

A BUSINESS INTELLIGENCE FRAMEWORK FOR ASSESSING THE IMPACT OF FOREIGN LABOUR ON ENTERPRISE PERFORMANCE

Ljerka Luić¹ – Silvija Drvarek^{1*}

¹Department of Media and Communication, University North, Trg dr. Žarka Dolinara 1, Koprivnica, Croatia

ARTICLE INFO

Article history:

Received: 22. 5. 2026.

Received in revised form: 5. 6. 2026.

Accepted: 14. 7. 2026.

Keywords:

Business Intelligence

Information flows

Analytics

Foreign labour

Enterprise performance

DOI: 10.30765/er.3382

Abstract:

Building on preliminary research for the study A Conceptual Business Intelligence–Driven Tripartite Model for Assessing Foreign Labour Effects in Small Open Economies, which defined key constructs, elements, and outputs of foreign labour markets as a basis for further model integration, this paper presents an integrative conceptual framework for a human resource analytics model, supporting operational, tactical, and strategic decision-making on foreign worker management. The proposed framework establishes a Business Intelligence and Analytics-driven tripartite architecture that integrates microeconomic, organisational, and macroeconomic dimensions across three core constructs: Foreign Workers as the resource input, Business Activity at the organisational level, and Economic Activity at the macroeconomic level. To process these constructs, the underlying system architecture integrates four functional components: data collection, central business intelligence analytics, reporting, and predictive–prescriptive decision support. By routing all information flows through the central BI&A hub, the model ensures semantic consistency, data traceability, and compliance with data governance standards. Ultimately, this framework operationalises empirical insights to deliver interactive dashboards, performance predictions, and prescriptive recommendations, optimizing worker allocation, risk management, strategic planning, and budgeting across all organizational levels in small open economies.

1 Introduction

Managing foreign workers within organisations presents a range of complex operational, tactical, and strategic challenges, particularly with respect to their integration, productivity attainment, and retention. Preliminary research conducted for the study A Conceptual BI–Driven Tripartite Model for Assessing Foreign Labour Effects in Small Open Economies [1] indicated that no sufficiently developed integrated model exists that links data management, Business Intelligence and Analytics (BI&A), reporting, and predictive–prescriptive decision support in human resources (HR) when addressing the employment and management of foreign workers. The combination of predictive and prescriptive analytics, which proactively streamlines decision-making processes and reduces the time lag between anticipated events and managerial action, enables organisations to maximise business value, as demonstrated by Wissuchek and Zschech [2].

Recent research in the fields of information science, human capital management, and business analytics increasingly emphasises the need for modelling information flows and a systematic approach to the analysis of human capital, which is also (im)mediately applicable to the management of the foreign workforce. In the field of information science, Dong demonstrates how the optimisation of information flows in networked

* Corresponding author

E-mail address: sildrvarek@unin.hr

systems enhances knowledge flow and the quality of interaction between participants [3], while Ding et al. [4], through models of information diffusion in networks, show how the structure and dynamics of data flow influence the behaviour and outcomes of the system. In their work, Al Mamary and Alshammari explain how multiple system elements can be integrated into a model that enables a systematic analysis of effects [5]. Guo et al. [6] further emphasise the evolutionary dimension of information and knowledge flows (dissemination) in institutional settings, while Raitviir and Lill [7] develop a conceptual framework for the synchronisation of information flows, highlighting the importance of integrated information models for decision-making. Liu et al. [8] confirm that properly structured information flows influence stability, trust, and cooperation in complex systems. Building on this, the human capital management literature emerges, introducing models that link human capital, business activities, and broader economic outcomes. Becker and Huselid [9] empirically confirm the link between human resources (HR) practices and organisational performance, laying the groundwork for the analytical observation of human resources. Boudreau and Ramstad [10] and Cascio and Boudreau [11] further conceptualise human capital as a measurable investment, emphasising the role of analytics in assessing its contribution to business and economic outcomes. More recent works further integrate information flows and HR analytics; Margherita [12] proposes conceptual models that link HR data, analytical tools, and strategic decision-making. These authors collectively provide the theoretical basis for the development of this research's conceptual model, in which the foreign workforce is viewed as part of the human capital system. Its effects are analysed through integrated information flows at the organisational and macroeconomic level, using business intelligence and analytics.

This paper provides a framework for optimising processes related to the recruitment and integration of foreign workers, planning, policy development, evaluation, and strategic human resource management in the context of small open economies. The proposed conceptual model incorporates data, information, and analytical flows, as well as feedback loops between constructs and elements. The objective of this paper is to develop a modular HR analytics framework that supports evidence-based decision-making at all organisational levels. The contribution of the paper lies in an integrative, conceptual, BI-driven model that links data collection, analytics, reporting, and recommendations for the optimisation of HR processes and risk management within organisations. The paper underscores the potential of BI&A for systematic and informed decision-making and provides a foundation for future empirical validation and further development of a comprehensive conceptual model. In this context, Correa-Peralta et al. emphasize that analytics applies statistical and quantitative methods (descriptive, predictive, and prescriptive) to uncover patterns, generate predictions and optimise business processes [14], supported by empirically grounded interpretation of results. Nonetheless, it would be inadequate to view BI solely as a system for transforming data into information, detached from organisational culture, as Luić et al. [13] argue, culture significantly influences the efficiency, effectiveness, and economy of the processes under consideration, highlighting the critical need to incorporate this context in future research

2 Methodology

The aim of the research was twofold: first, *to develop a conceptual model of business analytics for assessing the impact of the foreign workforce on business activity at the company level and on the national economy*; and second, *to explore the attitudes and experiences of Croatian employers regarding the employment of foreign workers, while identifying the key trends in their integration into the labour market*.

In the context of the insights gained from the reviewed literature and previous research, the research question was posed: *Is there a mismatch between the attitudes and experience of employers in the Republic of Croatia towards foreign workers as stakeholders in the labour market, and their actual impact on business activity, based on business intelligence analytics?* In order to answer the research question, the following hypotheses were formulated:

H1: The foreign workforce has a positive impact on the level and continuity of a company's business activity.

