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A Survey on Socially Responsible Activities of Business Companies in Central Europe

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ABSTRACT

Corporate social responsibility (hereinafter – CSR) is becoming an essential tool for sustainable development and increasing business competitiveness in Central European countries. The purpose of the study is to identify the most common socially responsible practices among companies in the Czech Republic, Poland and Slovakia, and to examine differences in their involvement by industry, size and territorial coverage. The methodological basis of the study includes a questionnaire survey of 300 companies (100 from each country), conducted in 2023 as part of the Corporate Social Responsibility in Business Practice of the Visegrad Region project. For statistical processing, correlation analysis methods (Pearson coefficients, t-tests) and comparative analysis based on four criteria: country, industry, enterprise size, and regional coverage. The results showed that 27% of Czech, 34% of Polish and 43% of Slovak companies strategically plan CSR activities. The most common forms of social responsibility include applying business ethics (43%), caring for employees beyond legal requirements (41%), staff training (36%), equal opportunities (36%), and cooperation with local communities (34%). At the same time, the differences across countries, industries, and sizes were statistically insignificant ($p > 0.05$). The analysis uncovered negligible differences in the engagement of surveyed businesses in socially responsible activities across industries, sizes, and regions. The suggestions for businesses emphasise a more strategic approach to socially responsible activities, with a focus on delivering the greatest value to the greatest number of people.Keywords: Corporate Social Responsibility, Social Pillar, Business Companies, Czechia, Poland, Slovakia

KEYWORDS: Corporate Social Responsibility, Enterprise Economics, Business, Strategic Management, Social Pillar, Czechia, Poland, Slovakia

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Исследование социально ответственной деятельности компаний в Центральной Европе

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АННОТАЦИЯ

Корпоративная социальная ответственность (далее – CSR) становится важнейшим инструментом устойчивого развития и повышения конкурентоспособности бизнеса в странах Центральной Европы. Цель исследования направлена на выявление наиболее распространённых практик социальной ответственности среди компаний Чехии, Польши и Словакии, а также в анализе различий их участия в таких инициативах в зависимости от отрасли, размера и территориального охвата. Методологическая база исследования включает анкетный опрос 300 компаний (по 100 из каждой страны), проведённый в 2023 г. в рамках проекта «Корпоративная социальная ответственность в деловой практике стран Вишеградского региона». Для статистической обработки использовались методы корреляционного и сравнительного анализа по четырём критериям: страна, отрасль, размер предприятия и региональный охват. Результаты показали, что лишь около трети компаний в Чехии, Польше и Словакии осуществляют стратегическое планирование деятельности в области КСО. Наиболее распространёнными формами социальной ответственности являются соблюдение принципов деловой этики, забота о сотрудниках сверх установленных законом требований, обучение персонала, обеспечение равных возможностей и сотрудничество с местными сообществами. При этом различия между странами, отраслями и размерами предприятий оказались статистически незначимыми ($p>0.05$). Полученные результаты свидетельствуют о несущественных различиях в уровне вовлечённости компаний в социально ответственную деятельность по странам, отраслям и регионам. Авторы подчёркивают необходимость более стратегического подхода к реализации КСО, ориентированного на достижение наибольшей общественной ценности и устойчивого эффекта для максимального числа заинтересованных сторон.

КЛЮЧЕВЫЕ СЛОВА: корпоративная социальная ответственность, экономика предприятия, бизнес, стратегическое управление, социальная составляющая, Чехия, Польша, Словакия

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INTRODUCTION

Any business activity of any business company has some impact on the outside world. The effects of business activities can be both positive, such as attractive job opportunities, and negative, such as severe environmental pollution (Guan et al., 2023). In terms of long-term prosperity and sustainability, every business should be aware of the impacts of its activities and act responsibly towards the society and environment in which it operates (Magee, 2019). These are the fundamentals of the corporate social responsibility (hereinafter – CSR) concept, which advances the voluntary social (people), environmental (planet), and economic (profit) responsibility of business companies (García-Piqueres & García-Ramos, 2022). Therefore, business companies should balance their social, environmental, and economic interests. In other words, they should find a way to make a profit while benefiting people and the planet (Isacowitz et al., 2022).

In recent years, socially, environmentally, and economically responsible behaviour in line with the CSR concept has become the standard for many businesses across the European Union (Thakkar et al., 2020). Such behavior has long been promoted by many European Commission initiatives, such as a Green Paper (2001) advancing the development of socially, environmentally, and economically responsible behavior of business companies within the European Union as elsewhere around the world. Similar initiatives should also lead to specific legislative changes in the member countries of the European Union to promote the implementation of positive social, environmental, and economic responsibility by businesses (Metzker, 2025; Hendrickx, 2018). Socially, environmentally, and economically responsible activities together represent the three traditional pillars of the CSR concept (Shim et al., 2021). The social pillar refers to improving the working and living conditions of employees, customers, and other stakeholder communities (Semenikhina et al., 2023; Ylipulli et al., 2025). A business company aiming to achieve long-term prosperity and sustainability should address all three pillars equally (Kucharcikova & Miciak, 2018). Investing in socially, environmentally, and economically responsible activities can bring more engaged employees, more loyal customers, better public relations, more attractive projects, lower production costs, higher sales revenues, improved company reputation, and so on (Blajer-Golebiewska & Vasa, 2024; Ben Hmiden et al., 2022; Oliinyk et al., 2023). All these potential benefits usually outweigh the time, money, and effort required to successfully implement the planned socially, environmentally, and economically responsible activities (Rizwan & Jenita, 2022).

This article is explicitly directed at the socially responsible activities of businesses in Czechia, Poland, and Slovakia, which, together with Hungary, form the so-called Visegrad Four. Since the 1990s, the economies of Czechia, Poland, and Slovakia have been among the relatively steadily developing market economies (Khan et al., 2023), including a diverse spectrum of industries from agriculture through production and trade to services (Burksaitiene et al., 2019). These economies benefit both from reciprocal cooperation and, above all, from cooperation with other member countries of the European Union (Matouskovi, 2022). Operating in markets within the European Union leads certain businesses to follow many of the European Union's development initiatives, including socially responsible behaviour (Babu et al., 2023; Hąbek, 2017).

As a result of efforts to improve their competitive position, particular businesses must improve their socially responsible behaviour towards stakeholder communities, particularly employees and customers. Therefore, the article deals with socially responsible activities of business companies in Central Europe (Czechia, Poland, and Slovakia) to identify specifics in socially responsible activities of surveyed business companies of different industries (production, trade, services), sizes (small, medium-sized, large), and regional coverage (one region, more regions, whole country). The article intends to answer two research questions:

RQ1: Which are the most common socially responsible activities across surveyed business companies in Czechia, Poland, and Slovakia?

RQ2: What are the differences in the engagement of surveyed business companies in Czechia, Poland, and Slovakia in socially responsible activities, depending on the industry, size, and regional coverage?

LITERATURE REVIEW

Socially responsible activities, as one of the traditional CSR pillars, aim to positively impact business activities on the well-being of stakeholder

communities, primarily employees and customers, by addressing working and living conditions (Srbova et al., 2023). In the practice of business companies, socially responsible behavior means advancing equal job opportunities, preventing discrimination in the workplace, supporting people with disabilities, creating a safe and healthy working environment, promoting work-life balance, cooperating with local communities, complying with business ethics, and so on (Lee et al., 2020; Strouhal et al., 2025). Within the CSR concept, businesses are expected to invest in similar activities voluntarily, while at the same time benefiting both the businesses engaged in socially responsible activities and the target stakeholder communities (Bahta et al., 2021; Knežević et al., 2023). This requires that investments in socially responsible activities be part of strategic planning and that they deliver the expected return in the form of meeting the needs of target stakeholder communities and achieving sustainable profitability and competitiveness (An & Yoon, 2021; Belás et al., 2024). The challenges of implementing the CSR concept within businesses have been the subject of scientific research in most developed economies over the past few decades. This article focuses on Central Europe and the socially responsible activities of businesses in Czechia, Poland, and Slovakia.

In Czechia, CSR research focused on specific CSR pillars, such as socially responsible activities, is not particularly common. Instead, the research focuses on the entire CSR practice, from the perspectives of businesses and stakeholder communities, primarily employees and customers. Nevertheless, Dohnalova and Legnerova (2018) researched socially responsible activities within the CSR practices of 66 business companies with a foreign owner operating in Czechia to determine whether and to what extent they engage in socially responsible activities focused on employee support and satisfaction. From a business perspective, Konecny (2019) compared the CSR practices of family- and non-family-owned companies operating in Czechia, using a sample of almost 300 companies. He revealed a greater emphasis on sustainability and socially responsible behaviour in family companies, which naturally build closer relationships with employees, customers, and local communities. A proactive approach to the development of CSR activities means, in particular, their communication to stakeholders, as confirmed, for example, by Tetrevova (2018), who analysed the quality of the communication of CSR activities by chemical companies operating in Czechia. From the perspective of stakeholders, Cincalova and Toporova (2021) analysed employee attitudes to CSR activities in a Czech brewery company. However, they suggested the company engage employees more in CSR activities to increase their positive impact. In addition to employees, customers often perceive companies' CSR activities as part of their good brand and reputation, which affects their attitude toward the companies. That was confirmed, for example, by Hommerova et al. (2020), who analysed customer perceptions of CSR activities of McDonald's restaurants in Czechia using a sample of more than two hundred and fifty respondents. Similar conclusions were reached by Hincica et al. (2022), who analysed customer perceptions of CSR activities of businesses operating in Czechia using a sample of more than 300 respondents.

In Poland, as in Czechia, CSR research seems to be oriented more toward the overall CSR practice than toward particular CSR pillars. Kogut and Brozek (2015) analysed the CSR practices of railway companies in Poland to identify examples of CSR activities and benefits. Wolak-Tuzimek (2017) analysed good CSR practices of businesses operating in Poland, comparing the author's survey findings with a national survey conducted in 2014, 2015, and 2016, covering responses from more than 100 companies per survey and year. On the other hand, somewhat different conclusions were reached by Dos and Pattarin (2021), who analysed the drivers of CSR activities among business companies in Poland. They concluded that most businesses invest in CSR activities only under pressure from normative or regulatory instruments. By these conclusions, they demonstrated again that most of the delivered CSR activities are determined by developed business strategies. In other words, the delivered CSR activities need to help companies achieve specific business objectives. From the perspective of the relationship between CSR activities and business objectives, Zielinski and Jonek-Kowalska (2021) analysed the link between CSR activities and the profitability of electricity-producing companies in Poland, comparing companies that declared socially responsible behaviour with those that did not. Similarly, Grabinska et al. (2021) analysed the association between the engagement of high-tech companies in Poland in CSR activities

and their attractiveness to investors, using a sample of 92 companies and data for 2014-2018. Nawrocki and Szwajca (2021) analysed the engagement of energy companies in Poland in CSR activities using a sample of six joint-stock energy companies and their annual report data for 2016-2020. However, cooperation with contractors, who represent strategic stakeholders, may be more important. In other words, delivered CSR activities must always find their target audience, as demonstrated by Wozniak and Jurczyk (2022), who analysed local community perceptions of CSR activities by lignite mining companies in Poland. They demonstrated how important it is to communicate the impacts and benefits of CSR activities to stakeholder communities to achieve their positive impact.

In Slovakia, as in Czechia and Poland, CSR research focuses more on the entire CSR practice than on particular CSR pillars. Moravcikova et al. (2015) conducted a secondary analysis of international surveys on the communication of CSR activities through CSR reports to assess the intensity of CSR communication by international businesses, including those operating in Slovakia. However, the intensity of communication about CSR activities must be balanced with the valuable benefits they offer to both businesses and the target stakeholder communities engaged in them. This fact was demonstrated, for example, by Krizanova and Gajanova (2016), who analysed the attitudes of businesses operating in Slovakia toward CSR activities using a sample of 47 companies that declared engagement in CSR activities. They confirmed that businesses surveyed voluntarily and rationally invest in CSR activities. Similar conclusions were reached by Dubravska et al. (2020), who analysed the association between the implementation of CSR activities and the profitability of surveyed companies using a sample of 200 of the largest businesses operating in various industries in Slovakia. The positive effect of implemented CSR activities on the profitability can be mediated by improved brand value, which was demonstrated, for example, by Kadekova et al. (2020) who analyzed the impact of CSR activities on brand value perceived by stakeholder communities (business partners, employees, customers, etc.) in domestic-owned and foreign-owned food companies in Slovakia using a sample of one hundred and twenty-five companies. Similarly, Hincica et al. (2021) analysed the engagement of logistics companies operating in Slovakia in CSR activities using a sample of twenty-nine companies. However, greater engagement in CSR activities was evident among companies with CSR specialists or departments and among foreign-owned companies.

From the perspective of Central European countries, Nagy et al. (2022) analysed the association between CSR activities and financial performance using a sample of 35 publicly listed companies that reported CSR activities and operated in Visegrad countries. They confirmed a positive association between CSR activities and the financial results of surveyed companies, plus improved company image resulting from the engagement in CSR activities. Similarly, Dvorsky et al. (2023) analysed the impact of implementing CSR activities on the financial performance of small and medium-sized businesses using a sample of 1,090 companies operating in four Central European countries. They confirmed a positive impact of CSR activities on the financial performance of surveyed companies.

The literature review of research on CSR activities of business companies in Czechia, Poland, and Slovakia is more exemplary than exhaustive. However, it provides an overview of business companies' engagement in CSR activities in Czechia, Poland, and Slovakia over recent years. The engagement of business companies in CSR activities is increasing across countries and industries. Business companies are, to varying degrees, voluntarily engaged in a wide range of CSR activities. In socially responsible activities, businesses commonly promote initiatives such as equal opportunities, a safe working environment, work-life balance, local communities, and corporate volunteering. However, they still primarily invest in activities that deliver the greatest added value to both the company and stakeholder communities.

