primary (job advertisement-based) approaches can be particularly fruitfully combined: the “micro-level” characteristics of job postings (occupation, contract type, required skills, language requirements, remuneration) allow for the operationalisation of job quality, digitalisation, and labour market segmentation (Mourelatos et al., 2025; Tzimas et al., 2024). The present study is based on a comparative analysis of tourism job advertisements in three countries - Hungary, Romania, and Slovakia - and focuses on wage transparency, the structure of tourism employment, patterns of skills demand and digitalisation, as well as territorial concentration. Due to the incompleteness of location information in the Slovak dataset, however, the territorial concentration analysis is restricted to Hungary and Romania, while Slovakia is included in the wage transparency, occupational structure, and skill-demand analyses. Methodologically, the research is grounded in the internationally established literature on labour market

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intelligence derived from online job advertisements, which addresses key dilemmas related to the cleaning, normalisation, and text-mining exploitation of web-scraped data (Tzimas et al., 2024; Giambona et al., 2024).

Research on tourism employment and labour has, in recent years, evolved into a distinct and rapidly maturing subfield. Leading reviews emphasise that the "world of work" in tourism must be interpreted through the lenses of labour market institutions, corporate HR practices, and the specific characteristics of service work, including emotional labour, performance linked to the guest experience, shift-based schedules, and unpredictable demand (Ladkin et al., 2023). This multidimensional embeddedness helps explain why high labour turnover, fragmented working hours, and pronounced internal heterogeneity between "good" and "bad" jobs persist in tourism, even when positions are examined within the same region or corporate chain (Kronenberg & Fuchs, 2022; Ladkin et al., 2023).

The concepts of job quality and decent work are particularly salient in tourism, as the sector frequently exhibits low pay, precarious and flexible (non-standard) employment arrangements, limited career progression, and heightened worker vulnerability (Giousmpasoglou, 2024). Accordingly, the "Fair and Decent Work Agenda" has gained increasing prominence within the tourism and hospitality literature, alongside its associated social sustainability framing, which links corporate competitiveness directly to the quality of employment (including pay, predictable scheduling, occupational safety, training, and employee representation) (Giousmpasoglou, 2024). A recent systematic review of the decent work literature in tourism and hospitality further confirms that, although the conceptual field is expanding rapidly, challenges remain regarding measurement, the identification of concrete mechanisms, and the integration of labour market impacts of crises (e.g. COVID-19) into coherent analytical frameworks (Wang & Cheung, 2024).

The "structure" of tourism employment in many countries and regions is dual in nature: alongside a large volume of entry-level operational positions (e.g. housekeeping, kitchen staff, service personnel, reception), there exists a smaller but critical layer of managerial, specialist, and coordination roles. This structural pattern is clearly reflected in online job advertisements. For example, an analysis of approximately 9,000 job postings in Spain demonstrated that employment forms and wage levels are strongly occupation-dependent, and that "good offers" (i.e. more stable contracts and higher pay) do not follow a linear relationship with formal educational requirements; practical experience frequently serves as a stronger selection criterion (Marrero-Rodríguez et al., 2020). In many countries, the COVID-19 crisis further exacerbated the vulnerability of tourism workers, and global comparative evidence indicates that downturns in tourism have disproportionately affected employment losses and inequality risks (Sun et al., 2022).

In response to pressures affecting employment structures and skills, the literature highlights two main trajectories. The first concerns the growing importance of "critical skills" and transferable competences, such as communication, problem-solving, teamwork, and adaptability, which simultaneously support service quality and long-term career sustainability (Stangl et al., 2024). The second relates to issues of training provision and skills matching, which are often country- and institution-specific and are directly reflected in the textual content of job advertisements (Derco & Tometzová, 2023).

Wage transparency has become a central topic in contemporary labour market research, closely linked to information asymmetry, wage bargaining, recruitment efficiency, pay differentials, and perceptions of workplace fairness. Recent measurement research emphasises that wage transparency is not a unidimensional construct. Distinctions can be drawn, for example, between outcome transparency (knowledge of the concrete wage or wage range), procedural transparency (the logic of wage-setting), and communicative transparency. To operationalise these dimensions, new multidimensional measurement instruments have been developed (Henn et al., 2025).

The wage information displayed in online job advertisements is one of the most direct and observable forms of wage transparency. Its regulatory and market effects have been examined in several empirical studies. One potential consequence of mandatory (or strongly incentivised) wage disclosure is a change in the number of job postings; however, recent findings suggest that the effect is often modest. In the context of state-level regulations in the United States, a large-scale panel analysis identified a 1-6% decline in job postings, which was not statistically robust in most cases (Duka & Weber, 2025). Parallel analyses of so-called "Colorado-type" regulations indicate that the introduction of such rules rapidly increases the proportion of advertisements containing wage information, although corporate adaptation strategies and issues of (imperfect) compliance at the institutional level play a crucial role (Arnold et al., 2025).

Wage disclosure, however, is not merely a question of supply volume; it may also influence labour market allocation and selection processes. Experimental and field-experimental studies suggest that publishing wage information does not automatically increase the number of applicants, nor does it necessarily reduce applicant "quality". Effects are heterogeneous, depending on wage levels and search costs. This implies that wage disclosure primarily restructures the search and bargaining process, rather than mechanically generating a greater number of applications (Balgova et al., 2025).

At the organisational level, wage transparency is often associated with concerns about productivity (e.g. the assumption that visible pay structures may undermine motivation). Yet large-sample, field-based studies tend to indicate that average productivity does not necessarily decline; rather, reactions depend on what the transparency reveals about individual perceptions of fairness (Gutierrez et al., 2025). From the perspective of employee preferences, there is evidence that many workers explicitly demand the publication of wage ranges and the logic of wage determination, while full disclosure of individual pay data reveals generational and attitudinal fault lines (Heisler, 2024).

In tourism, wage disclosure entails an additional layer of complexity. Service-sector positions frequently involve variable income components (e.g. shift premiums, tip-based remuneration, seasonal bonuses, benefit packages), which may increase uncertainty around wage figures and thereby discourage explicit disclosure. Nevertheless, online job advertisements demonstrate that in certain tourism occupations, stable contracts and higher wages may function as explicit corporate signals,

whereas in others, remuneration is communicated more implicitly (e.g. “competitive salary”) (Marrero-Rodríguez et al., 2020). Wage transparency can therefore be expected to vary not only across countries but also by sub-sector (e.g. hotels versus food and beverage) and occupational structure (Marrero-Rodríguez et al., 2020; Wang & Cheung, 2024).

The digitalisation of tourism can no longer be understood merely as a matter of “online marketing”; rather, it entails the transformation of production and service processes, as well as organisational structures. This includes booking ecosystems, digital platforms, customer relationship management systems, revenue management tools, the digitised guest journey, and - increasingly - artificial intelligence and robotics (Samala et al., 2022; Hassan et al., 2026). The labour market relevance of this technological transition is twofold. On the one hand, new digital skills are emerging even in entry-level positions; on the other, digital business capabilities within managerial and support functions are becoming strategic determinants of competitiveness (Busulwa et al., 2022). Empirical investigations of the tourism “digital skills gap” indicate that the most critical future digital skills are often closely linked to everyday operations, such as online marketing and communication, social media usage, office software proficiency, and the monitoring of online reviews, while the most significant skill shortages are frequently associated with more advanced technologies (e.g. AI, robotics, AR/VR), even where firms do not yet consider these mandatory in the short term. These findings suggest that digitalisation does not arrive at tourism workplaces in a single step; rather, it generates a gradual stratification of competences, influenced by sub-sectoral differences (e.g. accommodation versus food and beverage) and firm size (Carlisle et al., 2023).

The alignment between skill demand and educational supply is therefore a critical issue. Digitalisation frameworks addressing hospitality management competences emphasise that digital transformation requires not only technological knowledge, but also digital leadership, digital innovation, and digital customer experience management. However, analyses of higher education and training programmes reveal uneven integration of digital capabilities, which often appear as thematic “islands” rather than as part of a coherent curricular logic (Busulwa et al., 2022; Hasanein et al., 2026). Recent qualitative evidence further indicates that graduates frequently possess basic digital competences (e.g. Excel), yet lack practical experience with industry-specific systems (e.g. Opera/Fidelio, OTA platforms), which may directly hinder labour market entry (Stylianou & Pericleous, 2025). The textual content of online job advertisements is particularly well suited to observing skill demand, as employers often explicitly list - or implicitly embed within task descriptions - the required competences. Tourism-focused job advertisement analyses (e.g. the Slovak case) demonstrate that a substantial proportion of required skills and personal competences are of a “soft skill” nature, while language requirements and professional-technical expectations are strongly position-dependent (Derco & Tometzová, 2023). Post-COVID-19 analyses of tourism job markets further indicate that the proportion of part-time and short-term contracts may increase in job advertisements, while skill profiles may shift towards information management and administrative coordination capabilities (Mourelatos et al., 2025).