H2: Foreign labour has a positive impact on national economic activity, both directly and indirectly through business activity.

H3: The integration of data analytics and information flows into the business decision-making process improves the accuracy and transparency of assessing the contribution of the foreign workforce to business and economic activity.

The research was based on primary and secondary data sources. Primary data were collected through an online survey questionnaire among 75 employers in the Republic of Croatia. The questionnaire was distributed specifically to employers who were presumed to have, or have had, experience in employing foreign workers, thereby applying purposive sampling, with elements of the snowball method. The questionnaire comprised three sections: general organisational information, questions about experiences with foreign workers, and assessments of their perceived contribution to business performance, measured on a Likert scale.

Secondary data were drawn from publicly available statistical and institutional sources including the Croatian Bureau of Statistics, Croatian Employment Service, Ministry of the Interior of the Republic of Croatia, Croatian National Bank, Croatian Chamber of Economy, as well as from relevant scientific databases and literature. Since the research was conducted in 2025, official statistics for that year were not yet available, so the analysis includes data up to 2024, which is acknowledged as a limitation given the dynamic nature of the labour market and foreign workforce trends. A structured questionnaire, developed using Google Forms, was employed to collect primary data. The collected survey data were quantitatively processed and analysed using descriptive and inferential statistical techniques, including the calculation of frequencies, percentages, means, and standard deviations; testing the reliability of the measurement instrument; correlation analyses; and hypothesis testing.

The data processing and analysis were conducted using IBM SPSS Statistics software. Secondary data were analysed through trend and structural analyses, and their processing, integration, and visualisation were carried out using Microsoft Power BI, which provided a clear overview of the dynamics and structure of the foreign workforce according to relevant characteristics. The final stage of the methodological procedure involved the interpretation of the obtained results, the evaluation of the established hypotheses, and the identification of the study's limitations as well as directions for future research.

3 Results

This section presents the key findings of the empirical analysis related to employers' motivations for hiring foreign workers. When asked about the main reasons for employing foreign workers, the largest number of companies that participated in the study, 86.8%, employ foreign workers due to a shortage of domestic labour (excluding companies who do not employ foreign workers). A total of 34% of employers do so because of lower labour costs. Because employers could select multiple reasons, the total percent of cases sums to 147.2%, with these two primary reasons alone accounting for 82.1% of all responses provided (46 and 18 responses out of 78 total responses).

When asked about the positions at which foreign workers are employed in their organisations, excluding companies that do not employ foreign workers (29.3%), the largest share consists of organisations employing unskilled foreign workers (36 respondents). This category was selected by 67.9% of the surveyed companies, representing 42.9% of the total responses within this multiple-choice metric.

The next category indicates that qualified workers such as tilers, carpenters, waiters, and drivers – skilled vocational workers – are also employed. This category was reported by 27 companies, representing 50.9% of the companies and accounting for 32.1% of all selected response options. Mid-level skilled cadres and seasonal workers are equally present, each reported by 8 companies (15.1% of companies, 9.5% of responses), while highly educated foreign workers are represented in an extremely small proportion of 3.8% (2 companies).

A survey conducted among employers also showed that companies hire foreign workers precisely due to a shortage of the domestic workforce. This trend is also confirmed by available official data: between 2020 and 2023, there was a cumulative decrease in the number of domestic employees of 11.57% [1]. Although 2024 shows a partial recovery, the overall workforce loss remains at 6.93%, corresponding to approximately 112 000 fewer workers.

Although macroeconomic indicators appear highly positive when considered separately, despite the negative demographic trend and historically low unemployment rates, the decline in the working-age population remains concerning, driven primarily by an ageing population and the emigration of working-age labour, as clearly illustrated by the sharp contraction of the trendline in Figure 1.

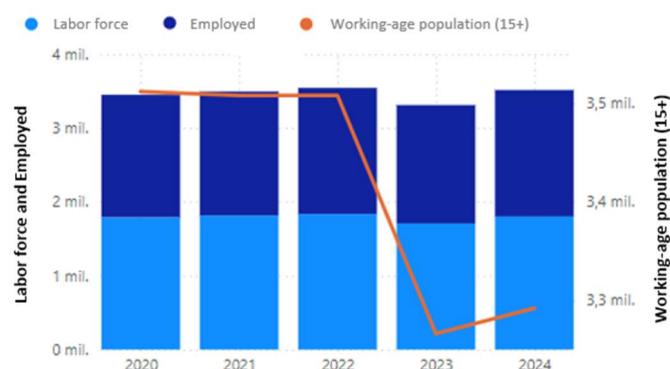


Figure 1. Trends in the labour force, employed population, and working-age population.

Table 1 indicates an accelerated trend in the employment of foreign workers, including in sectors that had not previously engaged them to a significant extent [1]. Although construction remains the largest single employer of foreign workers, the annual growth rate of employment in this sector is a mere 8.94% (2024 vs. 2023), which may indicate that the sector has reached near its maximum capacity or that economic activity is slowing. In contrast, the trade sector records the largest relative increase, at a staggering 54.60%, while transport and logistics follows with growth of 40.46%. All other sectors also exhibit double-digit growth rates, reflecting a significant shortage of domestic labour that employers are addressing by hiring foreign workers.

Table 1. Foreign work permits by sectors: 2023 vs. 2024.

Sectors Employing Foreign Workers	Foreign work permits issued in 2023	Foreign work permits issued in 2024	Increase in %
Construction sector	68 912	75 071	8.94%
Accommodation and Tourism	45 868	56 228	22.59%
Industry	24 034	28 486	18.52%
Transportation and Communication	11 497	16 149	40.46%
Trade	5 126	7 925	54.60%
Other sectors	17 062	22 670	32.87%
Total (All sectors)	172 499	206 529	19.73%

3.1 A Conceptual BI-Driven Tripartite Model

Based on descriptive analyses, observed business intelligence (BI) trends, and the statistical processing of survey data, key patterns were identified regarding labour market needs, the employment of foreign workers, their contribution to business activity, and employers' perceptions. To present these findings within a coherent and comprehensive framework, a conceptual model is developed that integrates the microeconomic, organisational, and macroeconomic levels. This model builds upon empirical insights and operationalises the proposed hypotheses through clearly defined constructs and interrelationships.