METHODOLOGY

The analysis of specifics in socially responsible activities of business companies of different industries, sizes, and regional coverage is founded on the results of a questionnaire survey performed within the project “Corporate Social Responsibility in Business Practice of the Visegrad Region (Visegrad Grant no. 22220149)”. Data collection was done from January to November 2023. Representatives of business companies operating in Czechia, Poland, and Slovakia that have declared CSR activities

were addressed via email. The intention was to obtain data from a roughly equal number of companies across countries, industries, sizes, and regions. Finally, relevant data were obtained from 300 business companies (100 from each country). The representatives of the business companies were owners, executive directors, CSR or PR managers, and other managers, such as HR managers.

The online questionnaire comprised 53 questions, organised into five sections, and investigated the current state of CSR practice in businesses in Czechia, Poland, and Slovakia. The questionnaire was translated into the respondents' national language to improve understanding of the statements. The questionnaire was secured before being automatically filled out by a computer. Also, the questionnaire includes a control question to eliminate heterogeneity in respondents' opinions (non-consistent responses). This respondent was rejected from the evaluation of the sample dataset.

The article analyzes data concerning socially responsible activities provided by surveyed business companies, namely: (1) respect for equal job opportunities (gender, age, etc.), (2) support of employee voluntary activities, (3) application of business ethics, (4) cooperation with local communities (schools, non-profit organizations, local governments, etc.), (5) employee care beyond legal obligations (safety, health, etc.), (6) employee training beyond legal obligations (additional training, retraining, etc.), (7) assistance to dismissed employees beyond legal obligations (retraining, recruitment, etc.), and (8) employee work-life balance (flexible working arrangements, family-friendly policies, etc.). These numbers are used in the text to identify particular socially responsible activities. The engagement of business companies in particular socially responsible activities was evaluated on a scale from not at all to very strongly. The article contains the following statistical hypothesis (hereinafter – SH) formulations:

SH1: Dependencies between socially responsible activities across countries are statistically significant with medium and large strong correlations.

SH2: There are no statistically significant differences in the engagement of surveyed businesses in Czechia, Poland, and Slovakia in socially responsible activities, depending on industry (SH2A), size (SH2B), or regional coverage (SH2C).

The statistical hypotheses (SH1, SH2A, SH2B, and SH2C) were verified with the application of the statistical methods. The research data were evaluated using the following statistical methods: sorting by a single statistical sign, sorting by two statistical signs, and sorting by absolute values (total number of respondents) for each of the single or two statistical signs. Also, the correlation analysis: Pearson´s correlation coefficients were calculated. A t-test was used to verify the statistical significance of Pearson´s pairwise correlation coefficients. These statistical methods are fundamental tools for presenting the main results from the questionnaire and the dependencies among its statements. Sample data were validated because they were representative of the primary criterion for SMEs (enterprise size) across three Central European countries.

The analysis using Microsoft Excel includes the evaluation of responses on the country (Czechia, Poland, Slovakia), industry (production-, trade-, and service-oriented business companies), size (small, medium-sized, and large business companies), and regional coverage (one region-, more region-, and whole country-oriented companies). The structure of the surveyed business companies by country, industry, size, and regional coverage is shown in Table 1.

Table 1. The structure of the surveyed business companies

Country	**Industry**		**Size***		**Regional Coverage**	
Czechia	Production:	22%	Small:	40%	One region:	37%
	Trade:	33%	Medium-sized:	20%	More regions:	31%
	Services:	45%	Large:	40%	Whole country:	32%
Poland	Production:	38%	Small:	40%	One region:	8%
	Trade:	27%	Medium-sized:	20%	More regions:	14%
	Services:	35%	Large:	40%	Whole country:	78%
Slovakia	Production:	39%	Small:	40%	One region:	41%
	Trade:	35%	Medium-sized:	20%	More regions:	37%
	Services:	26%	Large:	40%	Whole country:	22%
* Small (0-49 employees), medium-sized (50-249 employees), large (250+ employees)						

Note: compiled by the authors

The evaluation of responses involves comparing response frequencies and performing a Pearson's correlation analysis at the 0.05 significance level. Specifics in socially responsible activities of 300 business companies of different industries, sizes, and regional coverage operating in Czechia, Poland, and Slovakia are analyzed to reveal which are the most common socially responsible activities across surveyed business companies in Czechia, Poland, and Slovakia (RQ1) and what are the differences in the engagement of surveyed business companies in Czechia, Poland, and Slovakia in socially responsible activities depending on the industry, size, and regional coverage (RQ2).

The analysis revealed that approximately a third of surveyed businesses in Czechia (27%), Poland (34%), and Slovakia (43%) engage in strategic planning for CSR activities, including socially responsible activities. In Czechia, these are primarily large, service-oriented businesses operating nationwide. In Poland, these are primarily large, production-oriented businesses operating nationwide. In Slovakia, these are primarily large, production-oriented businesses operating across more regions. In the country comparison, minor differences appear depending on the industry and regional coverage. However, the standard view is that strategic planning for CSR activities is primarily the domain of large businesses, which typically plan most of their operations. On the other hand, no strategic planning for CSR activities was evident in most small businesses, regardless of industry or regional coverage. Pearson's correlation analysis across countries revealed a moderate positive association between the strategic planning of CSR activities and the size of business companies ($r = 0.337$), which may confirm the well-known fact that larger business companies tend to plan their CSR activities more strategically.

RESULTS

In Czechia, the surveyed business companies are strongly engaged in (1) respect for equal job opportunities (51%), (3) application of business ethics (47%), (5) employee care beyond legal obligations (43%), and (6) employee training beyond legal obligations (42%). In Poland, the surveyed business companies are strongly engaged in (5) employee care beyond legal obligations (32%), (3) application of business ethics (28%), (4) cooperation with local communities (25%), and (8) employee work-life balance (25%). In Slovakia, the surveyed business companies are strongly engaged in (1) respect for equal job opportunities (57%), (2) support of employee voluntary activities (54%), (3) application of business ethics (49%), and (4) cooperation with local communities (46%). There are minor differences in the extent to which the surveyed businesses engage in socially responsible activities. Table 2 shows the correlation matrix with dependencies between socially responsible activities across countries.

Table 2. Pearson's coefficients of correlation

Socially responsible activity	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Respect for equal job opportunities	1	-	-	-	-	-	-	-
Support of employee voluntary activities	0.614^{***}	1	-	-	-	-	-	-
Application of business ethics	0.572^{***}	0.699^{***}	1	-	-	-	-	-
Cooperation with local communities	0.434^{**}	0.655^{***}	0.647^{***}	1	-	-	-	-
Employee care beyond legal obligations	0.554^{***}	0.703^{***}	0.785^{***}	0.710^{***}	1	-	-	-
Employee training beyond legal obligations	0.500^{***}	0.651^{***}	0.711^{***}	0.682^{***}	0.804^{***}	1	-	-
Assistance to dismissed employees beyond legal obligations	0.434^{**}	0.614^{***}	0.580^{***}	0.527^{***}	0.585^{***}	0.619^{***}	1	-
Employee work-life balance	0.493^{**}	0.605^{***}	0.718^{***}	0.596^{***}	0.774^{***}	0.691^{***}	0.602^{***}	1
Pearson coefficient of correlation is statistically significant at the level of significance at $^{*}\alpha = 0.05$; $^{**}\alpha = 0.01$; $^{***}\alpha = 0.001$								

Note: compiled by the authors

The results confirmed that the dependencies between socially responsible activities across countries are statistically significant. However, across countries, the surveyed business companies pay dominant attention to (3) – 43% as well as to (5) – 41%, (6) – 36%, (1) – 36%, or (4) – 34%. Moreover, Pearson's correlation analysis revealed strong positive associations among specific socially responsible activities (see Table 2). For example, there is a very strong positive association between (6) and (5) – r = 0.804 or between (5) and (3) – r = 0.785. This demonstrates that the surveyed businesses typically offer sets of purposefully related socially responsible activities. Also, Table 2 shows that these dependences are medium-strong (the value of the coefficient of correlation is between 0.4 and 0.7) and large-strong (the value of the coefficient of correlation is greater than 0.7). Hypothesis 1 (SH1) was accepted.

Table 3 summarises the most common socially responsible activities across countries and industries.

Table 3. The most common socially responsible activities from the industry perspective

Country	Industry	Socially responsible activities
Czechia	Production	(3) Application of business ethics (6) Employee training beyond legal obligations (5) Employee care beyond legal obligations
	Trade	(1) Respect for equal job opportunities (5) Employee care beyond legal obligations (2) Support of employee voluntary activities
	Services	(3) Application of business ethics (1) Respect for equal job opportunities (6) Employee training beyond legal obligations
Poland	Production	(3) Application of business ethics (5) Employee care beyond legal obligations (4) Cooperation with local communities
	Trade	(8) Employee work-life balance (5) Employee care beyond legal obligations (3) Application of business ethics
	Services	(5) Employee care beyond legal obligations (4) Cooperation with local communities (8) Employee work-life balance
Slovakia	Production	(3) Application of business ethics (4) Cooperation with local communities (1) Respect for equal job opportunities
	Trade	(1) Respect for equal job opportunities (3) Application of business ethics (2) Support of employee voluntary activities
	Services	(1) Respect for equal job opportunities (3) Application of business ethics (5) Employee care beyond legal obligations

Note: compiled by the authors

The most common socially responsible activities are very similar across countries and industries. They include (1) respect for equal job opportunities, (3) application of business ethics, and (5) employee care beyond legal obligations. The results (see Table 3) confirmed that there exist statistically significant differences between business sectors across countries. The statistical hypothesis 2A (SH2A) was accepted.

From a size perspective, business companies in all three countries show similar patterns of engagement in socially responsible activities. Small and medium-sized firms mainly focus on equal job opportunities, business ethics, and employee care or training beyond legal obligations. Large enterprises tend to demonstrate broader strategic planning and higher involvement in employee development, work-life balance, and support for

voluntary initiatives. Overall, participation intensity increases with company size, but cross-country differences remain minor.

Table 4 summarises the most common socially responsible activities in countries and the sizes of businesses.

Table 4. The most common socially responsible activities from the size perspective

Country	Size	Socially responsible activities
Czechia	Small	(1) Respect for equal job opportunities (3) Application of business ethics (5) Employee care beyond legal obligations
	Medium-sized	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
	Large	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
Poland	Small	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
	Medium-sized	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
	Large	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
Slovakia	Small	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
	Medium-sized	(4) Cooperation with local communities (1) Respect for equal job opportunities (5) Employee care beyond legal obligations
	Large	(8) Employee work-life balance (6) Employee training beyond legal obligations (7) Assistance to dismissed employees beyond legal obligations

Note: compiled by the authors

Pearson's correlation analysis revealed negligible or weak positive associations between specific socially responsible activities and the size of businesses. The most common socially responsible activities are similar across countries and sizes. They include (1) respect for equal job opportunities, (2) support of employee voluntary activities, and (3) application of business ethics. There are minor differences between medium-sized and large companies in Slovakia and other business companies. The results (see Table 4) confirmed that there are statistically significant differences in enterprise types (by number of employees) across countries. The statistical hypothesis 2B (SH2B) was accepted.

From a regional coverage perspective, businesses in all three countries exhibit comparable patterns of socially responsible engagement. Firms operating across multiple regions or nationwide tend to be more involved in CSR initiatives, particularly in business ethics, equal job opportunities, and employee care beyond legal obligations. Local, single-region firms also participate in CSR, though their efforts are usually less structured and less strategic. Overall, the findings indicate that the wider a company's regional coverage, the stronger its CSR commitment, especially toward community cooperation and employee-related initiatives, while cross-country differences remain statistically insignificant.

Table 5 sums up the most common socially responsible activities in particular countries and the regional coverage of business companies.

Table 5. The most common socially responsible activities from the regional coverage perspective

Country	Regional coverage	Socially responsible activities
Czechia	One region	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics
	More regions	(1) Respect for equal job opportunities (3) Application of business ethics (5) Employee care beyond legal obligations
	Whole country	(3) Application of business ethics (1) Respect for equal job opportunities (5) Employee care beyond legal obligations
Poland	One region	(3) Application of business ethics (4) Cooperation with local communities (5) Employee care beyond legal obligations
	More regions	(3) Application of business ethics (5) Employee care beyond legal obligations (4) Cooperation with local communities
	Whole country	(5) Employee care beyond legal obligations (3) Application of business ethics (4) Cooperation with local communities
Slovakia	One region	(1) Respect for equal job opportunities (3) Application of business ethics (4) Cooperation with local communities
	More regions	(3) Application of business ethics (1) Respect for equal job opportunities (5) Employee care beyond legal obligations
	Whole country	(1) Respect for equal job opportunities (2) Support of employee voluntary activities (3) Application of business ethics

Note: compiled by the authors

Pearson's correlation analysis revealed negligible or weak negative associations between specific socially responsible activities and the regional coverage of businesses. The most common socially responsible activities are very similar across countries and regional coverage. They include (1) respect for equal job opportunities, (3) application of business ethics, (4) cooperation with local communities, and (5) employee care beyond legal obligations. The results (see Table 5) confirmed that there are statistically significant differences in regional coverage (types: one region, more regions, whole countries) across countries. The statistical hypothesis 2C (SH2C) was accepted.