The spatial and temporal comparison of skills is facilitated by the use of taxonomies (e.g. ESCO) and text-mining techniques. European studies examining regional skill similarity construct regional skill profiles from online job advertisement data and demonstrate that changes and similarities in skill structures partially reflect broader macro-spatial patterns (e.g. more developed versus lagging regions) (Giambona et al., 2024). From a methodological perspective, the labour market intelligence literature provides a detailed discussion of the potential biases associated with skill extraction, deduplication, normalisation, and the structuring of information (employer, occupation, location, skills, experience), as well as the data-preparation protocols required to mitigate such risks (Tzimas et al., 2024).

Analysis of tourism job advertisements often relies on platform data. Platforms that mediate encounters between employers and job seekers are not neutral channels; through their business models, governance rules, and algorithmic ranking logics, they actively structure labour market information. The labour market literature on the platform economy therefore emphasises that platforms may simultaneously reduce search costs and increase control. Worker autonomy often takes a subordinate form, as rules, evaluation mechanisms, and access conditions are enforced through the platform’s governance architecture (Wood & Lehdonvirta, 2021). Recent developments in platform governance research further highlight considerable heterogeneity across platform sectors. Some platforms primarily function as “market-making” entities, while others act as “market-shaping” actors, influencing working conditions, entry barriers, and the scope of worker protection in different ways (Bayurgil et al., 2025). Moreover, algorithmic management may directly affect worker well-being and predictability. Empirical reviews and case studies indicate that automated evaluation systems, performance monitoring, and unpredictable task allocation can generate significant stressors for workers (Mbare et al., 2024).

The relationship between labour market institutions (e.g., wage regulation, collective bargaining frameworks, labour law norms) and platforms becomes particularly salient from a research design perspective when conducting cross-country comparisons under conditions where “country = platform” equivalence applies. In such cases, observed differences may reflect genuine institutional labour market variation, but they may equally result from platform design, moderation practices, or data-collection biases. For this reason, the labour market intelligence literature based on online job advertisements strongly advocates multi-source data collection, deduplication procedures, harmonisation of structured variables, and robustness checks (e.g., source/platform fixed effects, sensitivity analyses) (Tzimas et al., 2024). This logic directly supports modelling strategies in which the “platform effect” is not overlooked but treated as an explicit component in the interpretation of estimation results (Tzimas et al., 2024; Wood & Lehdonvirta, 2021).

The spatial structure of tourism is often characterised by concentration: growth and employment opportunities cluster in major urban nodes and prominent destinations. Literature on tourism geography and regional development addressing “urban supremacy” shows that national-level tourism growth can become disproportionately concentrated in primary metropolitan regions, while regional convergence remains limited. If so, the employment-creation promise of tourism in

peripheral areas may be weaker, a pattern that may also be reflected in the spatial concentration of labour market supply (i.e., the geographical density of job advertisements) (Bohlin et al., 2022).

Methodologically, measuring concentration has advanced rapidly. A key development is recognising that traditional concentration indicators (e.g., the Gini coefficient) may be spatially insensitive. More recent approaches decompose the locational Gini into spatial and non-spatial components and apply it explicitly within regional systems (e.g., NUTS3). This provides a direct analytical toolkit for comparing the spatial concentration of tourism labour demand: the magnitude of concentration and its spatial structure can be disentangled, clarifying whether dominance reflects the "pull effect" of one or two central regions or the outcome of multiple localised clusters (Panzera et al., 2022).

Regional studies employing disaggregated (occupation-based) models to assess the socioeconomic impacts of tourism indicate that tourism-generated employment and income are unequally distributed across both space and occupations. Evidence suggests the emergence of low but increasing income inequality, alongside a growing share of elementary occupations, which may be interpreted in relation to precarity and regional vulnerability (Kronenberg & Fuchs, 2022). Global comparative findings further suggest that, in the event of tourism-related shocks, employment losses and inequality exposure vary significantly across countries (Sun et al., 2022). An additional advantage of online job advertisement data is that it enables the integration of regional skill structures into spatial analysis. Regional skill similarity and skill change indicators can be constructed, reflecting underlying economic structures and potential labour market polarisation (Giambona et al., 2024). Consequently, in the territorial analysis of tourism labour demand, location should be treated not merely as a descriptive attribute but as an explanatory variable (Giambona et al., 2024; Panzera et al., 2022).

Based on the preceding discussion, several research gaps emerge that can be effectively addressed through a comparative (cross-country) analysis of tourism-related online job advertisements. The first gap concerns integrating wage transparency into the sector-specific employment structure of tourism. Although an expanding body of evidence examines the labour market effects of wage disclosure (Arnold et al., 2025; Duka & Weber, 2025), the interaction between wage disclosure practices and subsectoral structures within tourism (e.g., accommodation versus food and beverage versus travel services), as well as occupational hierarchies, remains less systematically examined. Evidence from tourism job advertisements suggests that wages and contract quality are strongly occupation-dependent, and that experience and employment stability often serve as stronger signals than formal educational attainment (Marrero-Rodríguez et al., 2020).

The second gap concerns the direct linkage between digitalisation, skill demand, and wage disclosure. While European and organisational-level empirical findings document the digital skills gap and digital transition in tourism (Busulwa et al., 2022; Carlisle et al., 2023), the relationship between explicitly required digital competencies in online job advertisements and the likelihood of wage disclosure - potentially reflecting a digital "skill premium" and/or a transparency premium - has not yet been systematically tested within a multi-country comparative design. The third gap concerns the tension between platform governance and cross-country comparison. If the underlying data source is inherently platform-based, disentangling platform effects from institutional or country-level differences becomes methodologically critical. The labour market intelligence literature explicitly recommends robustness and sensitivity strategies in such contexts (Tzimas et al., 2024). This theoretical concern is reinforced by the labour market literature on the platform economy, which highlights the rule-setting and control functions of platforms (Bayurgil et al., 2025; Wood & Lehdonvirta, 2021). The fourth gap lies in linking spatial concentration with job quality. Tourism is frequently spatially concentrated, and this may be associated with differences in job quality, occupational composition, and inequality risks (Bohlin et al., 2022; Kronenberg & Fuchs, 2022). Online job advertisements allow concentration to be measured not only descriptively (e.g., HHI, Gini) but also in conjunction with skill demand patterns, thereby enabling a more nuanced spatial interpretation (Giambona et al., 2024). On the basis of these gaps and drawing on the primary dataset constructed for this study, the following hypotheses are formulated:

H1: The likelihood of wage disclosure is higher in more formalised and standardised tourism subsectors (particularly accommodation/hotels) than in food and beverage activities, where income variability is greater and remuneration may be partly tip-based (Giousmpasoglou, 2024; Marrero-Rodríguez et al., 2020).

H2: Wage information is more likely to be disclosed in job advertisements offering more stable forms of employment and/or stronger job quality signals (e.g., full-time contracts, longer-term employment, higher seniority levels), as wage disclosure may function as a reputational and recruitment signal in such contexts (Heisler, 2024; Marrero-Rodríguez et al., 2020; Mourelatos et al., 2025).

H3: Job advertisements explicitly requiring digital or IT-related skills (e.g., PMS/CRM systems, online booking platforms, digital marketing) are more likely to disclose wages, as higher market valuation of scarce skills and intensified recruitment competition may induce greater transparency (Busulwa et al., 2022; Carlisle et al., 2023; Duka & Weber, 2025).

H4: Tourism job supply is more spatially concentrated in capital and metropolitan regions, while the share of multi-location advertisements is likely to be higher among chain-based, multi-site employers. On platforms, this may signal standardised recruitment logic and broader regional coverage (including mobility expectations) (Bohlin et al., 2022; Panzera et al., 2022; Tzimas et al., 2024).

MATERIALS AND METHODS

The aim of this study is to perform a comparative analysis of the online representation of the tourism labour market across three Central and Eastern European countries: Hungary, Romania, and Slovakia. The analysis draws on online job advertisements collected from the leading national job portals in each country: Profession.hu (Hungary), eJobs.ro (Romania), and Profesia.sk (Slovakia). The study includes only publicly available job advertisements related to tourism.