The model consists of three interconnected core constructs:

(1) Foreign Workers (FW) - the input level of the model, encompassing the key characteristics of foreign workers that define the initial capacities of the work process and form the basis for subsequent analytical assessments. This construct includes demographic, educational, and employment-related attributes, as well as motivational and communication factors relevant to the employment of foreign labour.

(2) Business Activity (BA) – the organisational level of the model, capturing the effects of foreign workers on company's operational stability, productivity, business continuity, and staffing sustainability. It reflects the integration and productive contribution of foreign workers, administrative and organisational efficiency, and the degree of dependence on foreign labour, and is theoretically grounded in hypothesis H1, which assumes a positive effect of foreign labour on business activity.

This level of the model also delivers four BI&A outputs, as visualized on the right side of the model framework (Figure 2):

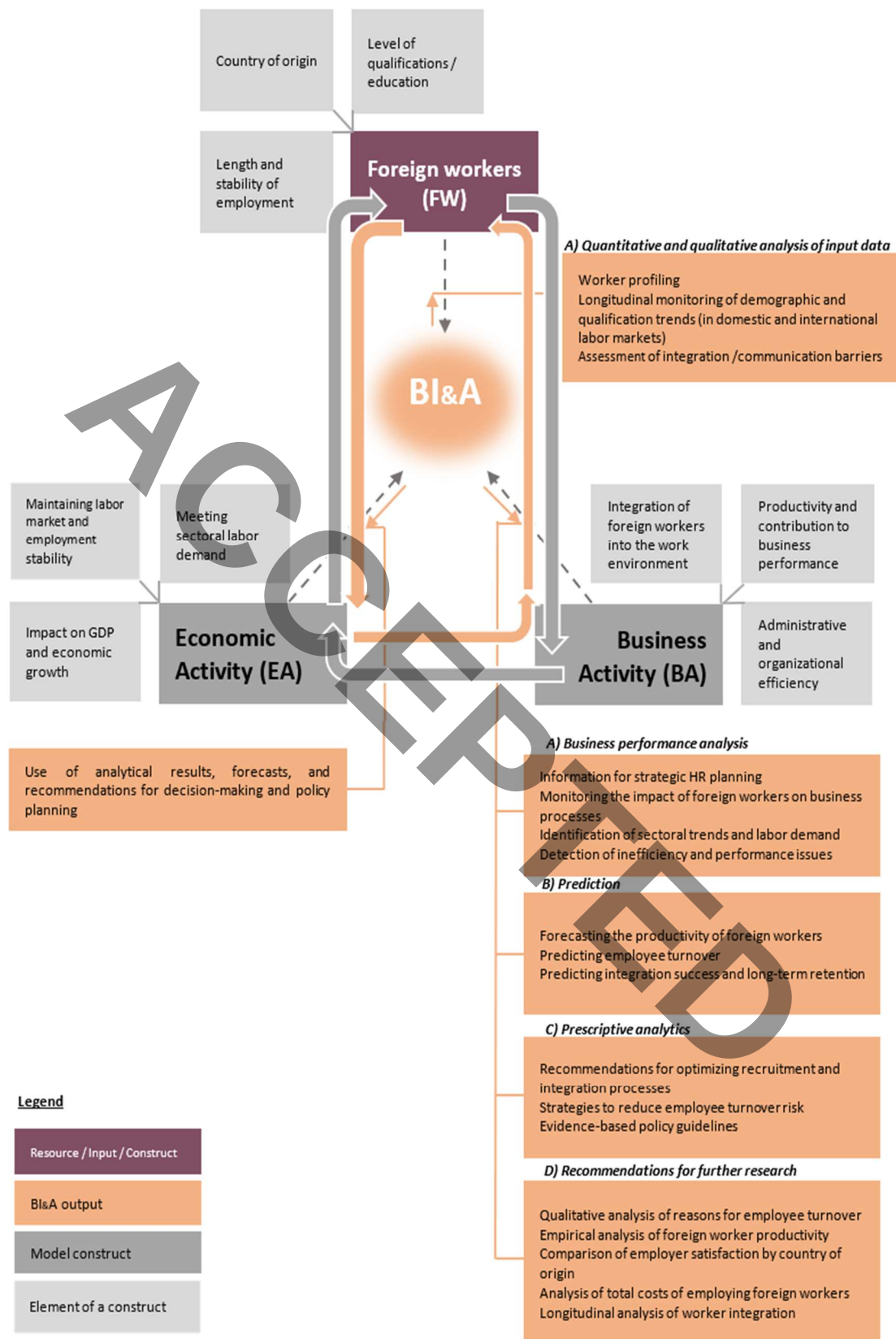


Figure 2. A BI-Driven Tripartite Model for Assessing Foreign Workforce Effects in Small Open Economies.

These BI&A outputs for the Business Activity construct include:

A) Quantitative and qualitative analysis of input data through profiling foreign workers, monitoring demographic and qualification trends in the domestic and international labour market, identifying sectoral labour needs, analysing the effectiveness and efficiency of work processes, and integrating data into strategic human resource management planning.

B) Business performance analysis and predictive analytics through creating productivity and performance forecasts, predicting employee retention within the organisation, forecasting employer desistance from hiring, predicting the long-term integration of foreign workers, and sectoral forecasting of future labour shortages.

C) Prescriptive analytics through recommendations for optimising the recruitment and integration process, guidelines for managing administrative and organisational risks, recommendations for evidence-based policy, and recommendations for improving the efficiency of business processes and HR management.

D) Perspectives and recommendations for further research, such as qualitative analyses of the reasons for employers' withdrawal, comparative studies of productivity by country of origin, analysis of the total cost of integrating a foreign worker, and longitudinal studies of integration and employment stability.