DISCUSSION

The analysis of specifics in socially responsible activities of 300 business companies of different industries, sizes, and regional coverage operating in Czechia, Poland, and Slovakia uncovered that the most common socially accountable activities across surveyed business companies in Czechia, Poland, and Slovakia (RQ1) are (1) respect for equal job opportunities, (3) application of business ethics, (4) cooperation with local communities, (5) employee care beyond legal obligations, and (6) employee training beyond legal obligations. The engagement of surveyed businesses in these socially responsible activities aligns with the fundamental purpose of the social pillar of Corporate Social Responsibility (Matei et al., 2021). They help businesses ensure a positive impact of business activities on the well-being of stakeholder communities, mainly employees and customers, by complying with fair and non-discriminatory practices (Newey et al., 2023) and by promoting better working and living conditions (Diamantis & Puhr, 2022).

The analysis uncovered negligible differences in the engagement of surveyed businesses in Czechia, Poland, and Slovakia in socially responsible activities across industries, sizes, and regions (RQ2).

The most common socially responsible activities from the industry, size, and regional coverage perspectives align with those across countries. In other words, the most common socially responsible activities of the surveyed companies are very similar across countries, industries, sizes, and regional coverage. It could be said that the socially responsible activities of the surveyed business companies follow commonly known and proven CSR strategies and policies (Nardi et al., 2021), aiming to meet the requirements and expectations associated with socially responsible behaviour (Koseoglu et al., 2021).

Surveyed business companies pay dominant attention to (1) respect for equal job opportunities, (3) application of business ethics, (4) cooperation with local communities, and (5) employee care beyond legal obligations. Moreover, strong positive associations among specific socially responsible activities of the surveyed businesses were uncovered. For example, (5) employee care beyond legal obligations is very strongly positively associated with (3) application of business ethics and (4) cooperation with local communities. Alternatively, (8) employee work-life balance is very strongly positively associated with (3) application of business ethics and (5) employee care beyond legal obligations.

The associations revealed could explain the need to provide socially responsible activities as a system (Galbreath et al., 2022), helping to meet both business and stakeholder community goals (Grofcikova et al., 2020). Such a concept of socially responsible activities requires a strategic approach grounded in meaningful CSR strategies implemented alongside business strategies (Siltaloppi et al., 2021). In general, however, all CSR activities should be driven by voluntarism rather than normative or regulatory pressures (Knott & Wilson, 2024). In addition, the return on investment in socially responsible activities depends on their effective communication to target stakeholder communities, especially employees and customers, whose decisions are influenced by businesses' socially responsible behaviour (Kliestikova, 2017).

Suggestions arising from the analysis relate to the strategic approach and to a focus on socially responsible activities, including compliance with business ethics and equal job opportunities; contributions to employee work-life balance and voluntary activities; employee care beyond legal obligations; and cooperation with local communities. The surveyed businesses should focus more on strategic planning for CSR activities, including socially responsible initiatives, in line with environmentally and economically responsible practices. Learning and understanding the needs of stakeholder communities should be part of this process. Any socially responsible activities should be targeted at specific issues related to people's working and living conditions. Businesses should focus on socially responsible activities that deliver the greatest value to the largest number of people. Such activities should specifically include the respect for equal job opportunities (gender, age, etc.), the application of business ethics, cooperation with local communities (schools, non-profit organisations, local governments, e.g. Vierербl & Koch, 2022), employee care beyond legal obligations (safety, health, e.g., Hsieh et al., 2022), and the employee work-life balance (flexible working arrangements, family-friendly policies, e.g., Stojanović et al., 2022). Future research on socially responsible activities could focus on the impact of specific socially responsible activities across stakeholder communities, from founders, owners, and shareholders to managers and employees, and from suppliers and customers to government institutions and local communities.

CONCLUSION

The analysis of specifics in socially responsible activities of business companies of different industries, sizes, and regional coverage operating in Central Europe (Czechia, Poland, and Slovakia) aimed to uncover which are the most common socially responsible activities across surveyed business companies across countries and what are the differences in the engagement of surveyed business companies in socially responsible activities depending on the industry, size, and regional coverage.

The findings revealed negligible differences in the engagement of the surveyed businesses in socially responsible activities. The most common socially responsible activities of surveyed businesses are very similar across countries, industries, sizes, and regional coverage. They include respect for equal job opportunities, adherence to business ethics, cooperation with local communities, and employee care beyond legal obligations. These socially responsible activities relate to people's working and living conditions and deliver the greatest value to the most significant number of people. To meet their

purpose, they should be founded on the understanding of the needs of stakeholder communities. This should be part of the strategic planning process for CSR activities to meet both business and stakeholder community goals.

The research findings and suggestions have some limitations. They could be challenged by a relatively small number of surveyed businesses across different industries, sizes, and regional coverage. Data collection was realised with the main criterion of the size of the company. Also, additional demographic characteristics were not evaluated, such as the legal form of enterprise, the length of business, and so on. Also, data collection was conducted in only three Central European countries, with a minimal impact on the range of the business environment across the European Union.

Further research arising from the findings and suggestions could examine the impacts of specific socially responsible activities on stakeholder communities. Their knowledge could improve the strategic planning and implementation of socially responsible activities with a clear purpose and high added value. The findings could be beneficial for both theory and practice.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: MS, RS and IR; research design: MS, RS, IR, ZP and ZM; data collection: MS; analysis and interpretation: MS, RS, IR, ZP and ZM; writing draft preparation: MS, RS and IR; supervision: IR, ZP and ZM; correction of article: MS, RS, IR, ZP and ZM; proofreading and final approval of article: MS. All authors have read and agreed to the published version of this manuscript.

REFERENCES

An, S. B., & Yoon, K. C. (2021). The effects of socially responsible activities on management performance of internationally diversified firms: Evidence from the KOSPI Market. *The Journal of Asian Finance, Economics and Business*, *8*(3), 251-265. https://doi.org/10.13106/jafeb.2021.vol8.no3.0251

Babu, N., De Roeck, K., Rivkin, W., & Bhattacharya, S. (2023). I can do good even when my supervisor is bad: Abusive supervision and employee socially responsible behaviour. *Journal of Occupational and Organizational Psychology*. *97*(2), 555-578. https://doi.org/10.1111/joop.12482

Bahta, D., Yun, J., Islam, M. R., & Bikanyi, K. J. (2021). How does CSR enhance the financial performance of SMEs? The mediating role of firm reputation. *Economic Research-Ekonomska Istraživanja*, *34*(1), 1428-1451. https://doi.org/10.1080/1331677X.2020.1828130

Belás, J., Jr., Petráková, Z., Streimikis, J., & Kozová, K. (2024). Participative management style in SMEs: Influence of CSR factors. Empirical evidence from the Visegrad Group. *Journal of International Studies, 17*(3), 133-147. https://doi.org/10.14254/2071-8330.2024/17-3/7

Ben Hmiden, O., Rjiba, H., & Saadi, S. (2022). Competition through environmental CSR engagement and cost of equity capital. *Finance Research Letters*, *47,* 102773. https://doi.org/10.1016/j.frl.2022.102773

Blajer-Golebiewska, A., & Vasa, L. (2024). Effect of reputation and social media on the financial performance of SMEs – a comparison between selected business sectors. *Journal of Business Sectors*, *2*(1), 21–31. https://doi.org/10.62222/ADXS7200

Burksaitiene, D., Jegelaviciute, R., Grencikova, A., Krajco, K., & Sokol, J. (2019). Economic indicators paradigm on the labour market in Lithuania and Slovakia. *Engineering Economics*, *30*(5), 612-620. https://doi.org/10.5755/j01.ee.30.5.23599

Cincilova, S., & Toporova, V. (2022). ESR-CSR congruence assessment of Czech brewery. In F. Bezzina (Ed.) *Proceedings of the 17th European Conference on Management, Leadership, and Governance (ECMLG 2021)* (pp. 125-132). https://doi.org/10.34190/MLG.21.056

Diamantis, D., & Puhr, R. (2022). Corporate social responsibility and work-life balance provisions for employee quality of life in hospitality and tourism settings. *Worldwide Hospitality and Tourism Themes*, *14*(3), 207-209. https://doi.org/10.1108/WHATT-02-2022-0026

Dohnalova, M., & Legnerova, K. (2018). Corporate social responsibility as a new approach to the employees' satisfaction. In T. Loster & T. Pavelka (Eds.), *12th International Days of Statistics and Economics* (pp. 373-382). Melandrium. https://msed.vse.cz/msed_2018/article/89-Dohnalova-Marie-paper.pdf

Dos, A., & Pattarin, F. (2021). Drivers of CSR anchoring in transition economies: Evidence from Poland. *Business Ethics the Environment & Responsibility*, *30*(4), 507-521. https://doi.org/10.1111/beer.12363

Dubravska, M., Marchevska, M., Vasanicova, P., Kotulic, R. (2020). Corporate social responsibility and environmental management linkage: An empirical analysis of the Slovak Republic. *Sustainability*, *12*(13), 5431. *https://doi.org/10.3390/su12135431*

Dvorsky, J., Svihlikova, I., Kozubikova, L., Frajtova Michalikova, K., & Balcerzak, A. P. (2023). Effect of CSR implementation and crisis events in business on the financial management of SMEs. *Technological and Economic Development of Economy*, *29*(5), 1496-1519. https://doi.org/10.3846/tede.2023.19821

Galbreath, J., Lucianetti, L., Tisch, D., Thomas, B. (2022). Firm strategy and CSR: the moderating role of performance management systems. *Journal of Management & Organization*, *28*(1), 202-220. https://doi.org/10.1017/jmo.2020.27

García-Piqueres, G., & García-Ramos, R. (2022). Complementarity between CSR dimensions and innovation: behaviour, objective, or both? *European Management Journal*, *40*(4), 475-489. https://doi.org/10.1016/j.emj.2021.07.010

Grabinska, B., Kedzior, D., Kedzior, M., & Grabinski, K. (2021). The impact of CSR on the capital structure of high-tech companies in Poland. Sustainability. 13(10), 5467. https://doi.org/10.3390/su13105467

Green Paper (2001). Green Paper. Promoting a European Framework for Corporate Social Responsibility. Commission of the European Communities. Retrieved October 15, 2025, from https://ec.europa.eu/commission/presscorner/api/files/document/print/en/doc_01_9/DOC_01_9_EN.pdf

Grofcikova, J., Izakova, K., & Skvareninova, D. (2020). Impact of corporate governance on CSR in Slovak insurance companies. In N. Tsounis & A. Vlachvei (Eds.), Advances in Cross-Section Data Methods in Applied Economic Research (571-592). Springer. https://doi.org/10.1007/978-3-030-38253-7_37

Guan, X., Ahmad, N., Sial, M. S., Cherian, J. & Han, H. (2023). CSR and organizational performance: The role of pro-environmental behavior and personal values. Corporate Social Responsibility and Environmental Management, 30(2), 677-694. https://doi.org/10.1002/csr.2381

Hąbek, P. (2017). CSR reporting practices in Visegrad group countries and the quality of disclosure. Sustainability, 9(12), 2322. https://doi.org/10.3390/su9122322

Hendrickx, F. (2018). The European social pillar: A first evaluation. European Labour Law Journal, 9(1), 3-6. https://doi.org/10.1177/2031952518759987

Hincica, V., Malikova, M., & Rezankova, H. (2021). Logistics social responsibility: Understanding and development of the concept in the Slovak Republic. Management: Journal of Contemporary Management Issues, 26(1), 111-128. https://doi.org/10.30924/mjcmi.26.1.7

Hincica, V., Rezankova, H., & Breckova, J. (2022). Perception of CSR by Czech consumers – an in-depth analysis. Management: Journal of Contemporary Management Issues, 27(1), 97-121. https://doi.org/10.30924/mjcmi.27.1.7

Hommerova, D., Sredl, K., Vrbkova, L., & Svoboda, R. (2020). The perception of CSR activities in a selected segment of McDonald's customers in the Czech Republic and its effect on their purchasing behavior. Sustainability, 12(20), 8627. https://doi.org/10.3390/su12208627

Hsieh, Y.-C., Weng, J., Pham, N.T., Yi, L.-H. (2022). What drives employees to participate in corporate social responsibility? A personal characteristics - CSR capacity - organizational reinforcing model of employees' motivation for voluntary CSR activities. International Journal of Human Resource Management, 33 (18), 3703-3735. https://doi.org/10.1080/09585192.2021.1967422

Isacowitz, J. J., Schmeidl, S., & Tabelin, C. (2022). The operationalization of Corporate Social Responsibility (CSR) in a mining context. Resources Policy, 79. https://doi.org/10.1016/j.resourpol.2022.103012

Kadekova, Z., Savov, R., Kosiciarova, I, & Valaskova, K. (2020). CSR activities and their Impact on brand value in food enterprises in Slovakia based on foreign participation. Sustainability, 12(12), 4856. https://doi.org/10.3390/su12124856

Khan, K. A., Akhtar, M. A., Vishwakarma, R., K., & Hoang, H. C. (2023). A sectoral perspective on the sustainable growth of SMEs. Empirical research in the V4 countries. Journal of Business Sectors, 1(1), 10-19. https://doi.org/10.62222/CVFW6962

Kliestikova, J. (2017). CSR reporting in specific conditions of the Slovak Republic. New Trends and Issues Proceedings on Humanities and Social Sciences, 3(4), 159-167. https://doi.org/10.18844/prosoc.v3i4.1544

Knežević, G., Pavlović, V., & Bojičić, R. (2023). Does gender diversity improve CSR reporting? Evidence from the Central and West Balkan banking sector. Economics and Sociology, 16(3), 261-280. https://dx.doi.org/10.14254/2071-789X.2023/16-3/14