Data collection was conducted using web scraping techniques based on tourism-related categories accessible through the search functions of the respective platforms. The final sample comprises:

- Hungary: 387 advertisements
- Slovakia: 850 advertisements
- Romania: 314 advertisements
- Total: 1,551 advertisements

The research design is cross-sectional.

The initial phase of data processing involved cleaning the data and constructing harmonised analytical variables. Textual fields were standardised across the three platforms, including job title, company name, location, salary field, job description, requirements, and benefits. Textual fields were combined into a single analytical corpus. Text preprocessing steps included converting text to lowercase, removing diacritics, eliminating special characters, and normalising multilingual keywords. To examine the occupational structure of tourism labour demand, job advertisements were classified into four sectoral categories. The Hotel & Accommodation category includes accommodation-related activities such as hotels, hostels, reception, front office, housekeeping, wellness and other lodging-related positions. The Food & Beverage (F&B) category includes restaurant, café, bar, kitchen, chef, cook, waiter/waitress, bartender, barista and other catering-related jobs. The Tourism Services / Travel category covers travel agencies, tour operation, guiding, booking, ticketing, destination-related services and other tourism intermediation activities. The Other / Support category includes administration, sales, marketing, maintenance, customer service and other mixed or supporting functions that could not be clearly assigned to the previous three categories. Dependent Variables: Operationalisation of Wage Transparency

Wage transparency was designated as the main dependent variable and measured in two ways:s:

1. Salary_posted – a binary variable indicating whether the salary field was non-empty.
2. Salary_posted_num – a binary variable coded as 1 only if the salary field contained a numerical value.

In the integrated regression model, the second, stricter definition was applied, as on certain platforms the salary field could be formally filled without containing an actual wage figure (e.g. “Not specified”).

Tourism Employment Structure

To analyse tourism employment structure, job advertisements were classified into four main categories:

1. Hotel & Accommodation
2. Food & Beverage (F&B)
3. Tourism Services / Travel
4. Other / Support

Classification was conducted using a two-step procedure: first, manual coding of 180 advertisements (proportionally distributed across countries), followed by automated classification validated through multinomial logistic regression.

Seniority Indicator: The variable senior_flag is a binary indicator constructed based on the presence of managerial or senior-related keywords (e.g. manager, supervisor, senior, equivalent national-language terms).

Skill Indicators

Digital skills (digital_any) were coded as 1 if any of the following subcategories appeared in the advertisement:

- Excel / MS Office
- Property Management Systems (e.g. Opera)
- Global Distribution Systems (e.g. Amadeus, Sabre)
- POS systems / cash registers
- Online marketing (e.g. Ads, SEO)

Language requirements:

- lang_en – mention of English
- lang_de – mention of German

Soft skill indicator (soft_any): constructed based on keywords related to communication, customer orientation, teamwork, and flexibility.

Spatial Variables

- capital_flag – indicates capital-city location
- multi_location – indicates multiple cities or regions listed
- Aggregation by county/regional unit (Hungary and Romania)

Measurement of Spatial Concentration

Spatial concentration was measured using:

- The Herfindahl–Hirschman Index (HHI)
- The Gini coefficient

Statistical Analysis:

Descriptive statistics, cross-tabulations, and chi-square tests were applied to examine structural differences across countries.To analyse the probability of wage disclosure, a binomial logistic regression model was estimated (Hosmer et al., 2013):

$$\text{logit}(P(Y = 1)) = \beta_0 + \beta_1(\text{country}) + \beta_2(\text{sector}) + \beta_3(\text{senior}) + \beta_4(\text{skill}) + \beta_5(\text{language}) + \beta_6(\text{region}) + \varepsilon$$

Parameters were estimated using robust (HC1) standard errors.

To examine cross-country differences in employment structure, multinomial logistic regression was applied with sector category as the dependent variable. Where numerical wage data were available, OLS regressions were estimated separately by country using the logarithm of the minimum wage value as the dependent variable. Text Mining Procedures

Text-mining analyses included:

- Keyword-based indicator construction
- Skill co-occurrence matrices
- TF–IDF representations
- NMF-based topic modelling

Robustness Checks

The following robustness analyses were conducted:

- Country-specific regression models
- Alternative dependent variable definitions
- Subsample analyses (HU + RO)
- Controls for seniority and sector

Research Limitations

Several limitations must be acknowledged. First, due to the country = platform correspondence, platform and country effects cannot be fully disentangled. Second, the digital skill indicator aggregates heterogeneous competences. Third, wage data formats differ across countries. Finally, location data are incomplete in the Slovak dataset.

RESULTS

Wage Transparency and Wage Posting

Wage transparency was measured using a binary wage posting indicator (salary_posted = 1 if a wage or wage range was specified in the advertisement; 0 if not). The explanatory variables were derived from standardised features extracted from the job titles and textual descriptions of the advertisements: sector (Hotel / F&B / Travel services / Other), senior or managerial character (presence of managerial keywords), language requirements (English, German), and the mention of benefits.

The frequency of wage disclosure varied substantially across the three countries.

Table 1. Wage posting ratios by country (Wilson 95% CI), own analysis

Country	N	Wage posted (n)	Ratio (%)	95% CI
HU	387	220	56.8	[51.9–61.7]
SK	850	800	94.1	[92.3–95.5]
RO	314	314	100.0	[97.6–100.0]

The differences are statistically significant ($\chi^2(2) = 313.66$, $p < 0.001$), indicating that the propensity to disclose wages differs systematically across the three countries and is unlikely to be the result of random variation. Instead, structural or platform-level differences may underlie these patterns. As shown in Table 1, only approximately half of tourism job advertisements in Hungary contain wage information, whereas wage disclosure is nearly universal in Slovakia and appears in all advertisements within the Romanian sample. This alone provides a strong indication that the institutional, market, or platform-regulatory environments of wage transparency differ substantially across countries.

In the explanatory model, the Romanian sample was excluded because the wage posting rate was 100%, which would lead to perfect separation (i.e. the dependent variable does not vary). Consequently, predictor effects were estimated using the pooled HU–SK sample (N = 1,237), with a country dummy variable included. The estimation was conducted using logistic regression with heteroskedasticity-robust (HC1) standard errors.

Table 2. Logistic regression results (dependent variable: salary_posted, HU–SK; OR = odds ratio) , own analysis
Model fit: Pseudo $R^2 = 0.234$; N = 1,237

Variable	**OR**	**95% CI**	**p**
Slovakia (ref: Hungary)	10.788	[6.996–16.634]	<0.001
Sector: Hotel (ref: Other)	0.912	[0.616–1.352]	0.647
Sector: F&B (ref: Other)	0.881	[0.571–1.359]	0.567
Sector: Travel services (ref: Other)	1.266	[0.384–4.170]	0.698
Senior/managerial keywords (1 = yes)	0.340	[0.235–0.493]	<0.001
English language requirement (1 = yes)	0.869	[0.617–1.223]	0.419
German language requirement (1 = yes)	1.024	[0.534–1.960]	0.944
Mention of benefits (1 = yes)	1.007	[0.672–1.511]	0.972

The results reported in Table 2 indicate a strong country/platform effect: the odds of wage disclosure in Slovak advertisements are approximately 10.8 times higher than in Hungarian advertisements (OR = 10.788, $p < 0.001$). This finding is consistent with the descriptive ratios and suggests that wage disclosure practices are largely shaped by country-specific or platform-related regulatory and social norms. Another notable finding concerns lower wage transparency in senior or managerial positions. In advertisements containing managerial keywords, the odds of wage posting are approximately 66% lower (OR = 0.340, $p < 0.001$). In practical terms, this indicates that higher-status or

more complex roles are more likely to omit explicit wage information. Regarding sector effects in the pooled HU–SK model, the Hotel and F&B sector dummies are not statistically significant. This suggests that sector-level variation is largely absorbed by the country/platform effect or that sectoral composition differs across countries.

Language requirements do not exhibit a stable or statistically significant relationship with wage posting in the pooled model. However, this aggregated result may obscure country-specific patterns, which motivated additional robustness checks through within-country models. Because platform = country (i.e. one platform per country), the "pure" platform effect cannot be separated from the country effect. To address this limitation, robustness checks were conducted using separate logistic regressions for each country, as presented in Tables 3a and 3b.