(3) Economic Activity (EA) - the macroeconomic level, addressing the contribution of foreign labour to aggregate employment, GDP, sectoral output, labour market stability, and regional development. This construct captures both direct and indirect effects of foreign workers on economic activity and is grounded in hypothesis H2, which posits a positive impact of foreign labour on macroeconomic indicators.

The model also includes a transversal process—**Business Intelligence and Analytics (BI&A)**—which, as an intermediary engine, connects and supports the three core constructs. The key functions of this central BI&A hub include: consolidation of data on the foreign workforce and business processes, analytics of trends and regional patterns, visualisation of critical indicators, integration of data from organisational and national sources, and support for data-driven decision-making.

Figure 2 shows a conceptual model that visualises the following relationships:

- direct effect $FW \rightarrow BA$, where the foreign workforce improves the functional stability and capacities of the enterprise;
- direct effect $BA \rightarrow EA$, where increased business activity contributes to economic growth;
- direct effect $FW \rightarrow EA$ through labour inclusion and sectoral coverage;
- mediating effect $FW \rightarrow BA \rightarrow EA$, in which foreign workers enable an increase in output, which then contributes to national economic activity;
- integrative effect $BI \rightarrow (FW, BA, EA)$, where BI enables a more objective, data-driven assessment of contributions and dynamic trend monitoring.

In the model, the use of colours establishes a clear distinction between constructs (dark gray), construct elements (light gray), BI&A output and BI&A itself (orange), thereby making the model's architecture more visually clear and readable. Exceptionally, the Foreign Workers (FW) construct is shown in purple due to its multifunctional role in the model.

By integrating data analytics through the introduction of BI&A as an intermediate process, the accuracy, transparency and timeliness of assessing the impact of the foreign workforce on business and economic activity are enhanced. This component methodologically aligns with and conceptually supports hypothesis H3, which posits a positive effect of business intelligence integration on the efficiency of impact assessment.

3.2 A BI framework for assessing the impact of foreign labour on enterprise performance

The model positions the central BI&A hub as an intermediary process that transforms raw data into actionable information for decision-making (DIKW structure) and the generation of insight, as noted by Fiorina [15]. This process connects operational data sources on one side with managerial or strategic decision-making on the other. While the structural relationships and analytical outputs are conceptualized in Figure 2, the underlying system architecture operates through four functional components. Each of the four functional components of the underlying system architecture performs a specific function, yet all depend on BI&A for coordination, data management, dissemination, and the maintenance of logical consistency. BI&A functions as the central semantic, analytical, and operational point of the entire architecture. The model establishes BI&A as the primary channel through which data, information, and analytical outputs circulate.

The advantages of such an architecture are reflected in:

- consistency – all components operate on harmonised data;

- traceability – centralized documentation of transformations and processing results;
- data and process quality management – monitoring, validation, control;
- configurability – no interference with existing inter-modular flows during additional configuration.

The centralized position is essential for further upgrades, as it prevents the uncontrolled proliferation of direct flows, which would complicate both theoretical analysis and practical implementation.

The Data Collection Component (Component 1 – C1) consolidates raw data from heterogeneous, relevant internal and external sources. It encompasses operational systems, structured and unstructured data flows, and potentially real-time data, connecting with other digital platforms. Within the model, this component sends data exclusively to BI&A, ensuring that no other component receives unprocessed or unverified data. Centralization prevents inconsistencies and ensures the processing and transformation of personal data in compliance with the General Data Protection Regulation (GDPR).

The Analytics Component (Component 2 – C2) performs data transformations, descriptive analytics, and statistical analyses. BI&A exports information to this component, and through analytical result flows, the outputs return to BI&A and are further disseminated to the reporting component and the predictive–prescriptive decision support component.

The Reporting Component (Component 3 – C3) converts analytical outputs into dashboards, visualizations, summaries, and indicators. In this model, data are not retrieved directly from the analytics component. All inputs are mediated through BI&A to preserve semantic and numerical consistency. Through a feedback loop, this component returns structured data to the analytics component for further transformations and analyses of already processed information.

The Predictive–Prescriptive Decision Support Component (Component 4 – C4) extends descriptive analytics with predictive modelling, scenario simulation, optimisation, and prescriptive guidance. Predictive and prescriptive outputs can trigger feedback loops to the reporting component or the analytics component.

The model defines primary flows and includes feedback loops:

C1 → BI&A:	collected data are transferred to BI&A.
BI&A → C2:	BI&A processes data for the analytics component.
C2 → BI&A:	analytical results return to the central hub.
BI&A → C3:	BI&A distributes structured analytical outputs for reporting.
BI&A → C4:	BI&A disseminates analytical and contextual data to predictive and prescriptive component.
C3 → BI&A → C2:	insights from reporting can enhance analytical processes.
C4 → BI&A → C3:	predictive and prescriptive outputs can reshape the reporting structure.
C4 → BI&A → C2:	predictive and prescriptive findings can adjust inputs or assumptions of the analytical model.

These loops are conceptually important for iterative improvement and are strictly controlled via BI&A. By routing all data flows through BI&A, the architecture maintains a stable, reliable, and controlled structure. Direct flows C2 → C3 and C2 → C4 are omitted because they compromise effective data governance (allowing potential uncontrolled exchanges), increase the risk of semantic inconsistencies among results, complicate system maintenance, and reduce conceptual clarity.

4 Discussion

The research indicated structural changes in the Croatian labour market: a clear decline in the number of employees among the domestic workforce, with a slight positive shift in 2024, and a significant increase in the number of foreign workers. All this indicates a certain degree of dependence of the Croatian labour market on foreign workers, and if this trend continues, Croatia will certainly have to create a comprehensive system for the integration of foreign workers. An integration system would help foreign workers adapt successfully and contribute not only to the economy, but also to social cohesion and the reduction of conflict and misunderstandings, as OECD, ICMPD, Andrea et al., and Matsuyama et al. confirm [16–20], showing that quality integration of migrants reduces social tensions, increases intercultural understanding, and strengthens community stability. For such a system to be functional, coordination among state institutions, employers, local communities, and the workers themselves is crucial. The complexity of the relationship between economic growth, demographic and migration movements, labour market trends, and their interconnections, clearly indicates a series of challenges that small open economies, including Croatia, have faced in recent

years. Viewed in isolation, macroeconomic indicators in Croatia are more than positive, despite a negative demographic trend and the lowest unemployment rate in its history. The growth in Gross Domestic Product (GDP), which follows a significant upward trajectory, should nevertheless be viewed in the context of considerable price increases and inflationary pressures (real GDP is growing at a slower pace than nominal GDP) – but growth is present nonetheless, and it is being generated by all its components: personal consumption, government spending, investment and exports. A deficit persists, as imports continue to grow faster than exports. Investment in the construction sector, the growth of tourism, and the development of IT services which increase exports, all have a stimulating effect on economic activity.