Knott, S., & Wilson, J.P. (2024). Core charitable purpose and voluntary CSR activities in charity organizations: do they conflict? Social Responsibility Journal, 20(6), 1056-1071. https://dx.doi.org/10.1108/SRJ-09-2023-0498

Kogut, J., & Brozek, K. (2015). Corporate social responsibility with the example of railway companies in Poland. In T. Loster & T. Pavelka (Eds.), 9th International Days of Statistics and Economics (pp. 811-820). Melandrium. Retrieved October 15, 2025, from https://msed.vse.cz/msed_2015/article/75-Kogut-Justyna-paper.pdf

Konecny, F. (2019). Does approach to CSR differ in family and non-family firms? Case of Czech Republic. In K. S. Soliman (Ed.), Proceedings of the 34th International Business Information Management Association (IBIMA) Conference (pp. 8851-8861). IBIMA. Retrieved October 15, 2025, from https://ibima.org/accepted-paper/does-approach-to-csr-differs-in-family-and-non-family-firms-case-of-czech-republic/

Koseglu, M. A., Hon, A., Kalargyrou, V., & Okumus, F. (2021). Hiring people with disabilities as a CSR strategy in the tourism industry. Tourism Analysis, 26(1), 41-55. https://doi.org/10.3727/108354220X15758302602547

Krizanova, A., & Gajanova, L. (2016). The importance of CSR implementation. In CBU International Conference Proceedings 2016 (pp. 515-519). https://doi.org/10.12955/cbup.v4.807

Kucharcikova, A., & Miciak, M. (2018). Human cap-

ital management in transport enterprises with the acceptance of sustainable development in the Slovak Republic. Sustainability, 10(7). https://doi.org/10.3390/su10072530

Lee, S., Han, H., Radic, A., & Toriq, B. (2020). Corporate social responsibility (CSR) as a customer satisfaction and retention strategy in the chain restaurant sector. Journal of Hospitality and Tourism Management, 45, 348-358. https://doi.org/10.1016/j.jhtm.2020.09.002

Magee, R. G. (2019). Environmental worldview beliefs and CSR advertising. Social Responsibility Journal, 15(3), 379-394. https://doi.org/10.1108/SRJ-11-2017-0229

Matei, F. B., Boboc, C., & Ghita, S. (2021). The relationship between corporate social responsibility and financial performance in Romanian companies. Economic Computation and Economic Cybernetics Studies and Research, 55(3), 297-314. https://doi.org/10.24818/18423264/55.3.21.19

Matouskovi, E. (2022). Comparison of economic cycles of the Slovak economy and other Visegrad Four countries. Public Finance Quarterly, 67(3), 463-481. https://doi.org/10.35551/PFQ_2022_3_9

Metzker, Z. (2025). The Impact of Financial Management on the CSR Perception in the SME Segment. Journal of Business Sectors, 3(1), 61–70. https://doi.org/10.62222/PIKE8611

Moravcikova, K., Stefanikova, L., & Rypakova, M. (2015). CSR reporting as an important tool of CSR communication. Procedia Economics and Finance, 26, 332-338. https://doi.org/10.1016/S2212-5671(15)00861-8

Nagy, M., Valaskova, K., & Durana, P. (2022). The effect of CSR policy on earnings management behavior: Evidence from Visegrad publicly listed enterprises. Risks, 10(11), 203. https://doi.org/10.3390/risks10110203

Nardi, L., Zenger, T., Lazzarini, S. G., & Cabral, S. (2021). Doing well by doing good, uniquely: Materiality and the market value of unique CSR strategies. Strategy Science, 7(1), 10-26. https://doi.org/10.1287/stsc.2021.0145

Nawrocki, T. L., & Szwajca, D. (2021). A multidimensional comparative analysis of involvement in CSR activities of energy companies in the context of sustainable development challenges: Evidence from Poland. Energies, 14(15), 4592. https://doi.org/10.3390/en14154592

Newey, L. R., de Oliveira, R. T., & Mishra, A. (2023). Well-being as a staged social responsibility process: exploratory testing of a new theory. Social Responsibility Journal, 19(2), 286-304. https://doi.org/10.1108/SRJ-09-2021-0394

Oliinyk, O., Mishchuk, H., Vasa, L., & Kozma, K. (2023). Social Responsibility: Opportunities for Integral Assessment and Analysis of Connections with Business Innovation. Sustainability, 15(6), 5608. https://doi.org/10.3390/su15065608

Rizwan, K. F., & Jenita, A. M. A. (2022). An analysis of impact of CSR practices on investment behaviour. Journal of Statistics and Management Systems, 25(5), 1011-1020. https://doi.org/10.1080/09720510.2022.2083828

Semenikhina, V., Pochtovyuk, A., & Onyshchenko, O. (2023). Social and environmental components of social responsibility of industrial companies in the conditions of a digital and sustainability economy. Auspicia, 1, 18-33. https://doi.org/10.36682/a_2023_1_2

Siltaloppi, J., Rajala, R. & Hietala, H. (2021). Integrating CSR with Business Strategy: A Tension Management Perspective. Journal of Bussiness Ethics 174, 507–527 https://doi.org/10.1007/s10551-020-04569-3

Shim, J. M., Lee, W. S., Moon, J., & Song, M. (2021). Coffee shop corporate social responsibility (CSR) and reuse intention using triple bottom line theory. British Food Journal, 123(12), 4421-4435. https://doi.org/10.1108/BFJ-12-2020-1134

Srbova, P., Reznakova, M., Tomaskova, A. (2023). Socially responsible activities and the economic performance of family businesses. EnPress, 7(1). https://doi.org/10.24294/jipd.v7i1.1958

Stojanović, A., Sofranova, N., Arsić, S., Milošević, I., Mihajlović, I. (2022). The effects of CSR activities on business according to employee perception. European Review, 30 (5), 686-707. https://doi.org/10.1017/S1062798721000156

Strouhal, J., Horák, J., Resik, A., Gurvitš-Suits, N., & Kadak, T. (2025). Stakeholders' perceptions on ESG reporting: On the case of Czechia and Estonia. Journal of International Studies, 18(2), 75-93. https://doi.org/10.14254/2071-8330.2025/18-2/4

Tetrevova, L. (2018). Communicating CSR in high profile industries: Case study of Czech chemical industry. Engineering Economics, 29(4), 478-487. https://doi.org/10.5755/j01.ee.29.4.19199

Thakkar, J., Mahanty, B., & Maiti, J. (2020). Editorial for the special section on "TBL (Triple Bottom Line) sustainability and CSR (Corporate Social Responsibility) driven performance measurement systems". International Journal of Productivity and Performance Management, 69(3), 429-430. https://doi.org/10.1108/IJPPM-03-2020-501

Viererbl, B., & Koch, T. (2022). The paradoxical effects of communicating CSR activities: Why CSR communication has both positive and negative effects on the perception of a company's social responsibility. Public Relations Review, 48(1), 102134. https://doi.org/10.1016/j.pubrev.2021.102134

Wolak-Tuzimek, A. (2017). Good practices of Polish enterprises in areas of corporate social responsibility. In T. Loster & T. Pavelka (Eds.), 11th International Days of Statistics and Economics (pp. 1863-1872). Melandrium. Retrieved October 15, 2025, from https://msed.vse.cz/msed_2017/article/115-Wolak-Tuzimek-Anna-paper.pdf

Wozniak, J., & Jurczyk, W. (2022). SLO in CSR perspective – A comparative case study from Poland

(2018-2020). Resources Policy, 77, 102654. https://doi.org/10.1016/j.resourpol.2022.102654

Ylipulli, J., Hämäläinen, J. ., & Palo, E. (2025). Radical digital agency as a foundation for just and sustainable smart cities. Human Technology, 21(1), 6–34. https://doi.org/10.14254/1795-6889.2025.21-1.1

Zielinski, M., & Jonek-Kowalska, I. (2021). Does CSR affect the profitability and valuation of energy companies? An example from Poland. Energies, 14(12), 3668. https://doi.org/10.3390/en14123668

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Labor Migration in the Context of Brexit and the 2030 Agenda: The Slovak Case

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ABSTRACT

This research paper examines the potential impact of Brexit on Slovak workers' motivation to pursue employment opportunities in the UK. The purpose of this study is to assess the impact of Brexit on labor migration from Slovakia to the UK and to analyze the migration intentions and institutional perceptions of Slovak workers in the context of the 2030 Agenda. The research methodological framework is based on quantitative methods, including questionnaire surveys, descriptive statistics, and chi-square hypothesis testing, supported by graphical analyses. The empirical base comprises results from a survey of Slovak workers with work experience in the UK, selected from a sample of 867 valid questionnaires collected in 2022 as part of an international research project. The results have indicated that, to some extent, Brexit will also affect the labor market in Slovakia, as some Slovaks working in the UK intend to return to Slovakia after Brexit comes into force, up to 21% of respondents have no intention of returning to the UK for work. However, a larger share of Slovak workers currently working in the UK will not feel affected by Brexit, facing increased bureaucracy or differential treatment, as 72% of the 158 respondents with UK work experience plan to return to the UK for work. The prospects for further research include conducting a cross-country comparative analysis of labor migration, an in-depth study of the sectoral structure of migration flows, and an assessment of the long-term consequences of Brexit for the sustainability of labor markets.

KEYWORDS: Human Capital, Labor Market, Labor Economics, Migration, International Migration, Migration Strategy, Slovak Workers, United Kingdom

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Трудовая миграция в контексте Brexit и реализации Повестки-2030: опыт Словакии

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АННОТАЦИЯ

Настоящее исследование посвящено углублённому анализу потенциального влияния Brexit на мотивацию словацких работников к трудоустройству в Великобритании. Целью исследования является оценка воздействия Brexit на трудовую миграцию из Словакии в Великобританию, а также анализ миграционных намерений и институционального восприятия словацких работников в контексте Повестки дня ООН на период до 2030 г. Методологическая основа исследования базируется на количественных методах, включая анкетный опрос, описательную статистику и проверку статистических гипотез с использованием критерия хи-квадрат, с графическим представлением результатов. Эмпирическую базу исследования составляют результаты опроса словацких работников, имеющих опыт трудовой деятельности в Великобритании, отобранные из массива 867 валидных анкет, собранных в 2022 г. в рамках международного исследовательского проекта. Результаты исследования показали, что Brexit в определённой степени окажет влияние и на рынок труда Словакии, поскольку часть словацких работников, занятых в Великобритании, планирует вернуться в Словакию после вступления Brexit в силу, при этом до 21% респондентов не намерены возвращаться в Великобританию для продолжения трудовой деятельности. Вместе с тем более значительная доля словацких работников, уже имеющих опыт работы в Великобритании, не ожидает негативных последствий Brexit в виде усиления бюрократических барьеров или дифференцированного отношения: 72% из 158 опрошенных с опытом работы в Великобритании планируют вновь вернуться в страну для трудоустройства. Перспективы дальнейших исследований связаны с проведением межстранового сравнительного анализа трудовой миграции, углублённым изучением отраслевой структуры миграционных потоков и оценкой долгосрочных последствий Brexit для устойчивости рынков труда.

КЛЮЧЕВЫЕ СЛОВА: человеческий капитал, рынок труда, экономика труда, миграция, международная миграция, миграционная стратегия, словацкие работники, Великобритания

КОНФЛИКТ ИНТЕРЕСОВ: авторы заявляют об отсутствии конфликта интересов.

ФИНАНСИРОВАНИЕ: данное исследование выполнено при поддержке Словацкого агентства по исследованиям и разработкам при Министерстве образования Словацкой Республики в рамках проекта «Формирование процессов управления персоналом в больницах и их влияние на миграцию врачей и медицинских сестёр для работы за рубежом» (регистрационный номер проекта APVV-19-0579).

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INTRODUCTION

The research paper addresses the recent phenomenon of a member country of the European Union (hereinafter – EU) initiating the process of its departure from the EU, marking the first instance in the union's history. As this phenomenon has not previously occurred, it has attracted significant attention from a diverse range of individuals and groups, including those within the European Union and beyond. It was also the fact that the UK's exit from the European Union may set a precedent for future exits by other countries from the EU. The negotiations regarding the rights of UK citizens after leaving the European Union had also attracted attention. This was a complex process in which UK leaders, led by Prime Minister Boris Johnson, sought to guarantee the preservation of as many rights as possible for both EU and UK citizens following the UK's withdrawal from the EU. On the other hand, several national leaders were concerned that citizens of a country that had voluntarily left the European Union would be favored at the expense of their own citizens. This issue is anticipated to have a significant impact on the UK labor market and the EU single labor market, particularly regarding employment and the availability of skilled and unskilled positions across various sectors in both economies.

This paper presents a framework for a new and so far unexplored issue, where the novelty is how the circumstances of Brexit will affect the motivation of Slovak workers to work in the UK after Brexit is in force, and to what extent the UK labor market will suffer from the outflow of labor from EU member states, illustrated by a Slovak case as an example. This paper aims to fill this gap in the literature by assessing the impact of Brexit on labor migration from the Slovak Republic to the UK and whether and how Brexit would affect the inflow of the Slovak labor force to the UK in terms of the Agenda 2030 elements, such as human capital development, multiculturalism and tolerance, development cooperation, contributing to sustainability goals.