Table 3a. Within-country model for Hungary (OR), own analysis

Variable	OR	95% CI	p
Hotel (ref: Other)	0.373	[0.188–0.739]	0.005
F&B (ref: Other)	0.460	[0.258–0.820]	0.009
Senior/managerial	0.262	[0.150–0.459]	<0.001
English requirement	0.474	[0.281–0.800]	0.005
Mention of benefits	1.199	[0.750–1.918]	0.448

Table 3b. Within-country model for Slovakia (OR), own analysis

Variable	OR	95% CI	p
Hotel (ref: Other)	12.681	[2.936–54.779]	<0.001
F&B (ref: Other)	5.782	[1.363–24.535]	0.017
Senior/managerial	2.504	[0.328–19.098]	0.376
English requirement	5.050	[1.948–13.089]	<0.001
Mention of benefits	0.235	[0.103–0.538]	<0.001

In Hungary, wage disclosure is significantly less frequent in hotel and F&B advertisements compared with the "other" category. Wage transparency is also particularly low in managerial positions and in advertisements requiring English language skills. This suggests that, in the Hungarian sample, hotel and F&B advertisements may contain a relatively large proportion of locally embedded, operational, and negotiation-based positions, where remuneration is more often communicated during the recruitment process rather than explicitly stated in the advertisement. By contrast, the "other" category includes more administrative, sales, marketing, support, and mixed professional roles, where formalised job advertisement practices may be more common. In Slovakia, wage disclosure is generally very high, and differences mainly appear in the relatively small number of cases where wages are nevertheless omitted. Wage posting is particularly strong in the hotel and F&B categories, while the mention of benefits is associated with a lower probability of wage disclosure. This pattern suggests that the Slovak platform context is characterised by a stronger general norm of salary disclosure. Under such conditions, standardised operational sectors such as hotel and F&B may display particularly high wage transparency, most likely because these positions are advertised through more structured and standardised templates.

The opposite direction of the sectoral effects in Hungary and Slovakia should therefore not be interpreted as a contradiction, but as evidence that sectoral effects are conditioned by country- and platform-specific wage disclosure practices. In the Hungarian case, hotel and F&B jobs appear more closely associated with informal or negotiation-based wage communication, while in the Slovak case the same operational sectors are embedded in a platform environment where explicit wage posting is much more strongly institutionalised. This supports the broader argument of the study that wage transparency in tourism job advertisements is shaped not only by occupational category, but also by the interaction between sectoral structure, organisational standardisation, and platform-level norms.

The analysis demonstrates substantial cross-country variation in wage disclosure: HU 56.8%, SK 94.1%, RO 100% ($p < 0.001$). The magnitude of these differences strongly suggests country- or platform-level influences.

In the pooled HU–SK model, the most consistent predictors of wage disclosure are:

(a) country (SK >> HU) and (b) managerial character (negative relationship).

Sector, language requirements, and benefits do not show stable effects in the pooled model. However, the country-specific robustness models indicate that both the direction and magnitude of predictor effects vary by country, which is consistent with the significant role of platform governance and institutional context in shaping wage disclosure practices.

Tourism Employment Structure: Cross-Country Differences in the Supply Structure

To analyse the structural composition of tourism job advertisements, a two-stage classification procedure was applied.

(1) Manual Coding: A randomly selected, proportionally weighted subsample by country (N = 360) was subjected to manual content analysis. Advertisements were classified into four main categories:

1. Hotel & Accommodation (hotel staff, reception, housekeeping, front office, etc.)
2. Food & Beverage (F&B) (restaurants, cafés, chefs, waiters, bartenders, etc.)
3. Tourism Services / Travel (travel agencies, tour guiding, tour operators, ticketing services, etc.)
4. Other / Support (administration, sales, marketing, maintenance, and other support functions)

Based on the manual coding, a label dictionary and keyword list (including Hungarian, Romanian, and Slovak variants) was constructed and applied to the full dataset.

(2) Automated Classification: The categorisation was validated across the full dataset (N = 1,394) using multinomial logistic regression with text-based features. Model fit was satisfactory (McFadden pseudo $R^2 = 0.41$), indicating that the textual fields effectively discriminate between sectoral categories.

The following results are based on the standardised and validated classification. The cross-country differences in sectoral distribution presented in Table 4 are statistically significant ($\chi^2(6) = 146.21$, $p < 0.001$).

Table 4. Distribution of tourism job advertisements by sector (%), own analysis

Country	Hotel	F&B	Tourism services	Other	N
HU	24.5	49.6	6.2	19.7	387
SK	38.7	32.5	8.1	20.7	850
RO	52.9	18.5	17.2	11.4	314

Table 5. HHI index, own analysis

Country	HHI
HU	0.37
SK	0.29
RO	0.36

Table 6. Share of managerial positions (%), own analysis

Country	Managerial (%)
HU	18.1
SK	12.7
RO	21.7

In the Hungarian sample, nearly half of tourism job advertisements (49.6%) correspond to food and beverage positions, while traditional hotel jobs account for 24.5%. This suggests that the online representation of the tourism labour market is strongly hospitality-centred. In the Slovak sample, the shares of hotel (38.7%) and F&B (32.5%) positions are relatively similar, indicating a less concentrated structure around a single sub-sector and suggesting a more diversified tourism labour demand. In the Romanian sample, hotel and accommodation positions dominate (52.9%), accompanied by a relatively high share of tourism services/travel positions (17.2%), which is substantially higher than in the other two countries. This may indicate a stronger presence of the more institutionalised and organised segments of tourism in the online labour market.

To measure structural concentration, the Herfindahl–Hirschman Index (HHI) was calculated at the sectoral level.

The results indicate that the Slovak sample exhibits the most diversified structure (lowest HHI value). In contrast, the Hungarian and Romanian samples are closer to a more concentrated structure, with a stronger dominance of particular sub-sectors. This suggests that tourism labour demand in Slovakia is relatively balanced across sectors, whereas in Hungary and Romania one sector tends to dominate the online job market representation.To examine labour market polarisation, advertisements were classified into two broad groups based on seniority-related keywords:

- Entry / operational positions
- Managerial / senior positions

The differences reported in Table 6 are moderately significant ($p = 0.041$). Romania and Hungary exhibit a higher proportion of managerial positions, whereas Slovakia is characterised more strongly by operational or entry-level job postings. This suggests that the Slovak online tourism labour demand is more heavily oriented towards lower- and mid-level positions, while the Romanian sample contains a relatively higher proportion of management roles. Subsequently, a multinomial logit model was estimated, with the sector category as the dependent variable and country as the main explanatory variable (with seniority as a control variable). The results indicate that. In the Hungarian sample, the probability of belonging to the F&B category is significantly higher (OR = 2.41, $p < 0.001$). In the Romanian sample, the probability of belonging to the Hotel category (OR = 2.87, $p < 0.001$) and Tourism services (OR = 3.12, $p < 0.001$) is significantly higher.

Relative to these patterns, Slovakia displays a more balanced sectoral structure. The findings demonstrate that the structure of tourism labour demand differs significantly across countries. In Hungary, the hospitality sector dominates; in Romania, hotel and travel services sectors are more prominent; while Slovakia exhibits a more balanced structure. At the same time, a moderate degree of polarisation can be observed. Operational positions dominate in Slovakia, whereas Romania and Hungary show a somewhat higher proportion of managerial roles. However, none of the countries display extreme or "U-shaped" labour market polarisation; rather, the results reflect structural shifts in emphasis across tourism sub-sectors.

Skill Demand and "Digitalisation" in the Tourism Labour Market

Skill demand was examined using a corpus constructed by combining the job title + description + requirements + additional textual fields of the advertisements (N = 1,551; HU = 387, SK = 850, RO = 314). The texts were converted to lowercase, stripped of diacritics, and binary indicators were created using a multilingual keyword dictionary.

Digital skill indicators were constructed across the following subgroups:

1. Office software (e.g. Excel, MS Office)
2. Tourism/operational systems (e.g. PMS/Opera, GDS – Amadeus/Galileo/Sabre, Booking/channel manager)
3. POS / cash register systems
4. Online marketing (SEO/Ads, social media)

For language requirements, separate indicators were created for English (lang_en) and German (lang_de), while the soft skill indicator (soft_any) was based on keywords related to customer orientation, communication, reliability, and flexibility.

The "digital skill premium" was examined in two ways:

1. Probability of wage disclosure (salary_posted2) – estimated using logistic regression
2. Reported wage level (log-salary) – estimated using within-country OLS models

In this section, a stricter definition of wage disclosure was applied (salary_posted2 = 1), meaning that an advertisement was considered wage-transparent only if the field contained an actual numerical wage value. This definition is more suitable for wage-level modelling, although it differs from the earlier coding approach. The mention of digital skills differs significantly across countries (χ^2, $p < 0.001$). The aggregated digital skill indicator (digital_any) is presented in Table 7.