Moments such as accession to the EU and subsequently to the eurozone have provided an additional impetus for GDP growth, as well as for the resulting consequences for the labour market, as confirmed by Valsan et al. [21], who point out that accession to the EU increases economic growth and transforms the labour market in new member states through integration into the single European market. The open market, the abolition of trade barriers, and the introduction of the European currency all created a much larger “playing field” for Croatian entrepreneurs and the market in general, but it also created the basis for the free movement of labour within the EU, as Hölscher and Howard-Jones confirm [22]. The imperative of competitiveness for Croatian companies has necessitated cost reductions, with the focus, in this regard, on maintaining lower wage levels (comparable to those in Western EU countries in the same sectors). As technological progress has often lagged behind, productivity has frequently been sought through increased workloads for under-invested workers, which in turn led to a loss of domestic labour to the now-open and better-paying European labour market. The paradox of the cost leadership vs. differentiation strategy (where the latter lacks systematic, incentivised investment in innovation and technology) lies in the working conditions that are unattractive to the domestic workforce, whilst simultaneously attracting foreign labour. According to data from a Eurostat publication [23], the age structure of immigrants in the EU, compared with that of EU citizens, has a higher proportion of adults aged 20 to 49 – this is true for both men and women. The ageing of the domestic workforce, accelerated technological progress leading to skills mismatches with labour market demands, as well as poor job quality, inadequate wages and unfavourable working conditions, make certain high-demand sectors less attractive to domestic workers. These labour market challenges are also addressed by recent OECD analyses, including the study “Labour Shortages and Labour Market Inequalities: Evidence and Policy Implications” [24], [25], which point to structural reasons for the labour shortage in sectors such as accommodation and food services, transport and storage, construction, and health and social care. All of this suggests that quantitative GDP growth reflects higher consumption, higher prices and an increase in exports, but it is not a qualitative indicator of working conditions, social fairness, or long-term sustainability; or, if these elements do exist, domestic workers do not recognise or feel them to a sufficient extent.

The results of this research show that the structure of employment of foreign workers in Croatia is changing rapidly, with traditionally dominant sectors such as construction and hospitality facing gradual saturation, while other activities – particularly trade, transport and logistics – are experiencing an increasingly intense growth in demand for foreign workers. This redistribution confirms the spread of reliance on foreign labour from sectors with chronic shortages to a wider spectrum of economic activities, indicating the structural nature of the problem. Changes are also evident in the workers' countries of origin: the share of workers from neighbouring countries remains high but is relatively stagnant, while there is an intensive increase in workers from more distant countries such as Nepal, India and the Philippines. This trend suggests the exhaustion of traditional sources of labour, potentially increasing demands from neighbouring countries, and strengthening international migration flows mediated by agencies.

The results of a survey of employers confirm these trends: the majority of employers engage foreign labour primarily due to a shortage of domestic workers, further emphasising the economy's growing dependence on migratory mobility. Although the survey shares cannot be fully aligned with official statistics due to the smaller sample size, the same pattern of dominant sectors and countries of origin was observed, which supports the consistency of the findings. It remains to be examined to what extent foreign workers represent a genuinely more cost-effective option, particularly when all employment costs are taken into account and their actual contribution to productivity is assessed. According to research, foreign workers often come with lower initial labour costs, and their presence contributes to increased productivity and resilience for the companies that employ them, which can result in a positive financial impact and genuine cost-effectiveness in the long term as Peri, Causa et al., and Gu et al. confirm [26–28]. Together, these patterns suggest structural, rather than cyclical, reasons for the demand for foreign labour, confirming the need for business analytics models that

enable precise monitoring, prediction, and assessment of the impact of foreign workers on business processes and the wider economic system.

The findings provide partial support for the first hypothesis (H1), which posits that the foreign workforce positively contributes to the continuity and level of business activity of the company. Employers primarily engage foreign workers to compensate for a shortage of the domestic workforce, confirming that their availability enables the stability of operational processes and the maintenance of production and service capacities.

In contrast, regarding hypothesis H2, employers generally hold a neutral perception of the overall economic impact of foreign workers. While the importance of foreign labour is recognised in specific contexts, such as performing jobs that domestic workers are unwilling to do or meeting sectoral growth targets, their broader contribution to national economic activity is less clearly perceived. This suggests that although foreign labour is crucial for operational stability and sectoral functioning, its macroeconomic significance may not be fully recognised by employers.

The third hypothesis (H3), of a conceptual nature, was further confirmed through the developed conceptual business analytics model, which shows how the integration of data streams and the application of predictive and prescriptive analytical tools, including advanced BI&A methods in HR management, can enhance the accuracy and transparency of assessing the contribution of the foreign workforce and enable evidence-based decision-making, as Marler and Boudreau, Minbaeva, Tawalbeh et al., and Căvescu et al. confirm [29–32].

The model clearly illustrates that the foreign workforce represents an input resource in the business process system, whose true value can only be more accurately perceived when processed through an analytical hub. The introduction of business analytics enables better strategic planning, identification of sectoral needs, risk management, and the formulation of evidence-based policies, thereby creating scope for more systematic and long-term sustainable management of migration and labour flows.