The uniqueness of the paper lies in its exploration of the impact of the Brexit issue on labor migration trends, as well as its examination of the parallels and synergies between this issue and the United Nations' Agenda 2030. To put it in nutshell the purpose of this study is to estimate to which Brexit would affect the inflow of Slovak labor force to the UK along with the intention of Slovak workers to work in the UK when Brexit is to be in force when Agenda 2030 aspects such as multiculturalism and tolerance, development cooperation, contributing to sustainability goals are to be highlighted. Thus, the purpose of this study is to assess the impact of Brexit on labor migration from Slovakia to the UK and to analyze the migration intentions and institutional perceptions of Slovak workers in the context of the 2030 Agenda.

This paper is organized as follows. Following the introduction in Section 2, the essential theoretical background is presented in accordance with the description of global migration and Brexit issues as presented in the relevant literature. Section 3 provides a more detailed account of the research methodology. Section 4 presents the findings of the empirical analysis. Section 5 discusses the contributions, advantages, and recommendations associated with these findings, as well as significant insights. In conclusion, this study demonstrates the relevance of its findings and suggests research directions for future investigation.

LITERATURE REVIEW

As argued by Marginean et al. (2020) and Privara et al. (2023), labor migration inherently brings both positive and negative effects. These effects must be considered equally by both the emigrating and immigrating countries (i.e., the country of origin and the country of destination). Most of the criteria used to evaluate these effects depend on the labor force's proficiency level, the magnitude of remittances, and other pertinent factors. In evaluating the international migration of highly skilled labor, the movement of human capital is a key consideration. As Walter (2020) and Yildiz (2021) have observed, the creation of a single internal market represents one of the most significant achievements of the EU integration process. This has entailed the removal of almost all restrictions on the free movement of people, labor, goods, services, and capital. The free movement of workers not only affects the workers themselves but also their family members, even if they are not EU citizens. However, their right to reside derives from the worker's rights, who must be an EU citizen. As demonstrated by Sargent (2023) and Aucejo (2021), there are multiple points of synergy between labor migration and the 2030 Agenda.

This is because both issues pertain to foundational matters of global development and sustainability. Labor migration can be a valuable factor for economic growth and development, as it enables the transfer of labor to locations where it is needed. This can lead to increased productivity, create new jobs, and promote economic growth, all of which are objectives of the 2030 Agenda. Migration can provide people with access to better job opportunities, education, and training, thereby contributing to the Sustainable Development Goals (Mura & Stehlíková, 2025; Lincényi, 2017; Glimm & Fabus, 2024). Belas et al. (2023) and Daoudy et al. (2022) argue that labor migration can contribute to the development of multicultural societies and improve intercultural understanding and tolerance, which is significant for achieving the sustainable development goals, such as promoting peace and inclusiveness. Migration can stimulate the exchange of ideas, experiences, and innovations between countries, fostering technological development and innovation in line with the 2030 Agenda, which promotes sustainable development through technological progress. Finally, migration can be a means to achieve the sustainable development goals in health, education, economic growth, and other areas, as it enables people to access better resources and opportunities (Nijenhuis & Leung, 2017; Fojtíková et al., 2023).

As stated by Mishchuk et al. (2023) and Simionescu et al. (2019), on Tuesday, June 23, 2016, UK citizens held a referendum to determine whether to remain in or leave the EU. The results of the referendum indicated that 52% of the electorate voted in favor of leaving the EU, while 48% voted in favor of remaining in it. Most voters thus opted to leave the EU. This majority represented approximately 17.4 million citizens, with a turnout of over 30 million. Lulle et al. (2019) acknowledge that, when examining the implications of Brexit for the labor market, one of the European Commission's primary concerns is safeguarding the rights of EU citizens in the UK and UK citizens residing in the EU. The EU27 Member States have put in place various national crisis measures to prevent a situation in which UK citizens are forced to depart the Member States and vice versa following the imminent exit. These measures guarantee that the families of workers residing in the country may also reside therein, thus conferring upon them the status of lawful residents. The Member States, with the assistance of the Commission, are working to ensure that this principle is applied across the board, while recognizing that some Member States will approach the issue with some flexibility (Billing et al., 2019; Rózsa et al., 2023; Mishchuk et al., 2025).

As for the analysis of the EU labor market situation after Brexit, individual Member States will make their migration policies towards the UK, which will make the free movement of UK residents much more difficult. Adler-Nissen et al. (2017) and Pollard (2021) concur that from 1 January 2021, EU states have started to view UK citizens as third-country nationals. Consequently, EU member states are at liberty to establish their own criteria for the admission of UK nationals to their respective jurisdictions. If UK citizens wish to obtain permanent residence in EU member states, they must prove that they are legally residing in the state's territory. Tian et al. (2021) and Dhingra et al. (2017) posit that Malta and Ireland have indicated that British nationals will continue to be subject to the same terms and conditions as previously, with only a limited number of potential modifications. Austria, for example, intends to require a criminal record, and Lithuania plans to introduce a language test, but Slovakia does not appear to be joining these countries. The only change for UK citizens living in Slovakia would be the obligation to exchange their EU citizens' cards for a new residence card by the end of 2020. Slovakia has adopted a law on the regulation of rights applicable to UK citizens, under which the status of Brits living in Slovakia will not change after Brexit, as they will be guaranteed all the rights of an EU citizen, except the right to vote and stand for election to the European Parliament. However, another issue is how these changes will affect family members of UK citizens from outside the European Union. In Slovakia, registered family members of British citizens who are third-country nationals will be able to remain after Brexit under the same conditions. Still, they will have to obtain the same residence card (Vojtovic et al., 2021; Hajduova et al., 2025).

Subsequently, the shape of the UK's migration system, which is based on a points-based system, is another point of contention. As noted by Esmaeilzadeh and Mirzaei (2018) and Morgan (2017), immigrants will need to score 70 points under the new points system to be eligible for a visa. From 1 January 2021, applicants would need to earn more than £25,600 a year, have a job offer in the UK, and speak English to a sufficient level to be eligible

for a visa. However, there are also exemptions for those earning between £20,480 and £25,600 a year in understaffed areas, such as the National Health Service (hereinafter – NHS). Entrepreneurs and sole traders will be largely unaffected, and the obligation to apply for a visa will remain on the same terms as before (in this case, as before Brexit, i.e., they will not require any investment in their business from the UK). For all job applicants, there will be a system where the following three conditions would apply: having a job offer from a sponsor, i.e. an employer approved by the relevant authorities - 20 points; having a job offer that is on the 'required skill level' list – 20 points; and speaking English to a sufficient level - 10 points (Walter, 2020).

For the analysis of the new immigration rules for experienced and highly skilled workers, all applicants (EU and non-EU) interested in living and working in the UK will be required to score 70 points to obtain a visa. Doválová et al. (2018) indicated that migrants coming from the NHS are to have a more lenient list of requirements due to staff shortages in the area. Additionally, points will be awarded for specific skills in areas where the UK is experiencing a labor shortage. If migrants deemed necessary by the UK government fail to attain the requisite number of points or the specified income level, they may still be permitted to enter the UK if they apply to work in areas experiencing job scarcity and economic vulnerability. These risk areas are to be listed in a UK government list. The same applies to applicants with a PhD in each risk area. Individuals who accumulate a requisite number of points and are subsequently admitted to the UK may be designated as highly skilled, even in the absence of a specific job offer. In such cases, the designation is made based on support from a relevant and competent authority, which may include bodies with expertise in science, technology, engineering, or mathematics. Since 1.1.2021, temporary visas for low-skilled workers are no longer valid (Svendsen, 2019; King, 2020). As Pollard (2021) and Rozsa et al. (2022) contend, UK businesses must adapt to the end of free movement. It is therefore imperative that employers stop relying on the UK immigration system as a substitute for investing in workforce retention. The new regulations in this domain are expected to have a detrimental impact on the labor market, potentially causing significant disruption across numerous segments, particularly in the healthcare sector.

METHODOLOGICAL APPROACH

The objective of this study is to ascertain the influence of Brexit on labor migration from the Slovak Republic to the UK and to evaluate its potential impact on labor inflow into the UK. The objective of this research is to examine the influence of Brexit on labor migration between Slovakia and the UK, with particular consideration of the elements outlined in the 2030 Agenda. The primary research method was a questionnaire survey conducted within the framework of the APVV project output, from which questions related to migration were analyzed. In terms of the Slovak Research and Development Agency project dealing with the issue of impact on the migration to work abroad, within the pilot survey conducted during September and December 2022, 1276 workers working abroad were anonymously contacted through the survio.com questionnaire survey; 867 returned fully completed questionnaires (68%) were assessed and subsequently 207 questioners regarding workers experienced in working in Britain were selected as the observed sample for the research. In particular, the Slovak workforce comprised 103 women and 104 men with practical experience of working in the UK. The problem with a conventional research sample that does not include these criteria is that it would not provide relevant feedback on the Brexit research questions. Thus, when selecting the sample, the intention was to recruit a group of Slovak workers in the U.K. These were groups of Slovaks who work or have worked in the U.K., as well as advisory groups on issues related to working and learning in the U.K. The results section evaluates the data from the questionnaire survey and the responses from respondents, who are Slovak workers working in the UK. The questionnaire was designed to address the area to find out about their experiences and attitudes in their work in the UK. The results of this survey will be interpreted and analyzed using graphs and the Chi-square test, along with the hypothesis verification.

Regarding the continued relevance of the 2022 data, if it was collected to track long-term developments or inform multi-year strategies, it remains relevant as part of a larger dataset. The data continues to provide valid projections or insights into future outcomes. There is no urgent need for newer data since the 2022 dataset captures relevant and actionable insights. This may be because the context

it represents has not drastically shifted or because real-time updates are not critical for the type of decisions being made. The external factors, such as economic conditions and Brexit regulatory frameworks, that were important when the data was collected, have not changed drastically. In such cases, the 2022 data continues to provide an accurate reflection of the current situation. Even if there were minor short-term changes in the external environment (e.g., brief economic downturns, migration outbreaks), the 2022 data still reflects broader trends that were not affected by these temporary fluctuations. To address potential bias in self-reported data, self-reported data were combined with objective data to cross-verify information and reduce reliance on self-reporting alone. Respondents were assured of their security by maintaining anonymity and confidentiality, which can reduce social desirability bias. Clear and specific wording in questions was used to avoid leading respondents or allowing for misinterpretation. Complex or ambiguous questions were eliminated, which can result in inaccurate responses. Validation questions or consistency checks were implemented within the survey to identify and correct inconsistencies or implausible answers. By and large, applying these aspects minimized potential bias in self-reported data, improving the reliability of the collected information.

RESULTS

The following will be observed in the questionnaire survey findings. The initial step is to analyze the UK economic sectors in which Slovak immigrant workers are employed. Then, from the perspective of Slovak workers in the UK, the dependencies will be statistically investigated concerning the attitude of the British authorities towards domestic workers according to the age and education of the respondents, the attitude towards workers from other countries also according to the age and education of the respondents, and finally the attitude of the British co-workers towards workers from Slovakia according to the age and education of the respondents. Finally, issues regarding attitudes towards dealing with the situation arising after Brexit, 31.12.2020, interest in obtaining UK citizenship and remaining in the UK, and intention to stay/return from the UK to Slovakia will be examined.

Figure 1 shows the most significant sectors in the UK where Slovak workers are employed: gastronomy, agriculture, services, and construction.

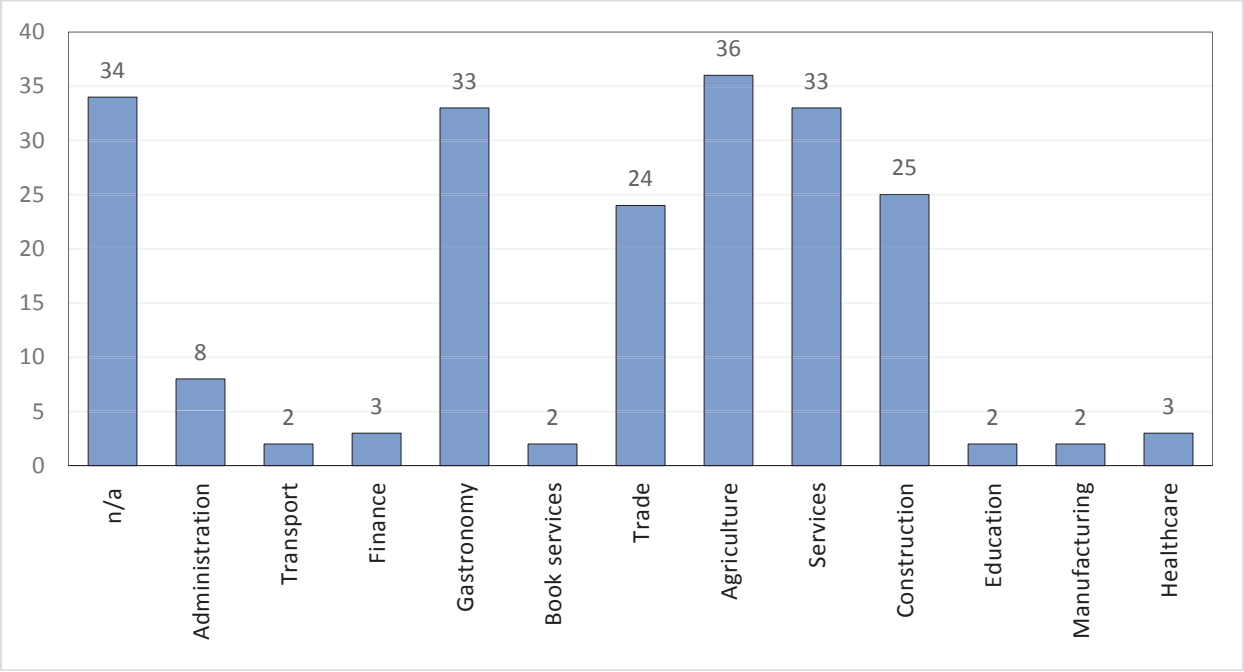

Figure 1. Respondents' job positions by economic sectors

In the gastronomy sector, jobs related to the sale and preparation of food are predominantly represented. In the agriculture sector, answers associated with harvesting crops, etc., have been included. Services represent occupations related to the sale of goods of various kinds (respondents gave a significant number of specific service responses, so their answers have not been changed here). The service sector is abundantly represented. The administration, transport, education, manufacturing, financial, and healthcare sectors are less represented. Regarding the UK authorities' attitude towards Slovak workers compared to domestic workers, Figure 2 shows that up to 35% (i.e., 73 respondents) reported no experience of different treatment by the authorities compared to domestic workers.