Table 7. Occurrence of skill indicators by country (%), own analysis

Country	Digital_any	Excel	MS Office	PMS/Opera	GDS	POS/cash register	Ads/SEO	Soft_any	N
HU	33.3	4.4	6.7	3.1	0.5	14.7	7.2	62.3	387
RO	22.9	7.0	8.9	3.8	3.8	1.3	0.0	83.4	314
SK	7.6	5.8	6.2	0.4	0.2	0.1	0.0	63.4	850

In Hungary, digital keywords appear relatively frequently, particularly due to the presence of POS/cash register systems (14.7%) and Ads/SEO-related elements (7.2%). This is consistent with the fact that a substantial proportion of advertisements correspond to operational F&B positions, where POS systems frequently appear as explicit requirements.

In Romania, digital office skills (Excel/MS Office) and tourism-system-specific competences (PMS/GDS) occur relatively more often, which is consistent with the stronger representation of hotel and travel-service structures.

In Slovakia, the explicit mention of digital skills is lower. A possible explanation is that, in addition to language and formatting characteristics of the platform's structured fields (job description/competences), part of the advertisements are shorter and less oriented towards explicit skill listing; however, this should be treated as a corpus-related limitation.

Among language requirements, the mention of English differs strongly across countries (χ^2, $p < 0.001$), while German also shows a smaller but statistically significant difference (χ^2, $p = 0.0058$), as shown in Table 8.

Table 8. Occurrence of language requirements by country (%), own analysis

Country	English (lang_en)	German (lang_de)	N
HU	39.3	2.6	387
RO	43.9	0.6	314
SK	9.6	5.3	850

The Hungarian and Romanian samples display a particularly high prevalence of English language requirements, which may reflect the importance of guest communication and international clientele. As an additional check for Hungary, the county-level distribution of English and German language requirements in tourism job advertisements was compared with official county-level tourism statistics. The analysis used the 2024 number of international tourism nights in hotels reported by the Hungarian Central Statistical Office as an indicator of international tourism exposure. The results indicate that foreign-language requirements are spatially uneven and are positively associated with the internationalisation of local tourism demand. The association is particularly visible when English and German requirements are considered jointly (Spearman's $\rho = 0.613$, $p = 0.007$), while the relationship is weaker and not statistically significant for English alone ($\rho = 0.338$, $p = 0.170$). This suggests that language requirements in Hungarian tourism job advertisements are influenced not only by occupational characteristics, but also by the international tourism profile of the given county.

The result should nevertheless be interpreted cautiously due to the limited number of territorial units and the uneven spatial distribution of job advertisements. In the Slovak sample, English appears explicitly less often, while German is relatively more frequent. This pattern was compared with official inbound tourism data for Slovakia. According to the OECD Tourism Trends and Policies 2024 country profile, Slovakia's leading inbound markets in 2023 were Czechia (34%), Poland (13%) and Germany (7%). This visitor composition, dominated by neighbouring and Central European source markets, is consistent with the relatively stronger presence of German language requirements in Slovak tourism job advertisements. However, the interpretation should remain cautious, as language requirements are also shaped by occupational structure, employer practices and cross-border labour market relations.

Subsequently, skill co-occurrence was examined. Co-occurrence was measured through pairwise combinations of binary indicators within each advertisement. The most frequent pairs by country are shown below.

HU (most frequent pairs)
- Excel × MS Office (n = 14)
- MS Office × English (n = 14)
- PMS/Opera × English (n = 12)
- English × German (n = 9)
- Ads/SEO × English (n = 7)

SK (most frequent pairs)
- Excel × MS Office (n = 42)
- MS Office × English (n = 12)
- Excel × English (n = 10)
- English × German (n = 9)

RO (most frequent pairs)
- Excel × MS Office (n = 14)
- MS Office × English (n = 12)
- PMS/Opera × English (n = 9)
- GDS × English (n = 7)

Across all three countries, an "office digital + language" cluster emerges (Excel/MS Office + English), typically associated with front office, administrative, sales, or travel-related positions. In the Romanian sample, the co-occurrence of GDS/PMS + English suggests a competence package linked to more professionalised travel and hotel systems.

The relationship between digital skills and wage disclosure was examined using the stricter wage disclosure definition (salary_posted2 = numerical wage value present) through logistic regression, as shown in Table 9 (N = 1,551; country dummies; robust HC1 standard errors). The mention of digital skills is associated with more than double the odds of numerical wage disclosure (OR ≈ 2.11). This indicates that more specifically detailed advertisements - those explicitly listing competencies - also tend to be more transparent about wage information. Language requirements (Lang_any) and especially managerial status (Senior_flag) decrease the likelihood of wage disclosure, which aligns with the common practice that higher-status or negotiation-driven roles more often leave wage details undisclosed. The negative sign of the Romanian dummy signifies that on the Romanian platform, the salary field frequently contains non-informative entries (e.g., placeholders), so under the stricter criterion of numerical wage disclosure, measured wage transparency is reduced.

Table 9. Logit model – salary_posted2 (OR, 95% CI), own analysis

Variable	OR	95% CI	p
SK (vs HU)	13.39	[9.37–19.12]	<0.001
RO (vs HU)	0.48	[0.31–0.74]	0.001
Digital_any	2.11	[1.46–3.04]	<0.001
Lang_any	0.42	[0.31–0.58]	<0.001
Soft_any	2.20	[1.54–3.12]	<0.001
Senior_flag	0.19	[0.11–0.33]	<0.001

At this point in the analysis, the question emerged whether digital requirements are linked to wage levels. Wage levels were analysed within countries, with log(sal_min) as the dependent variable. Models were estimated with robust (HC1) standard errors, and wage data were filtered by type of unit.

Hungary – hourly wage (HUF/hour; N = 114; range: 800–6,000 HUF/hour)

- Effect of Digital_any: −3.2% ($p < 0.001$)

Hungary – monthly wage (HUF/month; N = 92; range: 150,000–2,000,000 HUF/month)

- Effect of Digital_any: −9.5% (not significant, $p = 0.130$)
- Effect of Senior_flag: +20.9% (marginal, $p = 0.073$)

Slovakia – monthly wage (EUR/month; N = 614; range: 300–10,000 EUR/month)

- Effect of Digital_any: −10.1% ($p = 0.017$)
- Effect of Senior_flag: +32.0% ($p < 0.001$)

In this sample, the relationship between digital skills and wage levels does not appear as a positive premium, but rather as a form of negative selection: digital keywords - particularly operational systems such as POS - are frequently associated with operational occupations characterised by lower wage levels. By contrast, managerial or senior status is consistently associated with higher wages. Consequently, the "digital premium" is not automatic: its direction is strongly influenced by the type of digital skill involved (operational systems versus analytical/managerial digital competences) and by job level. This finding justifies further refinement of the digital skill taxonomy (e.g. distinguishing "operational digital" from "managerial/analytical digital"). Subsequently, a TF–IDF representation was generated from the advertisement texts, followed by NMF-based topic modelling (6 components). Although topics were strongly organised around language-specific tokens, dominant thematic blocks were clearly distinguishable:

- HU: operational positions (part-time/hourly/student work) + English-linked service jobs
- SK: qualification and educational requirements + position-specific descriptions
- RO: "turism / experienta / echipa"-type competence and team-focused narratives, often in large urban contexts (e.g. Bucharest)

Topic modelling confirms that the three countries differ in advertisement style and in the "language" of skill communication: Hungary places stronger emphasis on operational aspects and work schedule/wage format; Romania uses a strong soft-skill and experience narrative; Slovakia highlights more formalised qualification markers. Digital skill mentions are most frequent in the Hungarian sample (particularly POS and online marketing elements), while Romania shows stronger PMS/GDS-related patterns. In Slovakia, digital skills appear explicitly less frequently. Soft skills occur at high rates in all three countries. Digital skills significantly increase the likelihood of numerical wage disclosure (OR ≈ 2.11), yet in wage-level models, their effect does not manifest as a positive premium and, in several cases, appears as a negative association. This may be due to digital requirements often being linked to operational roles. English language requirements are high in the Hungarian and Romanian samples (above approximately 40%), while they are substantially lower in Slovakia (around 10%). By contrast, German appears relatively more frequently in Slovakia than in Hungary or Romania.

Spatial Concentration in the Tourism Labour Market

To examine spatial concentration, the location fields of the advertisements were standardised. In the Hungarian sample, county-level identification was conducted based on the address field. In the Romanian sample, location fields frequently contained multiple cities; in such cases, the advertisement was classified as multi-location. In Slovakia, location data were largely incomplete, and therefore spatial analysis was conducted only for the Hungarian and Romanian samples.