4.1 Reliability testing of the measurement instrument

Cronbach's Alpha for the items (10 in total) relating to Hypothesis H1: *The foreign workforce has a positive impact on the level and continuity of a company's business activity*, has a value of 0.795, which indicates a satisfactory to high level of internal consistency of the measurement instrument. This shows that the items comprising the scale are interconnected and reliably measure the same construct. The reliability analysis includes the full sample of surveyed employers ($N = 75$) to capture broader institutional perceptions regarding organizational impacts. Cronbach's Alpha Based on Standardised Items is 0.800, which shows that variations in the item variances do not significantly affect the reliability of the scale. In other words, the internal consistency would only be slightly better if all items had the same variance, as is evident from Table 2.

Table 2. Cronbach's Alpha coefficient for hypothesis H1.

Case Processing Summary				Reliability Statistics		
		N	%			
Cases	Valid	75	100.0	Cronbach's Alpha	Cronbach's Alpha based on Standardised Items	
	Excluded ^a	0	0.0			
	Total	75	100.0			
^a Excluded Listwise deletion based on all variables in the procedure				0.795	0.800	10

Cronbach's Alpha for the items ($N = 10$) relating to Hypothesis H2: *Foreign labour has a positive impact on national economic activity, both directly and indirectly through business activity*, is 0.908, indicating an extremely high level of internal consistency of the measurement instrument. This shows that the items comprising the scale are interrelated and reliably measure this macroeconomic dimension across the entire respondent base ($N = 75$). Cronbach's Alpha Based on Standardised Items is 0.915, which shows that variations in the item variances do not significantly affect the reliability of the scale; in other words, the internal consistency would only be slightly higher if all items had the same variance, as shown in Table 3.

Table 3. Cronbach's Alpha coefficient for hypothesis H2.

Case Processing Summary		N	%	Reliability Statistics		
Cases	Valid	75	100.0	Cronbach's Alpha	Cronbach's Alpha based on Standardised Items	N of Items
	Excluded ^a	0	0.0			
	Total	75	100.0			
^a Excluded Listwise deletion based on all variables in the procedure				0.908	0.915	10

4.2 Testing hypotheses using the One-Sample t-test

To test Hypothesis H1: *The foreign workforce has a positive impact on the level and continuity of a company's business activity*, employers were presented with 10 statements designed to assess the degree of their (dis)agreement with the proposed statements using a Likert scale ranging from 1 to 5. A One-Sample t-test was conducted for each statement to determine whether the mean responses differed significantly from the neutral midpoint ($\mu = 3$). The results of the One-Sample t-test for H1 are presented in Table 4.

Table 4. One-Sample t-test for hypothesis H1.

C1: Employers' attitudes toward foreign workers (OBJECTIVE 1 / HYPOTHESIS H1)	<i>Test value = 3</i>		Significance <i>p</i> -value	Mean Difference	95% Confidence Interval of the Difference	
	<i>t</i>	<i>df</i>			Lower	Upper
Employing foreign workers is important for maintaining business continuity.	0.961	74	0.170	0.147	-0.16	0.45
Experiences with foreign workers are predominantly positive.	0.516	74	0.304	0.067	-0.19	0.32
Foreign workers integrate quickly into the work environment.	-0.533	74	0.298	-0.067	-0.32	0.18
Administrative procedures for employing foreign workers are extremely complex.	3.291	74	<0.001	0.400	0.16	0.64
The procedure for issuing work permits should be simplified and facilitated for employers.	4.403	74	<0.001	0.640	0.35	0.93
Foreign workers perform jobs that domestic workers are unwilling to do.	3.116	74	0.001	0.507	0.18	0.83
Foreign workers are employed due to a shortage of domestic workers in the labour market.	4.802	74	<0.001	0.747	0.44	1.06
Croatia should limit the number of foreign workers it "imports".	3.301	74	<0.001	0.507	0.20	0.81
Foreign workers are well integrated into society and the work environment.	-1.143	74	0.128	-0.147	-0.40	0.11
Problems in the integration of foreign workers arise due to cultural, religious, and security-related reasons.	2.140	74	0.018	0.307	0.02	0.59

Based on the research findings and the conducted data analysis, as presented in Table 4, Hypothesis *H1*: *The foreign workforce has a positive impact on the level and continuity of a company's business activity*, is partially supported. The results of the One-Sample t-test against the neutral midpoint of the scale ($\mu = 3$) indicate that employers express statistically significant agreement with statements related to labour shortages, administrative complexity, and the role of foreign workers in performing jobs that domestic workers are unwilling to do ($p < 0.001$).

The calculated Cohen's d values for these highly significant items range from 0.38 to 0.55, indicating medium practical effects that reinforce the strength of these findings. However, no statistically significant deviation from neutrality was found for statements concerning the impact of foreign workers on business continuity, overall experiences, and integration into the work environment and society ($p > 0.05$), with small or negligible Cohen's d values.

These findings suggest that while employers clearly recognise the necessity of foreign labour due to structural labour shortages, their perceptions of its direct impact on business performance and integration outcomes remain neutral or inconclusive.

To test hypothesis *H2*: *Foreign labour has a positive impact on national economic activity, both directly and indirectly through business activity*, companies were presented with 10 statements to determine their degree of agreement or disagreement with the options provided on a Likert scale, on a scale of 1 to 5. A One-Sample t-test was conducted for each statement to determine whether the mean responses differed significantly from the neutral midpoint ($\mu = 3$). The results of the One-Sample t-test for H2 are presented in Table 5.

Table 5. One-Sample t-test for hypothesis H2.