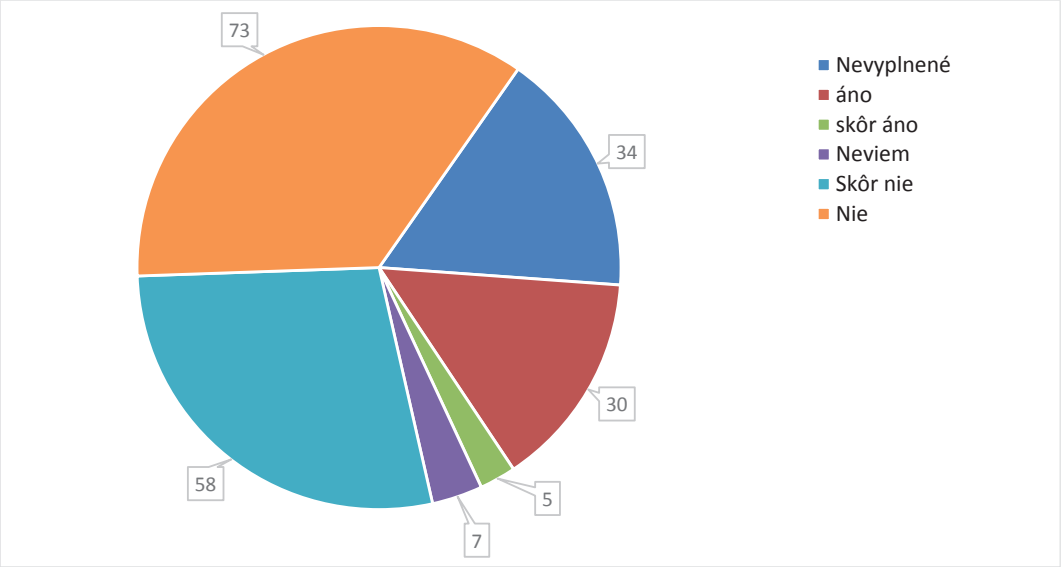

Figure 2. Different treatment of workers by the authorities compared to domestic workers

This result shows that the European Union's policy of discrimination based on the country of origin does work, at least to some extent. A further 28% (i.e., 58 respondents) said that they would rather not experience differential treatment. These supports stated general assumptions; 3% could not comment on the question, and it is assumed that the seven respondents in question had minimal interaction with the authorities or did not compare them with their co-workers. Nevertheless, 15% and 2% (i.e., 30 and 5 respondents) indicated that such discrimination does occur.

In the calculation in Appendix 1, the relationship between respondents' education and their responses to the question about the difference in treatment by the authorities compared to domestic workers was examined. When interpreting the results, it is essential to note that the dependence holds only if the calculated value is more significant than the value found in the respective tables. In this case, the given value is 47.189, whereas the tabulated value is 31.41. So, this means that the null hypothesis H0 has been rejected and the alternative hypothesis H1 has been accepted, indicating a dependency between the answers. The findings suggest that workers with lower levels of education are more likely to perceive differential treatment than those with higher levels of education.

In the calculation in Appendix 2, the calculated value is 16.96, whereas the tabulated value is 21.03. Thus, the hypothesis H1 has been rejected and H0 accepted, indicating a dependence between the responses. Hence, it is assumed that, regardless of age, Slovak workers in the UK perceive the authorities' attitude equally. Hence, no statistical dependence can be established in this case. In terms of the difference in treatment by the UK authorities compared to workers from other countries, from the perspective of Slovak workers in the UK, Figure 3 shows that 69% (i.e., 143 respondents) had a positive experience in this respect; this means that these 69% experienced little or no difference from the authorities compared to workers from other countries.

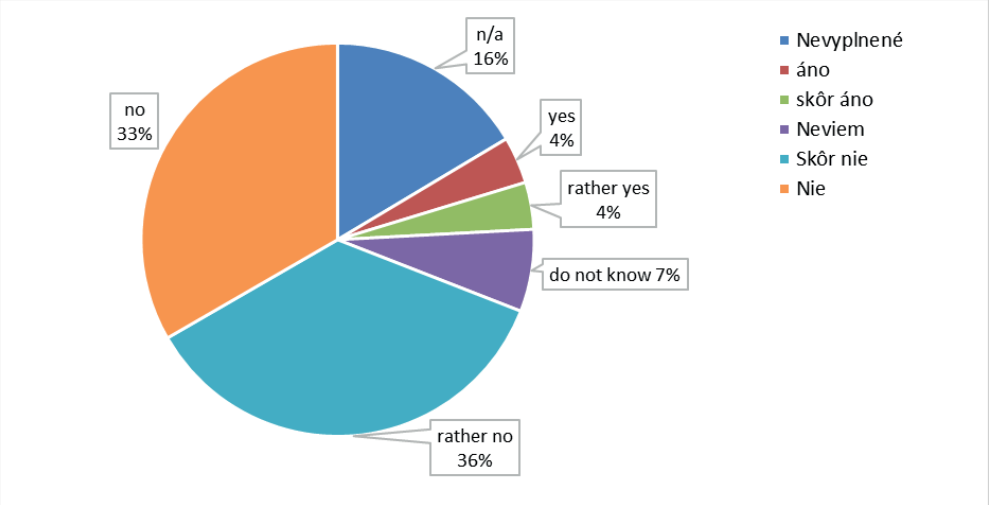

Figure 3. Different treatment of workers by the authorities compared to workers in other countries

It means the EU's anti-discrimination policy works even better in this respect than in the previous survey question. The exact number of respondents who did not complete this survey question is probably for the same reasons as in the last question. 8% of respondents (i.e., 17) reported experiencing a difference in treatment. Again, it was calculated whether their education affected their answer, as shown below: 7% of respondents were unable to provide an answer to this question.

When examining the relationship between respondents' education and the attitudes of authorities, compared with workers in other countries, Appendix 3 shows that the calculated value is 47.18, whereas the tabulated value is 31.41. Therefore, the null hypothesis (H0) has been rejected, and the alternative hypothesis (H1) has been accepted, indicating a dependency between the responses. This indicates that a dependency exists within the specified calculation. It may therefore be assumed that workers with less education are more likely to perceive differences in the attitudes of authorities than workers from other countries.

From the calculation in Appendix 4, it can be inferred that the value 16.96 is less than the tabulated value 21.03. Thus, the hypothesis H1 has been rejected, and H0 has been accepted, indicating a dependence between the responses. It is therefore assumed that, as in the previous calculation regarding age, there is no evidence that workers, based on their age, perceive the attitude of authorities compared to workers from other countries differently.

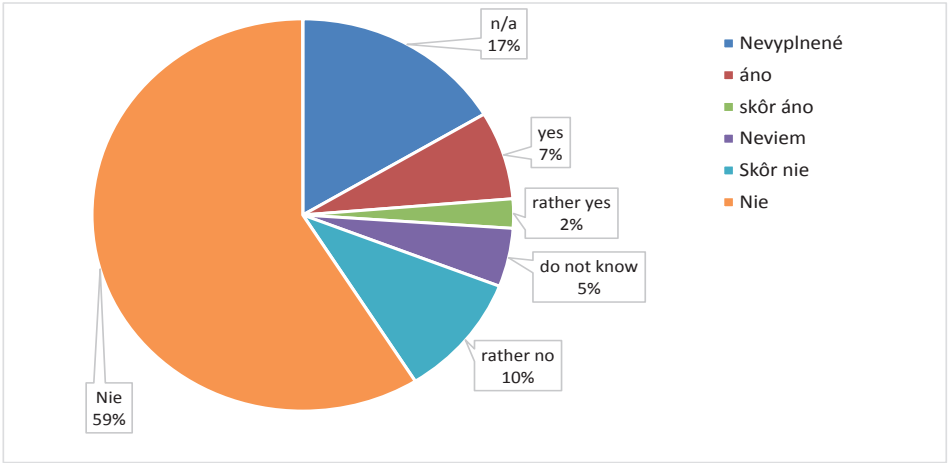

Figure 4. Attitudes of British employees to Slovak co-workers in the UK

This research question focused not on authorities' attitudes towards workers, but on co-workers' attitudes towards them. The objective of the inquiry was to ascertain whether discriminatory practices in the workplace based on national origin existed. As illustrated in Figure 4, the data indicate that 69% of respondents reported experiencing minimal or no noticeable discrepancy in their treatment. The exact number of respondents who answered the question was not provided. Differences were noted in responses, indicating either ignorance or acknowledgement of workplace discrimination. Only 5% of respondents were unable to answer the question. It is noteworthy that up to 9% of respondents indicated they had experienced differential treatment by colleagues, an increase of 1 percentage point from the previous question. This means there is still room for improvement in workplace discrimination, as the European Commission is working to address this through its anti-discrimination policy across the European Union.

The objective of the calculations presented in Appendix 5 was to test the veracity of the hypothesis H1, which posits that an individual's educational attainment is a determining factor in how their colleagues treat them. Additionally, the hypothesis suggests that workers with lower educational attainment are more susceptible to experiencing differential treatment from their colleagues. As the calculation shows, the value 39.83 is greater than the tabulated value 31.41, indicating that H1 is accepted and H0 is rejected. Thus, as in the previous calculations, Slovak workers in the UK with lower education are more likely to perceive a different attitude among their co-workers.

The calculation in Appendix 6 yields 26.69, whereas the tabulated value is 21.03. Thus, the null hypothesis H0 has been rejected and the alternative hypothesis H1 has been accepted, indicating dependence among the responses. This suggests that workers in younger age groups are more likely to perceive differential treatment from their colleagues. However, it is commonly observed that younger and less experienced workers are approached with a certain degree of skepticism. Therefore, it is reasonable to conclude that similar results would be expected in Slovakia.

Figure 5 shows that 50% of respondents intended to work in the UK after Brexit. It can be concluded that half of the respondents do not feel threatened by Brexit and plan to continue living in the UK, 18% of respondents did not complete the survey question.

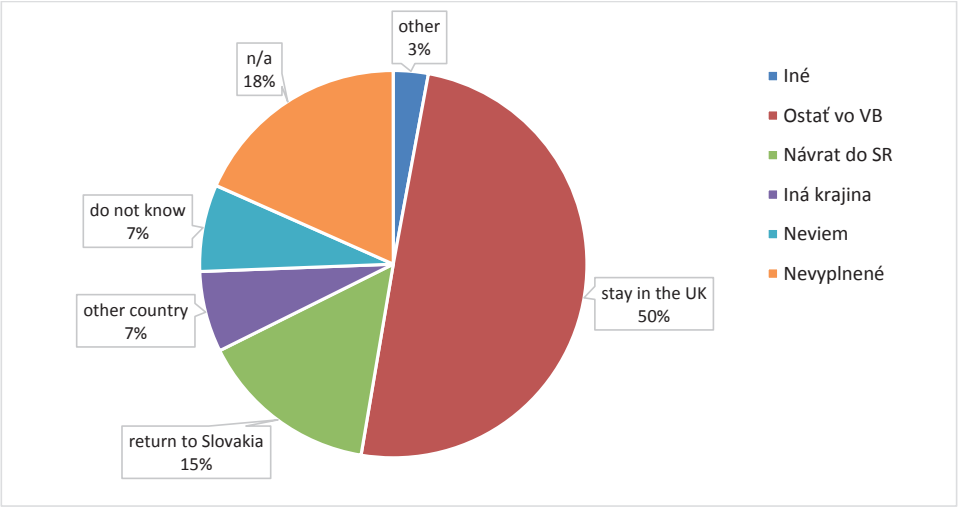

Figure 5. Respondents' attitude to dealing with the situation after 31.12.2020

An additional 7% of respondents indicated that they were unsure how to respond to the question or that they were currently uncertain about how they would answer it. Of the remaining respondents, 15% indicated that they had been affected by Brexit and therefore chose to return to the UK. It may be reasonably assumed that this group of workers primarily utilized the free movement of labor for seasonal employment, rather than for regular, weekly, or monthly services. In addition, responses indicating that the respondents intend to work in another country are included in the group of individuals

who perceive themselves to be affected by Brexit. Responses in the "other" category are specified as answers such as seasonal work, commuting between the UK and Slovakia, and other.

Figure 6 presents the interpretation of how the proportion of respondents who intend to stay in the UK make their decisions.