As shown in Table 10, two indicators were applied to measure spatial concentration:

1. Herfindahl–Hirschman Index (HHI) – concentration of the territorial distribution of advertisements (range 0–1)
2. Gini coefficient – inequality in the distribution of advertisements across territorial units

Table 10. Spatial concentration indicators, own analysis

Country	HHI	Gini	N
HU	0.128	0.521	387
RO	0.306	0.709	314

Table 11. Share of capital-city advertisements, own analysis

Country	Capital share (%)	Non-capital (%)
HU	30.2	69.8
RO	57.3	42.7

Table 12. Share of multi-location advertisements, own analysis

Country	Multi-location (%)
HU	9.8
RO	22.9

In addition, the proportion of capital-city versus non-capital advertisements and the share of multi-location advertisements were examined. In Romania, both the HHI (0.306) and Gini coefficient (0.709) indicate a strongly

concentrated spatial structure. The majority of advertisements are associated with a limited number of key cities, primarily the capital and major tourism centres. In Hungary, concentration is lower (HHI = 0.128), although the Gini value above 0.52 still indicates substantial inequality. This suggests that while multiple counties participate in the online representation of tourism labour demand, advertisements remain heavily concentrated in a limited number of central locations.

Thus, the Romanian online tourism labour market appears more strongly centralised, whereas Hungary shows relatively broader territorial coverage, albeit still characterised by centre dominance. As shown in Table 11, more than half of Romanian advertisements are associated with the capital city (Bucharest), indicating a strong centralisation of the tourism labour market. In Hungary, the capital accounts for approximately 30% of advertisements, suggesting that a considerable portion of tourism job postings relate to non-capital destinations, including the Balaton region, spa towns, and county seats. This difference reflects broader spatial variations in tourism structure: in Romania, the concentration in metropolitan and capital cities is more prominent within the online labour market representation. Multi-location advertisements were identified where more than one city or region appeared within a single advertisement, as shown in Table 12.

The proportion of multi-location advertisements in Romania is more than twice the Hungarian value. This may indicate the presence of nationwide chains or hotel networks, demand for geographically mobile labour, or centralised HR structures (with one advertisement covering multiple sites). In Hungary, tourism job advertisements are more closely tied to individual destinations and local labour demand. Overall, the results suggest that the online representation of tourism labour demand is highly centralised in Romania (HHI = 0.306; Gini = 0.709), whereas Hungary shows a more moderate concentration (HHI = 0.128; Gini = 0.521), though centre dominance remains clear.

The higher share of multi-location advertisements in Romania (22.9%) might imply a more networked national structure and greater geographical mobility needs, while in Hungary, local, destination-specific labour demand seems to be more prevalent. Overall, the spatial and skill-structure analyses indicate that Hungary's market operates primarily within the hospitality sector, relies heavily on digital operational skills, and covers a broader territory.

Romania's market is focused on hotels and travel, is strongly centring on major hubs, and exhibits network-based recruitment patterns. The Slovak market (to be interpreted cautiously due to missing spatial data) appears more balanced structurally, although clear digital skill requirements are less common.

Integrated Model

Building on the previous subchapters, the following question emerged: what explains numerical wage disclosure in tourism job advertisements? To address this, the model objective and variables were first identified. Wage transparency was examined in an integrated manner, with the dependent variable defined as numerical wage disclosure:

- salary_posted_num = 1 if the salary field contained actual numerical values (e.g. "1,300 EUR/month", "3300–3500 RON", "gross HUF 5.5 million annual salary")
- salary_posted_num = 0 if the wage was missing or non-numerical (e.g. "Not specified")

The explanatory variables were integrated from the previous analyses:

- country/platform (HU, SK, RO)
- sector (Other [ref.], Hotel, F&B, Travel) – title + text-based classification
- senior_flag (managerial/senior keywords)
- lang_en, lang_de (English/German requirements)
- digital_any (any of Excel / MS Office / PMS / GDS / POS / Ads-SEO)
- soft_any (soft-skill-related keywords)
- benefits_any (benefits/employer-offer signals)
- capital_flag (capital-city location)
- multi_location (multiple locations specified)

A binomial GLM (logit link) was estimated with HC1 robust standard errors on the full sample (N = 1,394). Model fit: McFadden pseudo $R^2 = 0.343$. (Reference: HU; sector reference: Other)

Table 13. Integrated logit model – probability of numerical wage disclosure (OR, 95% CI), own analysis

Predictor	OR	95% CI	p
SK (vs HU)	11.281	[6.707–18.975]	<0.001
RO (vs HU)	0.330	[0.192–0.568]	<0.001
Hotel (vs Other)	1.845	[1.145–2.971]	0.012
F&B (vs Other)	2.016	[1.274–3.190]	0.003
Travel (vs Other)	1.092	[0.623–1.914]	0.759
Senior/managerial character	0.184	[0.114–0.297]	<0.001
English requirement	0.366	[0.233–0.576]	<0.001
German requirement	1.022	[0.317–3.298]	0.971
Digital_any	0.792	[0.512–1.223]	0.293
Soft_any	0.833	[0.532–1.303]	0.423
Benefits_any	0.761	[0.496–1.168]	0.211
Capital city (capital_flag)	0.841	[0.557–1.270]	0.410
Multi-location	2.922	[1.771–4.821]	<0.001

As shown in Table 13, a strong country/platform effect persists even after full control. After accounting for sectoral, skill-related, linguistic, and spatial characteristics, the model still indicates significant differences: in Slovak advertisements, the odds of numerical wage disclosure are about 11 times higher than in Hungarian advertisements (OR = 11.28), whereas in Romanian advertisements the odds are considerably lower (OR = 0.33). This aligns with the earlier finding that on the Romanian platform, the salary field often contains non-substantive entries rather than actual wage amounts, implying that under the stricter criterion of numerical wage disclosure, effective transparency is lower. In managerial advertisements, the odds of numerical wage disclosure are roughly 82% lower (OR = 0.184, $p < 0.001$). This robustly confirms the pattern identified earlier: higher-status, negotiation-focused positions are more likely to leave salary unspecified.

After controlling for sector, Hotel (OR = 1.85) and F&B (OR = 2.02) categories are linked with higher odds of numerical wage disclosure, while the Travel category does not show a significant difference. This suggests that in traditional operational tourism roles, wage communication is more often standardised, whereas the Other category (support/mixed roles) exhibits more varied practices. The presence of an English requirement is independently associated with lower numerical wage disclosure (OR = 0.366, $p < 0.001$). This may indicate that English-requiring positions often involve greater responsibility or complexity (e.g., front office, sales, travel services), where salaries are more frequently negotiable. Advertisements listing multiple locations have nearly three times higher odds of numerical wage disclosure (OR = 2.92, $p < 0.001$).

This suggests that multi-location advertisements are often linked with network-based operations (chains), standardised HR procedures, and unified wage communication. Digital, soft skill, and benefit signals: No stable effects are observed in the integrated model. The mention of digital skills, soft skills, and benefits does not show a consistent statistically significant relationship with numerical wage disclosure in this model. A probable explanation is that these signals are highly country- and sector-dependent, while the digital_any variable combines both operational digital skills (e.g., POS systems) and higher-level system competences (e.g., PMS/GDS), which may counterbalance each other in the overall effect.

Robustness Checks

Because the Slovak sample creates a partly near-separated situation due to its very high wage disclosure rate, the model was also estimated on a HU + RO subsample (N = 701).

The main effects remained stable:

- RO (vs HU): OR = 0.369, $p < 0.001$
- senior_flag: OR = 0.110, $p < 0.001$
- lang_en: OR = 0.427, $p < 0.001$
- multi_location: OR = 2.963, $p < 0.001$
- digital_any: OR = 0.524, $p = 0.032$

These results suggest that the effects of managerial character, English requirement, and multi-location are not solely influenced by Slovak dominance. If wage transparency is defined more loosely (salary_filled: salary field non-empty), the overall results remain largely unchanged (e.g., senior and English negative, Hotel/F&B positive, multi-location positive). However, in the Romanian sample, perfect separation occurs because the salary field is always formally filled, even though it often lacks meaningful wage data. For this reason, the numerical wage definition is more methodologically useful for capturing genuine transparency. Since country = platform (HU = Profession, RO = eJobs, SK = Profesia), country effects and platform-regulatory effects cannot be entirely disentangled. Consequently, the results should be understood as reflecting differences in the country/platform context.

DISCUSSION

This study set out to examine how tourism labour markets are represented in online job advertisements across Hungary, Romania, and Slovakia, with particular attention to wage transparency, occupational structure, skill demand, and spatial concentration. By integrating sectoral, skill-based, and territorial variables into a unified modelling framework, the analysis reveals that online tourism labour markets are structured not only by human capital requirements but also by organizational standardization, negotiation logic, and platform–institutional context.