C2: Economic impact of foreign workers (OBJECTIVE 2 / HYPOTHESIS H2)	Test value = 3		Significance <i>p</i> -value	Mean Difference	95% Confidence Interval of the Difference	
	<i>t</i>	<i>df</i>			Lower	Upper
Foreign workers significantly contribute to productivity growth in organisations that employ them	-0.336	74	0.369	-0.040	-0.28	0.20
Foreign workers positively affect the overall business performance of organisations that employ them.	1.143	74	0.128	0.147	-0.11	0.40
Without foreign workers, organisations would not be able to achieve their business objectives.	0.394	74	0.347	0.053	-0.22	0.32
Investment in foreign workers is economically viable for organisations in the long term.	0.219	74	0.413	0.027	-0.22	0.27
Foreign workers contribute to competitiveness in the market.	-0.516	74	0.304	-0.067	-0.32	0.19
Employing foreign workers has a positive impact on GDP growth.	0.724	74	0.236	0.093	-0.16	0.35
Foreign workers help maintain labour market stability.	0.932	74	0.177	0.120	-0.14	0.38
Without foreign workers, certain sectors would not be able to achieve planned growth targets.	2.199	74	0.016	0.307	0.03	0.58
Employers prefer foreign workers over domestic workers because they are less expensive.	1.795	74	0.038	0.280	-0.03	0.59
Employers hire foreign workers because domestic workers are unwilling to perform all types of jobs.	3.241	74	<0.001	0.453	0.17	0.73

Based on the research findings and the data analysis conducted, hypothesis *H2: Foreign labour has a positive impact on national economic activity, both directly and indirectly through business activity*, receives limited support. The results of the One-Sample t-test against the neutral midpoint of the scale ($\mu = 3$) indicate that for most statements, employers' mean responses do not differ significantly from neutrality ($p > 0.05$). Corresponding Cohen's *d* values are very small ($d < 0.2$), indicating negligible practical effects. Exceptions are statements related to employing foreign workers where domestic workers are unwilling to perform certain jobs and achieving sectoral growth targets, which show small-to-moderate effects ($d = 0.207\text{--}0.374$), reflecting somewhat stronger agreement in these specific contexts. Overall, these findings suggest that employers perceive the economic impact of foreign workers as neutral in general, recognising its importance only in particular operational or sector-specific situations.

5 Conclusion

From the perspective of information flows, and based on the conducted conceptual development and analysis, the developed conceptual, business intelligence-driven tripartite model represents the central scientific contribution of this research, thereby confirming the achievement of the research objective defined in the introduction. By integrating the micro level – namely firms' business activities – with macroeconomic indicators through structured information flows, the model enables a systematic, transparent, and analytically grounded evaluation of the effects of foreign labour in small open economies. The introduction of Business Intelligence and Analytics as an intermediary process proved to be crucial for reducing data fragmentation, increasing the accuracy of assessments, and linking organisational and macroeconomic levels of analysis. In this sense, BI&A functions as a central semantic and analytical point – the nucleus of the model – ensuring the consistency of information flows, the traceability of analytical outputs, and quality control of data and processes. This establishes a foundation for evidence-based decision-making and for the formulation of policies that better align labour market needs with available labour supply, as well as for the development of future models for the evaluation, monitoring, and forecasting of the effects of foreign labour. Due to its conceptual structure and reliance on general analytical principles rather than the specificities of individual sectors, regions, or countries, the model is applicable and adaptable to other small open economies facing demographic decline and structural changes in the labour market.

Acknowledgment

Research was funded by funds of the University North, intended to support scientific research of the project “Research perspectives of the Design Thinking method in the field of interdisciplinary sciences” to which these authors express their gratitude.

References

- [1] S. Drvarek, “Conceptual model of business analytics using data analytics realized by applying BI tools for the purpose of assessing the contribution of foreign workers to the regional development of Croatia,” Master's thesis, University North, Varaždin, 2025 [Online]. Available: <https://dabar.srce.hr/object/unin:7720> [Accessed: 24 Jan. 2026].
- [2] C. Wissuchek and P. Zschech, “Prescriptive analytics systems revised: a systematic literature review from an information systems perspective,” *Information Systems and e-Business Management*, vol. 23, no. 2, pp. 279–353, 2024, doi: 10.1007/s10257-024-00688-w.
- [3] Y. Dong, “Information Flow and Optimization Model in Counselor Student Interaction in Higher Education Civics,” *Applied Mathematics and Nonlinear Sciences*, vol. 9, no. 1, pp. 1–20, 2024, doi: 10.2478/amns-2024-2922.
- [4] J. Ding, L. Zehan, W. Xia, L. Rong, and H. Hangyu, “Information dissemination model based on social networks characteristics,” *Mathematics*, vol. 13, no. 8, p. 1254, 2025 [Online]. Available: Information Dissemination Model Based on Social Networks Characteristics | MDPI [Accessed: 4 Jan. 2026].
- [5] J. Al-Mamary and A. F. Alshammari, “A conceptual model and its implications: Identifying key factors influencing entrepreneurial activity and innovation capabilities for sustainable development and green innovation,” *World Development Sustainability*, p. 100259, 2025, doi: 10.1016/j.wds.2025.100259.