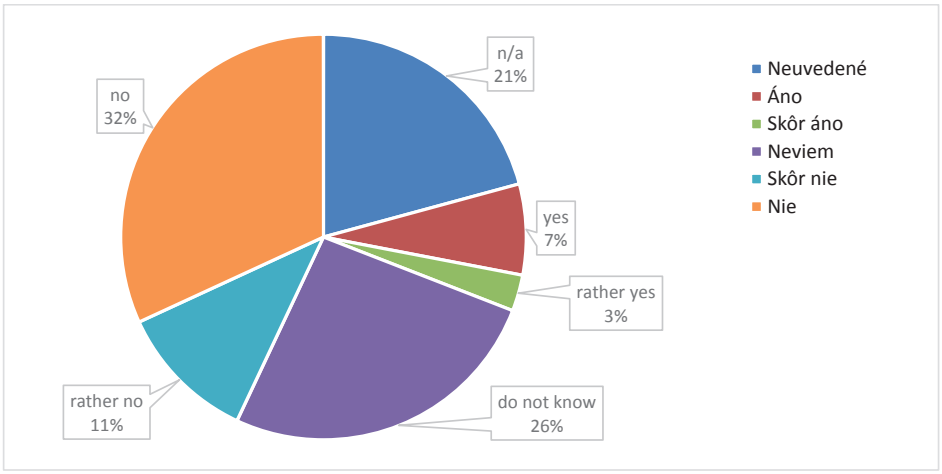

Figure 6. The interest of Slovak workers in becoming UK citizens

The group that does not intend to apply for UK citizenship has the most significant representation. This group represents 32%; the next 11% said they were not planning to acquire citizenship. The second-most represented group responded that they do not yet know whether they would apply for citizenship. Therefore, they are either lacking the necessary information to act on the issue or unwilling to provide details of their future plans. In this group, respondents' answers of "other" or failure to complete the question were also included. Respondents who are either considering obtaining citizenship or openly interested in obtaining it are the least represented. Together, this group represents 10% of respondents. The outlier on this question is represented by respondents who are already holding UK citizenship. It is assumed that these respondents were included in the "n/a" responses.

Figure 7 indicates that the majority of respondents (72% of the 158 individuals with UK work experience) intend to return to the UK for work purposes.

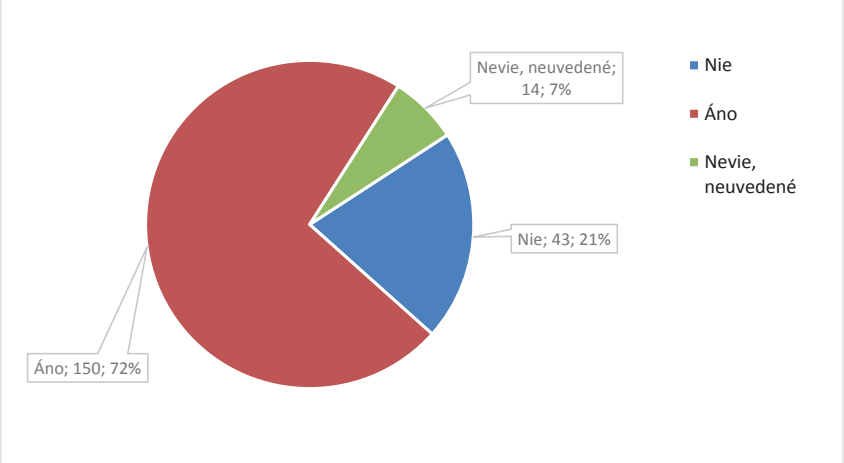

Figure 7. The interest of Slovak workers in becoming UK citizens

However, in this case, the aforementioned model situation is not subject to the effects of the Coronavirus, and thus, these results can be considered indicative or, at the very least, not applicable at this time. However, the situation regarding Brexit is complicated enough on its own without the added threat of a pandemic, and 7% of respondents are still undecided or unwilling to share their personal plans on this issue. Conversely, up to 21% of respondents have no intention of returning to the UK for work. Without further information, it can be stated that at least some of the respondents who have already decided and those who have not (i.e., some of the 28% in total) have been affected by Brexit.

DISCUSSION

The research paper addresses the intricate issues surrounding Brexit, its ramifications for the Slovak workforce employed in the UK, and its implications for labor markets in Slovakia and the UK. To ascertain the extent to which Brexit would affect the flow of labor between Slovakia and the UK, it can be argued that Brexit will also affect the labor market in Slovakia, as some respondents have indicated their intention to return. The research focused on respondents who had gained work experience abroad, with a particular emphasis on those who had worked in the UK. The research findings indicate that a significant proportion of workers currently employed in the UK will not perceive any direct impact of Brexit. This is evidenced by the survey results, which revealed that only a quarter of respondents reported experiencing any direct effects of Brexit. Next, it can be implied that only a small proportion of respondents will want to apply for UK citizenship, as only a tiny proportion of respondents indicated an interest in applying for UK citizenship; similarly, it is the case that a proportion of respondents is planning to return to Slovakia after the Brexit deal comes into force.

When it comes to the impact of Brexit on Slovak workers, those who wish to apply for jobs in the UK after the transition period will face slightly worsened conditions. Still, for workers already working in the UK, the UK government assures that they will not be affected to the same extent and will be able to remain in the territory without facing increased bureaucracy or differential treatment. The analysis of the findings indicated that workers with less education were more likely to perceive a difference in treatment, whether from the authorities or from their colleagues. However, this assumption does not necessarily mean that discrimination is taking place. By and large, it is essential to consider what kinds of jobs workers in the UK are applying for, and whether they really have the training and qualifications for those jobs. This is because, even in cases where discrimination occurs, it is not due to the country of origin per se, but rather to a lack of specific skills or knowledge necessary for the job in question or for communicating with the relevant authorities. Prospective workers in the UK should also keep up to date with current events through the UK Government's website, which provides regular updates on changes and developments in the UK-EU negotiations. Those considering employment opportunities in the UK are encouraged to visit the Office for Slovaks Living Abroad website, which provides comprehensive information on available employment options and the associated conditions in foreign countries. It is, however, important not to neglect the fate of those who will continue to work in the UK after the country departs from the EU. These individuals will not be subject to the single labor market and free movement of workers, as set out in the EU's current legislation. It is therefore of the utmost importance that negotiations continue to ensure the maintenance of as many of the benefits currently enjoyed by citizens of other EU Member States working in the UK as possible. Many countries, including the Slovak Republic, have decided to treat UK citizens working in Slovakia similarly to preserve these benefits.

The synergies between labor migration and the 2030 Agenda underline the significance of considering migration policies and initiatives within the broader framework of the Sustainable Development Goals as set out in Agenda 2030. In this case, it is not only about reducing discrimination in employment as such, but also about reducing discrimination in the employment of workers in the UK from other Member States. Many Slovaks working in the UK have not experienced differential treatment, and there is not a great deal of discrimination based on country of origin; hence, it can be argued that anti-discrimination policy is working in this regard. On the negative side, it is perhaps too narrowly focused and does not account for discrimination based on educational attainment. However, this statement

is highly questionable because employers cannot be blamed for preferring a more skilled workforce.

To justify that the data collected in 2022 remains relevant, several factors must be demonstrated to ensure that the data align with current needs and objectives. If the data was gathered to track long-term trends in respondents´ preferences, and those trends have not shifted significantly, the data remains relevant. The 2022 data pertains to respondents´ behaviors that are stable over time, and the same characteristics are being studied; the data remains applicable. The 2022 data shows trends that have continued into 2023 and 2024. If key indicator conditions have remained stable, the data is likely still relevant for analysis and decision-making. This consistency suggests that the 2022 data accurately reflects ongoing trends rather than outdated information. Since 2022, no significant events have occurred that could dramatically alter the data's relevance. In stable contexts, data from 2022 is likely still applicable. The data remain applicable because the factors it measured have not changed rapidly. The data sources used in 2022 remain reliable and accurate. No identified biases, errors, or inconsistencies in the data have emerged since 2022, reinforcing the accuracy and continued relevance of the information. The target audience or demographic for which the data was collected remains the same. For instance, if the data focused on a customer segment or region whose behavior has not shifted significantly, the insights from 2022 remain relevant.

Generally speaking, COVID-19 had a profound impact on labor migration, disrupting global migration patterns and affecting both migrant workers and host countries. According to Gavurova et al. (2023), Watterson (2020), and Belas et al. (2022), among the key impacts, aspects such as border closures and travel restrictions, imposed by many countries, could have included halting or severely restricting labor migration. This left many migrants stranded in their home or host countries without work or the ability to return home. Secondly, there are job losses and economic hardship when migrant workers, especially in sectors like hospitality and healthcare, face widespread job losses due to economic slowdowns. Many lacked access to social safety nets, increasing their vulnerability. Next, there is a shift in labor demand in some industries, such as healthcare and logistics, which saw an increased demand for migrant labor. However, sectors such as tourism and manufacturing experienced reduced labor needs, leading to changes in migration patterns. In international economics, remittances declined in 2020, a critical source of income for many developing countries, as migrant workers earned less or lost jobs. This negatively affected households dependent on these funds. Finally, within the health and safety concerns, migrant workers often faced higher risks of COVID-19 exposure due to overcrowded living conditions, lack of healthcare access, and unsafe work environments, exacerbating the pandemic's impact on their health and well-being. To sum up, COVID-19 disrupted labor migration, causing economic hardship for migrants and altering labor market demands, while also exposing vulnerabilities in migrant workers' access to protections.

CONCLUSION

This paper demonstrates that Brexit will also affect the Slovak labor market, as evidenced by the intention of some Slovak workers in the UK to return to Slovakia. On the other hand, a larger share of workers currently working in the UK will not be affected by Brexit. We have concluded that workers with lower educational qualifications are more likely to perceive a different attitude, either from the authorities or from their colleagues, which is why it is crucial to consider which jobs workers in the UK are applying for and whether they have the skills and qualifications for those jobs. In conclusion, the research results indicate that Slovak workers seeking employment in the UK after the Brexit transition period may encounter somewhat more challenging conditions. However, workers currently employed in the UK can find reassurance in the UK government's commitment to ensuring their continued presence in Britain without undue bureaucratic hurdles or discriminatory treatment. As a limitation of the research, it should be noted that some questionnaires were incomplete, some responses were irrelevant, and the statistical data varied across sources.

To justify that the 2022 data is still relevant the objectives of the data collection align with current goals, the trends and patterns it identifies have continued into the present, no major disruptions have occurred since the data was collected, the data quality remains high, and sources are reliable, the target audience or environment has not significantly changed as well as experts validate its continued usefulness,

and any newer data supports rather than contradicts it. In this context, the 2022 data remain a relevant and helpful resource for making informed decisions. By going deeper and making this explored topic coherent and compact further research will be devoted to exploring the issues such as the healthcare spending on the healthcare workforce composition trends in the UK and Slovakia; the demand for healthcare labor in the Slovak Republic and EU countries; a statistical analysis to explain the reasons behind the migration trends presented on the Slovak healthcare system labor force and EU member states versus the UK.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: MK; research design: MK; data collection: MK; analysis and interpretation: MK; writing draft preparation: MK; supervision: MK; correction of article: MK; proofread and final approval of article: MK. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Adler-Nissen, R., Galpin, C., & Rosamond, B. (2017). Performing Brexit: How a post-Brexit world is imagined outside the United Kingdom. *British Journal of Politics & International Relations, 19*(3), 573-591.https://doi.org/10.1177/1369148117711092 Aucejo, E.A. (2021). *International migration, productive economy and higher education within the framework of the United Nations 2030 Agenda*. Revista De Educacion Y Derecho-Educational and Law Review, 23.

Belas, J., Gavurova, B., Dvorsky, J., Cepel, M., & Durana, P. (2022). The impact of the COVID-19 pandemic on selected areas of a management system in SMEs. *Economic Research-Ekonomska Istrazivanja, 35*(1), 3754-3777. https://doi.org/10.1080/1331677X.2021.2004187

Belas, J., Gavurova, B., Kubak, M., & Novotna, A. (2023). Risk Management Level Determinants in Visegrad Countries - Sectoral Analysis. *Technological and Economic Development of Economy, 29*(1), 307-325. https://doi.org/10.3846/tede.2023.18415

Billing, C., McCann, P., & Ortega-Argilés, R. (2019). Interregional inequalities and UK sub-national governance responses to Brexit. *Regional Studies, 53*(5), 741-760. https://doi.org/10.1080/00343404.2018.1554246

Daoudy, M., Schraven, B., Kristiansen, M., Swain, A., & Scheffran, J. (2022). Migration and the 2030 Agenda. *One Earth, 5*(8), 838-840. https://doi.org/10.1016/j.oneear.2022.08.001

Dhingra, S., Machin, S., & Overman, H. (2017). Local Economic Effects of Brexit. *National Institute Economic Review, 242*(1), 24-36. https://doi.org/10.1177/002795011724200112

Dovál ová, G., Hosoff, B., & Stracová, E. (2018). Brexit In Terms of Foreign Trade, Value Added and Employment. *12th International Days of Statistics and Economics*, 393-403.