Three core findings stand out. First, wage transparency varies significantly across country–platform contexts, even after accounting for sector, seniority, skills, and location. Second, seniority and language requirements consistently decrease the likelihood of numerical wage disclosure, indicating that negotiation-based compensation systems remain prevalent in higher-status or more complex roles. Third, digital skills do not automatically result in wage premiums, suggesting that the digitalisation in tourism is diverse and often operational rather than strategic.

These findings provide empirical support for the four hypotheses (H1–H4) outlined above and contribute to the literature on tourism labour markets, digitalisation, and platform-mediated employment. The integrated model shows that the country–platform context remains the strongest predictor of numerical wage disclosure. Even after controlling for structural and skill-related factors, Slovak job advertisements display considerably higher wage transparency than Hungarian ones, while Romanian postings exhibit lower numerical wage disclosure under the stricter definition.

This supports the broader view that wage transparency is not solely determined by occupational traits but is deeply rooted in institutional norms and platform governance structures. Since each country in the sample aligns with a specific platform (Profession.hu, eJobs.ro, Profesia.sk), it is not possible to separate national regulation from platform-level design and posting norms. However, the sustained strong country effects imply that online tourism labour markets are influenced by contextual factors beyond firm-level traits. These findings affirm H1: organisations with multi-location

postings are significantly more likely to disclose wages transparently. Such postings are almost three times more likely to reveal numerical wages. This pattern suggests that organisations operating in multiple locations tend to adopt more formalised HR protocols, including predefined salary bands and structured communication practices. Rather than being more secretive, larger or networked organisations appear more standardised and thus more transparent.

This challenges the simplistic assumption that bigger employers rely more on personalised negotiations. Instead, organisational formalisation seems to promote wage transparency in tourism labour markets. Across all models, senior or managerial roles are significantly less likely to disclose numerical wages.

This consistent finding supports H2, which argued that higher-status roles are structurally less transparent in wage communication. This aligns with a negotiation-based view of compensation: senior roles often entail greater discretion, candidate-specific evaluation, and individual bargaining. Employers may avoid publishing fixed salary figures to maintain flexibility. Notably, this pattern remains significant after controlling for country, sector, language requirements, digital skills, and location. It indicates that the opacity of senior roles is a structural feature of tourism labour markets, rather than merely a consequence of national regulation. From a theoretical standpoint, this supports segmentation theories in labour economics, where upper-tier roles typically involve differentiated pay systems and individualised bargaining processes. One of the less intuitive findings concerns the role of language requirements.

Expectations for English-language skills significantly decrease the likelihood of disclosing wages numerically, even after controlling for other factors. This supports H3, which proposed that language requirements serve as a signal of negotiation-oriented roles rather than as straightforward indicators of higher wage levels.

Contrary to traditional human capital theory, where foreign language proficiency is often associated with wage premiums, the present results suggest that in tourism, language requirements may instead indicate:

• greater job complexity,

• customer-facing or international responsibilities,

• more variable compensation structures.

Rather than acting as a premium-generating skill within a standardised pay system, English appears to be embedded in roles where compensation is more personalised and therefore less transparently communicated.

This nuance advances tourism labour market research by demonstrating that skill signals and wage transparency do not necessarily move in the same direction. Perhaps the most conceptually significant result relates to digitalisation. While digital skills increase the likelihood of wage disclosure in some model specifications, they do not consistently produce a wage premium in the salary-level models. In some cases, digital skill indicators are even negatively associated with wage levels. This supports H4, which proposed that digital skills do not automatically yield wage premiums in tourism. The explanation lies in the heterogeneity of digital competencies:

• Operational digital skills (e.g., POS systems, booking software) are often linked to entry-level or operational roles.

• Managerial or analytical digital skills are less clearly identifiable in job advertisements and may not be captured by keyword-based indicators.

Hence, the “digital premium” in tourism is conditional rather than universal. Digitalisation in tourism frequently reflects standardised system usage rather than high-value analytical expertise, especially in operational environments such as F&B or front office positions. This finding challenges technology-driven narratives that assume digitalisation uniformly enhances workers' bargaining power and wage levels. Instead, the tourism sector appears to exhibit functional digitalisation without systematic wage augmentation. Sectoral composition also plays a role. Hotel and F&B positions are more likely to disclose wages than “Other” categories. Combined with the multi-location effect, this suggests that standardised, operationally intensive segments of tourism are more transparent in wage communication.

This may reflect clearer occupational role definitions, more homogeneous skill requirements, standardised pay scales, and higher turnover rates that necessitate competitive recruiting practices. By contrast, support or mixed roles may involve greater heterogeneity in responsibilities and pay, leading to less transparent wage communication.

The territorial analysis revealed significant concentration patterns, especially in Romania, where job advertisements are strongly capital-centric. Hungary shows a broader regional distribution but still exhibits centre-dominance.

Spatial concentration conceptually interacts with wage transparency and organisational standardisation:

• Capital-centred labour markets may facilitate negotiation-based recruitment for higher-status roles.

• Multi-location postings - more common in centralised systems - correlate with higher wage transparency.

This suggests geographical centralisation and organisational formalisation jointly influence online labour market transparency. The findings collectively imply that tourism labour markets on digital platforms are shaped by three interrelated mechanisms:

1. Institutional/platform context (country-level differences),

2. Organisational standardisation (multi-location, sector),

3. Negotiation logic (seniority, language requirements).

These mechanisms operate simultaneously and cannot be simplified to human capital models. Rather than a straightforward correlation between skill level and wage transparency, the study indicates a more complex structure where transparency is higher in standardised operational contexts and lower in negotiation-heavy roles. This advances tourism labour research by:

• Expanding understanding of wage communication practices,

• Highlighting platform governance importance,

• Showing that digitalisation does not uniformly produce wage premiums,

• Incorporating spatial concentration into online labour market analysis.

From a policy perspective, the notable country–platform effects suggest that regulatory frameworks and platform design play a key role in shaping transparency practices. Standardised disclosure requirements could reduce structural opacity in senior roles. For employers, the results indicate that transparent wage communication correlates with standardised, multi-location operations. Firms aiming to boost employer branding and recruitment efficiency may benefit from clearer wage disclosure practices. For job seekers, the findings suggest that opacity in senior or language-specific roles might not indicate higher wages but rather individualised bargaining contexts.

Several limitations must be acknowledged, such as the difficulty in fully disentangling country and platform effects; skill indicators based on keyword extraction may not capture implicit competencies; salary data varies in format and completeness across countries; and the spatial analysis for Slovakia was limited due to missing location data.

CONCLUSION

This study aims to examine how tourism labour markets are portrayed in online job advertisements across Hungary, Romania, and Slovakia, with particular focus on wage transparency, occupational structure, skill demand, and spatial distribution. Overall, the findings indicate that wage transparency in tourism online labour markets is not solely determined by occupational skill levels. Instead, it is shaped by organisational formalisation, negotiation processes, and platform–institutional contexts. The tourism sector, often viewed as low-skilled or operational, displays complex stratification patterns in its digital labour market portrayal. Transparency is usually highest for standardised and operational roles; it remains limited where negotiation dynamics dominate.

This complexity underscores the importance of analysing tourism labour markets through a comprehensive approach that incorporates institutional, organisational, skill-based, and spatial perspectives.

The comparative evidence also highlights marked cross-country contrasts. While virtually all Romanian and Slovak advertisements contained a non-empty salary field, only 56.8% of Hungarian postings did so; under the stricter numerical definition, however, Romanian postings proved less transparent than Hungarian ones, and the strong country–platform effect persisted after controlling for sector, seniority, skills, and location. At the organisational level, multi-location advertisements were almost three times more likely to disclose numerical wages, whereas senior positions and English-language requirements were consistently associated with lower transparency. Digital skills were linked to wage disclosure in some specifications but did not generate a consistent wage premium, indicating that digitalisation in tourism is predominantly operational rather than strategic. Spatially, tourism labour demand proved strongly capital-centric in Romania, while Hungary displayed a more dispersed but still centre-dominated pattern.

From a theoretical perspective, the results suggest that human capital approaches alone are insufficient to explain wage communication in tourism and should be complemented by labour market segmentation, organisational, and platform governance perspectives. In practical terms, clearer and more standardised disclosure rules on job portals and in national regulation could reduce the structural opacity observed in senior and language-intensive roles, while employers may strengthen recruitment efficiency and employer branding by communicating pay ranges more consistently. Future research should combine data from several platforms per country, apply longitudinal designs to capture seasonal dynamics, and use more advanced text-mining and taxonomy-based (e.g. ESCO) methods to identify implicit and higher-level digital competences.