- [6] J. Guo, W. Kai, L. Xuegin, and L. Xiaoling, "A new evolutionary model for institutional field knowledge flow network," *Journal of Data and Information Science*, vol. 9, no. 1, pp. 101–123, 2024, doi: 10.2478/jdis-2024-0009.
- [7] C. R. Raitviir and I. Lill, "Conceptual framework of information flow synchronization throughout the building lifecycle," *Buildings*, vol. 14, no. 7, p. 2207, 2024, doi: 10.3390/buildings14072207.
- [8] J. Yan, X. Xie, and W. Liu, "The collaborative evolution of trust, information flow, and social cooperation: a study on network stability based on dynamic game models," *Scientific Reports*, vol. 15, p. 30376, 2025, doi: 10.1038/s41598-025-13355-y.
- [9] B. E. Becker and M. A. Huselid, "High performance work systems and firm performance: A synthesis of research and managerial implications," *Academy of Management Journal*, vol. 44, no. 1, pp. 8–29, 2001.
- [10] J. W. Boudreau and P. M. Ramstad, *Beyond HR: The New Science of Human Capital*. Boston, MA: Harvard Business School Press, 2007.
- [11] W. F. Cascio and J. W. Boudreau, *Investing in People: Financial Impact of Human Resource Initiatives*, 2nd ed, Upper Saddle River, NJ: Pearson Education, 2011.
- [12] A. Margherita, "Human resources analytics: A systematization of research topics and directions for future research," *Human Resource Management Review*, vol. 30, no. 2, p. 100795, 2020, doi: 10.1016/j.hrmr.2020.100795.
- [13] L. Luić, N. Babić, and A. Rončević, "A step closer to understanding implementation of business intelligence in the organizational operations: A systematic literature review," *Proceedings of the International Conference on Applied Computing 2022 and WWW/Internet 2022*, Lisbon, Portugal, pp. 165–172, 2022.
- [14] M. Correa-Peralta, J. V. Martínez, and L. C. Heredia, "Evolution, Topics and Relevant Research Methodologies in Business Intelligence and Data Analysis in the Academic Management of Higher Education Institutions: A Literature Review," *Results in Engineering*, vol. 25, p. 103782, 2025, doi: 10.1016/j.rineng.2024.103782.
- [15] C. Fiorina, "Information: the currency of the digital age," speech at Oracle OpenWorld, San Francisco, CA, USA, Dec. 6, 2004 [Online]. Available: <https://www.hp.com/hpinfo/execteam/speeches/fiorina/04openworld.html> [Accessed: 1 March. 2025].
- [16] OECD, "Economic and Social Integration of Migrants," OECD Publishing, 2025 [Online]. Available: https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/06/indicators-of-immigrant-integration-2023_70d202c4/1d5020a6-en.pdf [Accessed: 1 Mar. 2025].
- [17] OECD, "Economic and Social Integration of Migrants," OECD Publishing, 2025 [Online]. Available: <https://www.oecd.org/en/topics/economic-and-social-integration-of-migrants.html> [Accessed: 4 Jan. 2026].
- [18] International Centre for Migration Policy Development (ICMPD), "Integration and Social Cohesion," ICMPD, 2024 [Online]. Available: www.icmpd.org/our-work/policy-and-research/policy/integration-and-social-cohesion [Accessed: 7 Feb. 2026].
- [19] C. Andrea, H. Flarer, M. Lehner, A. Mattes, and U. Reeger, "Volunteering as a Means of Fostering Integration and Intercultural Relations. Evidence from Six European Contexts," *Central and Eastern European Migration Review*, vol. 12, no. 1, pp. 49–63, 2023 [Online]. Available: <http://www.ceemr.uw.edu.pl/vol-12-no-1-2023/special-section/volunteering-means-fostering-integration-and-intercultural> [Accessed: 15 Jan. 2026].
- [20] H. Matsuyama, C. Okamoto, and S. Yasuhiro, "Social Integration of Immigrants in Cities: Theory and Evidence from the European Social Survey," *The Japanese Economic Review*, vol. 76, pp. 957–986, 2025, doi: 10.1007/s42973-025-00215-7.
- [21] B. Válsán, A. M. Rahat, and E. Druică, "Ten Lessons from the EU Accession of Ex Communist Countries," *Economies*, vol. 13, no. 11, p. 326, 2025, doi: 10.3390/economies13110326.
- [22] J. Hölscher and P. Howard-Jones, "Does accession to the EU affect firms' productivity?," *IZA World of Labor*, 2019 [Online]. Available: <https://wol.iza.org/articles/does-accession-to-the-eu-affect-firms-productivity> [Accessed: 15 Jan. 2026].
- [23] Eurostat, "Population structure and ageing: Population by citizenship and age groups," EU, Statistics Explained, 2024 [Online]. Available: <https://ec.europa.eu/eurostat/web/interactive-publications/migration-2024> [Accessed: 15 Oct. 2025].

- [24] OECD, International Migration Outlook 2024. Paris: *OECD Publishing*, 2024 [Online]. https://www.oecd.org/en/publications/international-migration-outlook-2024_50b0353e-en.html [Accessed: 2 Mar. 2025].
- [25] OECD, International Migration Outlook 2025. Paris: *OECD Publishing*, 2025 [Online]. Available: https://www.oecd.org/en/publications/international-migration-outlook-2025_ae26c893-en/full-report [Accessed: 10 Mar. 2026].
- [26] O. Causa, E. Soldani, M. Nguyen, and T. Tanaka, "Labour shortages and labour market inequalities: Evidence and policy implications," *OECD Economics Department Working Paper*, no. 1832, Paris: OECD Publishing, 2025, doi: 10.1787/14e62ec0-en.
- [27] G. Peri, "Immigrants, Productivity, and Labor Markets," *Journal of Economic Perspectives*, vol. 30, no. 4, pp. 3–30, 2016, doi: 10.1257/jep.30.4.3.
- [28] W. Gu, F. Hou, and G. Picot, "Immigration and Firm Productivity: Evidence from the Canadian Employer-Employee Dynamics Database," *Statistics Canada Research Paper*, 11F0019M, 2020 [Online]. Available: https://www150.statcan.gc.ca/n1/en/catalogue/11F0019M2020014?utm_source [Accessed: 2 Mar. 2025].
- [29] H. Marler and J. W. Boudreau, "An evidence-based review of HR Analytics," *International Journal of Human Resource Management*, vol. 28, no. 1, pp. 3–26, 2017, doi: 10.1080/09585192.2016.1244699.
- [30] D. B. Minbaeva, "Building credible human capital analytics for organizational competitive advantage," *Human Resource Management*, vol. 57, no. 3, pp. 701–713, 2018 [Online]. Available: https://www.researchgate.net/publication/312027668_Building_credible_human_capital_analytics_for_organizational_competitive_advantage [Accessed: 2 Mar. 2025].
- [31] M. Tawalbeh, A. Alzghoul, and G. A. Alsheikh, "Business intelligence as a catalyst for HR transformation: A case study of BI implementation in HR practices," in *Proceedings of the International Conference on Robotics, Automation and Intelligent Computing (ICRAIC 2K24)*, AIP Publishing, vol. 3255, p. 050007, 2025, doi: 10.1063/5.0255240.
- [32] A. M. Căvescu and N. Popescu, "Predictive Analytics in Human Resources Management: Evaluating AIHR's Role in Talent Retention," *Applied Math*, vol. 5, no. 3, p. 99, 2025, doi: 10.3390/appliedmath5030099.