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Abbreviations: AI – artificial intelligence; AR/VR – augmented reality/virtual reality; CI – confidence interval; CRM – customer relationship management; ESCO – European Skills, Competences, Qualifications and Occupations; F&B – food and beverage; GDS – global distribution system; HC1 – heteroskedasticity-consistent standard errors (type 1); HHI – Herfindahl–Hirschman Index; HR – human resources; HU – Hungary; NMF – non-negative matrix factorisation; NUTS – Nomenclature of Territorial Units for Statistics; OLS – ordinary least squares; OR – odds ratio; OTA – online travel agency; PMS – property management system; POS – point of sale; RO – Romania; SEO – search engine optimisation; SK – Slovakia; TF–IDF – term frequency–inverse document frequency.

REFERENCES

Arnold, D., Quach, S., & Taska, B. (2025). *The impact of pay transparency in job postings on the labor market*. National Bureau of Economic Research, Cambridge, MA, USA.

Balgova, M., Tekleselassie, T., Hensel, L., & Witte, M. (2025). Wage information and applicant selection. IZA Discussion Paper No. 18220. IZA – Institute of Labor Economics, Bonn, Germany. https://doi.org/10.2139/ssrn.5684443

Bayurgil, L., Pulignano, V., & Kirchner, S. (2025). Labour Governance of Platforms: Market-Making and Market-Shaping in Delivery and Care Sectors in Belgium. *Work, Employment and Society*, *40*(3), 4819. https://doi.org/10.1177/09500170251404819

Bohlin, M., Brandt, D., & Elbe, J. (2022). Spatial concentration of tourism–a case of urban supremacy. *Tourism Planning & Development*, *19*(5), 392-412. https://doi.org/10.1080/21568316.2020.1855239

Busulwa, R., Pickering, M., & Mao, I. (2022). Digital transformation and hospitality management competencies: Toward an integrative framework. *International Journal of Hospitality Management*, *102*, 103132. https://doi.org/10.1016/j.ijhm.2021.103132

Carlisle, S., Ivanov, S., & Dijkmans, C. (2023). The digital skills divide: evidence from the European tourism industry. *Journal of tourism futures*, *9*(2), 240-266. https://doi.org/10.1108/JTF-07-2020-0114

Derco, J., & Tometzová, D. (2023). Entry-level professional competencies and skills in tourism–The case of Slovakia. *Journal of Hospitality, Leisure, Sport & Tourism Education*, *32*, 100437. https://doi.org/10.1016/j.jhlste.2023.100437

Duka, Z., & Weber, B. S. (2025). The effect of mandatory salary revelations on job postings. *Economics Letters*, *254*, 112423. https://doi.org/10.1016/j.econlet.2025.112423

Giambona, F., Kahlawi, A., Buzzigoli, L., Grassini, L., & Martelli, C. (2024). Skills in online job ads: An analysis of Italian regions. *Socio-Economic Planning Sciences*, *94*, 101916. https://doi.org/10.1016/j.seps.2024.101916

Giousmpasoglou, C. (2024). Working conditions in the hospitality industry: the case for a fair and decent work agenda. *Sustainability*, *16*(19), 8428. https://doi.org/10.3390/su16198428

Gutierrez, C., Obloj, T., & Zenger, T. (2025). Pay transparency and productivity. *Strategic Management Journal*, *46*(8), 1831-1860. https://doi.org/10.1002/smj.3707

Hasanein, A. M., Khairy, H. A., Al-Romeedy, B. S., & Aliane, N. (2026). The role of digital leadership in shaping employees' digital mindset, agility, and adaptive performance in hotel enterprises. *Geojournal of Tourism and Geosites*, *67*(3), 2386-2399. https://doi.org/10.30892/gtg.67349-1861

Hassan, T. H., Hassanin, M. A., Ali, O. M., Ismael, M. A., Saleh, M. I., & Karas, L. M. (2026). Career anxiety among tourism guidance students: Exploring fears of AI-driven technological displacement. *Geojournal of Tourism and Geosites*, *67*(3), 2314-2325. https://doi.org/10.30892/gtg.67343-1855

Heisler, W. (2024). Pay transparency: how much disclosure do employees want? *Business Horizons*, *69*(1), 43-53.

Henn, C. M., Neck, C. B., & Houghton, J. D. (2025). The Pay Information Awareness Questionnaire (PIAQ): A Comprehensive Measure of Pay Transparency. *Compensation & Benefits Review*, *57*(2), 120-139. https://doi.org/10.1177/08863687241304017

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (3rd ed.). John Wiley & Sons, Hoboken, NJ, USA. https://doi.org/10.1002/9781118548387

Kronenberg, K., & Fuchs, M. (2022). The socio-economic impact of regional tourism: an occupation-based modelling perspective from Sweden. *Journal of Sustainable Tourism*, *30*(12), 2785-2805. https://doi.org/10.1080/09669582.2021.1924757

Ladkin, A., Mooney, S., Solnet, D., Baum, T., Robinson, R., & Yan, H. (2023). A review of research into tourism work and employment: Launching the Annals of Tourism Research curated collection on tourism work and employment. *Annals of Tourism Research*, *100*, 103554. https://doi.org/10.1016/j.annals.2023.103554

Marrero-Rodríguez, R., Morini-Marrero, S., & Ramos-Henriquez, J. M. (2020). Tourism jobs in demand: Where the best contracts and high salaries go at online offers. *Tourism Management Perspectives*, *35*, 100721. https://doi.org/10.1016/j.tmp.2020.100721

Mbare, B., Perkiö, M., & Koivusalo, M. (2024). Algorithmic management, wellbeing and platform work: understanding the psychosocial risks and experiences of food couriers in Finland. *Labour and Industry*, *34*(4), 386-411. https://doi.org/10.1080/10301763.2024.2423442

Mourelatos, E., Zervas, P., Zotos, N., Giotopoulos, K. C., & Tzimas, G. (2025). Unpacking the impact of COVID-19 on tourism job demand: a machine learning-driven web scraping analysis in Greece. *Current issues in tourism*, 1-29. https://doi.org/10.1080/13683500.2025.2563790

OECD. (2024). OECD Tourism Trends and Policies 2024. OECD Publishing. https://doi.org/10.1787/80885d8b-en

Panzera, D., Cartone, A., & Postiglione, P. (2022). New evidence on measuring the geographical concentration of economic activities. *Papers in Regional Science*, *101*(1), 59-79. https://doi.org/10.1111/pirs.12644

Samala, N., Katkam, B. S., Bellamkonda, R. S., & Rodriguez, R. V. (2022). Impact of AI and robotics in the tourism sector: a critical insight. *Journal of tourism futures*, *8*(1), 73-87. https://doi.org/10.1108/JTF-07-2019-0065

Stangl, B., Li, Y., Ma, E., Xu, S., & Alsaied, M. (2024). Transferable skills in tourism and hospitality. *Annals of Tourism Research*, *109*, 103854. https://doi.org/10.1016/j.annals.2024.103854

Stylianou, C., & Pericleous, K. (2025). Reviewing the digital skills and readiness of hospitality and tourism graduates: a way of success. *Worldwide Hospitality and Tourism Themes*, *17*(1), 11-21. https://doi.org/10.1108/WHATT-12-2024-0300

Sun, Y.-Y., Li, M., Lenzen, M., Malik, A., & Pomponi, F. (2022). Tourism, job vulnerability and income inequality during the COVID-19 pandemic: A global perspective. *Annals of Tourism Research Empirical Insights*, *3*(1), 100046. https://doi.org/10.1016/j.annale.2022.100046

Tzimas, G., Zotos, N., Mourelatos, E., Giotopoulos, K. C., & Zervas, P. (2024). From data to insight: Transforming online job postings into labor-market intelligence. *Information*, *15*(8), 496. https://doi.org/10.3390/info15080496

Wang, D., & Cheung, C. (2024). Decent work in tourism and hospitality–a systematic literature review, classification, and research recommendations. *International Journal of Contemporary Hospitality Management*, *36*(7), 2194-2213. https://doi.org/10.1108/IJCHM-10-2022-1263

Wood, A. J., & Lehdonvirta, V. (2021). Antagonism beyond employment: how the 'subordinated agency'of labour platforms generates conflict in the remote gig economy. *Socio-Economic Review*, *19*(4), 1369-1396. https://doi.org/10.1093/ser/mwab016

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