Esmaeilzadeh, P., & Mirzaei, T. (2018). Comparison of the UK citizens' perspectives on the consequences of different Brexit scenarios for healthcare: An experimental study. *Health Policy and Technology, 7*(4), 325-332. https://doi.org/10.1016/j.hlpt.2018.10.006

Fojtíková L., Vavrek R., & Doleželová P. (2023). Road of the least developed countries to sustainable development: Assessing trade participation in the context of the sustainable development goals. *Sustainable Development, 31*(4), 2492 – 2506. https://doi.org/10.1002/sd.2524

Gavurova, B., Skare, M., Belas, J., Rigelsky, M., & Ivankova, V. (2023). The relationship between destination image and destination safety during technological and social changes COVID-19 pandemic. *Technological Forecasting and Social Change, 191*, 122488. https://doi.org/10.1016/j.techfore.2023.122488

Glimm, F., & Fabus, M. (2024). Determinants of the Willingness to Use Autonomous Mobility as a Service in Germany. *Future Transportation, 4*(3), 746 – 764. https://doi.org/10.3390/futuretransp4030035

Hajduova, Z., Mura, L., & Ostrihoňova, M. (2025). Exploring generational differences in corporate culture perception and career orientation in the environment of family businesses. *Journal of International Studies, 18*(3), 219 – 236. https://doi.org/10.14254/2071-8330.2025/18-3/11

King, R. (2020). On Europe, Immigration and Inequality: Brexit as a 'Wicked Problem'. *Journal of Immigrant & Refugee Studies, 19*(1), 25-38. https://doi.org/10.1080/15562948.2020.1821275

Lincényi, M. (2017). Entrepreneurship ecosystem facets: The european migrant crisis and public opinion in Slovakia. *Entrepreneurship and Sustainability Issues, 5*(2), 357 – 367. https://doi.org/10.9770/jesi.2017.5.2(14)

Lulle, A., King, R., Dvorakova, V., & Szkudlarek, A. (2019). Between disruptions and connections: "New" European Union migrants in the United Kingdom before and after the Brexit. *Population Space and Place, 25*(1), e2200. https://doi.org/10.1002/psp.2200

Marginean, S.C., Orastean, R., & Sava, R. (2020). The Road to the Economics of Brexit: A New Direction in Economic Research. *Journal of Business Economics and Management, 21*(6), 1665-1682. https://doi.org/10.3846/jbem.2020.13505

Mishchuk H., Oliinyk O., Bilan Y., & Skare M. (2025). The Role of Leadership in Attracting Intellectual Migrants and Boosting Innovative Development of

Countries. *Contemporary Economics, 19*(3), 339 – 354. https://doi.org/10.5709/ce.1897-9254.570

Mishchuk, H., Bilan, Y., Androniceanu, A., & Krol, V. (2023). Social capital: Evaluating its roles in competitiveness and ensuring human development. *Journal of Competitiveness, 15*(2), 1-17. https://doi.org/10.7441/joc.2023.02.01

Morgan, J. (2017). Brexit: Be Careful What You Wish For? *Globalizations, 14*(1), 118-126. https://doi.org/10.1080/14747731.2016.1228785

Mura, L., & Stehlíková, B. (2025). The ethics of artificial intelligence: Safeguarding human dignity, social justice and environmental stability in the age of AI. *Equilibrium. Quarterly Journal of Economics and Economic Policy, 20*(2), 479 – 507. https://doi.org/10.24136/eq.3743

Nijenhuis, G., & Leung, M. (2017). Rethinking Migration in the 2030 Agenda: Towards a De-Territorialized Conceptualization of Development. *Forum for Development Studies, 44*(1), 51-68. https://doi.org/10.1080/08039410.2016.1276958

Pollard, J.S. (2021). Brexit and the wider UK economy. *Geoforum, 125*, 197-198. https://doi.org/10.1016/j.geoforum.2018.02.005

Privara, A., Masárová, T., & Tupá, M. (2023). Migration and Labour Market Competitiveness: The Case of EU. *Journal of Competitiveness, 15* (1), 131-145. https://doi.org/10.7441/joc.2023.01.08

Rózsa, Z., Folvarcná, A., Holúbek, J., Veselá, Z. (2023). Job crafting and sustainable work performance: A systematic literature review. *Equilibrium-Quarterly Journal of Economics and Economic Policy, 18*(3), 717-750. https://doi.org/10.24136/eq.2023.023

Rozsa, Z., Tupa, M., Belas, J., Metzker, Z., & Suler, P. (2022). CSR Conception and its Prospective Implementation in The SMEs Business of Visegrad Countries. *Transformations In Business & Economics, 21*(1), 274-289.

Sargent, K. (2023). The labor market impacts of Brexit: Migration and the European union. *Economic Modelling, 121*, 106196. https://doi.org/10.1016/j.econmod.2023.106196

Simionescu, M., Bilan, Y., & Gedek, S. (2019). Migration Determinants and Potential Impact of Brexit on Migration from the CEE Countries to the UK. *Acta Polytechnica Hungarica, 16*(7), 95-113, https://doi.org/10.12700/APH.16.7.2019.7.6

Svendsen, O. (2019). Brexit and the future of EU defence: a practice approach to differentiated defence integration. *Journal of European Integration, 41*(8), 993-1007. https://doi.org/10.1080/07036337.2019.1622540

Tian, Y., Ma, S.P., Rui, R.X., Yu, Z., & Tian, M.Z. (2021). The Analysis of Impact of Brexit on the Post-Brexit EU Using Intervented Multivariate Time Series. *Acta Mathematicae Applicatae Sinica-English Series, 37*(3), 441-458. https://doi.org/10.1007/s10255-021-1022-z

Vojtovic, S., Letková, N., & Kostrová, J. (2021). Impact of Brexit on Return Migration to the Slovak Republic. *Ad Alta-Journal of Interdisciplinary Research, 11*(1), 374-380.

Walter, S. (2020). EU-27 Public Opinion on Brexit. *JCMS-Journal of Common Market Studies, 59*(3), 569-588. https://doi.org/10.1111/jcms.13107

Watterson, A. (2020). COVID-19 in the UK and Occupational Health and Safety: Predictable not Inevitable Failures by Government, and Trade Union and Nongovernmental Organization Responses. *New Solutions-A Journal of Environmental and Occupational Health Policy, 30*(2), 86-94. https://doi.org/10.1177/1048291120929763

Yildiz, A. (2021). Brexit, Migration and European Integration Process. *Ankara Avrupa Calismalari Dergisi-Ankara Review of European Studies, 20,* 69-94. https://doi.org/10.32450/aacd.978770

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Appendix 1

Dependency calculations on respondents' education compared to those of domestic workers

Level	1	2	3	4	5	Total
Elementary	1	1	0	0	0	2
Apprenticeship	0	3	0	0	2	5
Secondary with graduation	2	20	7	23	36	88
Univ - Bc.	0	2	6	9	13	30
Univ - Master	5	13	2	4	19	43
Univ - Phd.	0	0	0	3	0	3
Total	8	39	15	39	70	171
	0,093567	0,45614	0,175439	0,45614	0,818713	
	0,233918	1,140351	0,438596	1,140351	2,046784	
	4,116959	20,07018	7,719298	20,07018	36,02339	
	1,403509	6,842105	2,631579	6,842105	12,2807	
	2,011696	9,807018	3,77193	9,807018	17,60234	
	0,140351	0,684211	0,263158	0,684211	1,22807	
	8,781067	0,648448	0,175439	0,45614	0,818713	
	0,233918	3,032659	0,438596	1,140351	0,001069	
	1,08855	0,000245	0,067026	0,427693	1,52E-05	
	1,403509	3,426721	4,311579	0,680567	0,04213	
	4,439021	1,039576	0,832395	3,438502	0,110977	
	0,140351	0,684211	0,263158	7,838057	1,22807	
47,18875						
df =	20					
Critical value	31,41					

Appendix 2

Dependency calculations on the age of respondents compared to those of domestic workers

Age group	1	2	3	4	5	Total
18-25	2	13	5	13	17	50
26-33	0	9	7	15	26	57
34-44	4	12	3	7	24	50
45 and more	2	5	0	4	3	14
Total	8	39	15	39	70	171
	2,339181	11,40351	4,385965	11,40351	20,46784	
	2,666667	13	5	13	23,33333	
	2,339181	11,40351	4,385965	11,40351	20,46784	
	0,654971	3,192982	1,22807	3,192982	5,730994	
	0,049181	0,223509	0,085965	0,223509	0,587551	
	2,666667	1,230769	0,8	0,307692	0,304762	
	1,179181	0,031201	0,437965	1,700432	0,609551	
	2,762114	1,022653	1,22807	0,203971	1,301402	
16,95614						
df =	12					
Critical value	21,03					

Appendix 3

Dependency calculations on the age of respondents compared to workers in other countries

Level	1	2	3	4	5	Total
Elementary	1	1	0	0	0	2
Apprenticeship	0	3	0	0	2	5
Secondary with graduation	2	20	7	23	36	88
Univ - Bc.	0	2	6	9	13	30
Univ - Master	5	13	2	4	19	43
Univ - Phd.	0	0	0	3	0	3
Total	8	39	15	39	70	171
	0,093567	0,45614	0,175439	0,45614	0,818713	
	0,233918	1,140351	0,438596	1,140351	2,046784	
	4,116959	20,07018	7,719298	20,07018	36,02339	
	1,403509	6,842105	2,631579	6,842105	12,2807	
	2,011696	9,807018	3,77193	9,807018	17,60234	
	0,140351	0,684211	0,263158	0,684211	1,22807	
	8,781067	0,648448	0,175439	0,45614	0,818713	
	0,233918	3,032659	0,438596	1,140351	0,001069	
	1,08855	0,000245	0,067026	0,427693	1,52E-05	
	1,403509	3,426721	4,311579	0,680567	0,04213	
	4,439021	1,039576	0,832395	3,438502	0,110977	
	0,140351	0,684211	0,263158	7,838057	1,22807	
47,18875						
df=	20					
Critical value	31,41					

Appendix 4

Dependency calculations on the age of respondents compared to workers in other countries

Age group	1	2	3	4	5	Total
18-25	2	13	5	13	17	50
26-33	0	9	7	15	26	57
34-44	4	12	3	7	24	50
45 and more	2	5	0	4	3	14
Total	8	39	15	39	70	171

2,339181	11,40351	4,385965	11,40351	20,46784
2,666667	13	5	13	23,33333
2,339181	11,40351	4,385965	11,40351	20,46784
0,654971	3,192982	1,22807	3,192982	5,730994

0,049181	0,223509	0,085965	0,223509	0,587551
2,666667	1,230769	0,8	0,307692	0,304762
1,179181	0,031201	0,437965	1,700432	0,609551
2,762114	1,022653	1,22807	0,203971	1,301402

16,95614						
df=	12					
Critical value	21,03					

Appendix 5

Dependency calculations on respondents' educational attainment compared to workplace relationships or co-workers' attitudes

Level	1	2	3	4	5	Total
Elementary	1	1	0	0	0	2
Apprenticeship	0	3	0	0	2	5
Secondary with graduation	8	11	3	27	39	88
Univ - Bc.	3	3	5	6	13	30
Univ - Master	4	11	2	7	19	43
Univ - Phd.	0	3	0	0	0	3
Total	16	32	10	40	73	171

0,187135	0,374269	0,116959	0,467836	0,853801
0,467836	0,935673	0,292398	1,169591	2,134503
8,233918	16,46784	5,146199	20,5848	37,56725
2,807018	5,614035	1,754386	7,017544	12,80702
4,023392	8,046784	2,51462	10,05848	18,35673
0,280702	0,561404	0,175439	0,701754	1,280702

3,530885	1,046144	0,116959	0,467836	0,853801
0,467836	4,554423	0,292398	1,169591	0,008476
0,006645	1,815493	0,895062	1,999284	0,054642
0,013268	1,21716	6,004386	0,147544	0,002908
0,000136	1,083848	0,105318	0,929991	0,022542
0,280702	10,59265	0,175439	0,701754	1,280702

39,83782						
df=	20					
Critical value	31,41					

Appendix 6

Dependency calculations on the age of respondents versus workplace relationships or co-workers' attitudes

Age group	1	2	3	4	5	Total
18-25	6	11	3	10	20	50
26-33	2	7	3	16	29	57
34-44	5	6	4	14	21	50
45 and more	3	8	0	0	3	14
Total	16	32	10	40	73	171
	4,678363	9,356725	2,923977	11,69591	21,34503	
	5,333333	10,66667	3,333333	13,33333	24,33333	
	4,678363	9,356725	2,923977	11,69591	21,34503	
	1,309942	2,619883	0,818713	3,274854	5,976608	
	0,373363	0,2886	0,001977	0,245906	0,084755	
	2,083333	1,260417	0,033333	0,533333	0,894977	
	0,022113	1,204225	0,395977	0,453906	0,005577	
	2,180477	11,04845	0,818713	3,274854	1,482479	
26,68677						
df=	12					
Critical value	21,03					

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Kazakhstan's Environmental Policy: A Bibliometric Literature Review

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ABSTRACT

Environmental policy research plays a crucial role in solving environmental problems. In Kazakhstan, the study of environmental policy covers a wide range of topics, from air pollution to environmental education. The purpose of this work is to conduct a bibliometric analysis of scientific publications on environmental policy in Kazakhstan based on two sets of data from Google Scholar and OpenAlex bibliographic catalogs. The analysis was performed using VOSviewer software, systematizing publications by language, subject matter, type of source, and institutional affiliation of authors. The results show a steady increase in scientific interest in Kazakhstan's environmental policy since 2010, with peak publication activity in 2022–2024 (62, 70 and 82 publications respectively). Among the publications selected in Google Scholar, four key thematic groups stand out: research on the green economy, environmental safety and environmental protection, environmental legislation and regulatory reforms, as well as environmental education. The analysis of the OpenAlex dataset shows a similar structure of scientific interests, but with different substantive emphases: works on energy security, climate policy, post-Soviet political economy, and sustainable development predominate. Scientific articles comprise the bulk of both datasets, reflecting a sustained academic focus on research. For future research, it is recommended to conduct a deeper study on specific aspects of policy change, especially in the fields of environmental education and defining "policy change" within the context of Kazakhstan in order to better understand its implications.

KEYWORDS: Ecology, Environmental Policy, Environmental Strategy, Green Economy, Bibliometric Review, Strategic Management, Sustainable Growth.

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Экологическая политика Казахстана: библиометрический обзор литературы

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АННОТАЦИЯ

Исследования экологической политики играют важнейшую роль в решении экологических проблем. В Казахстане изучение экологической политики охватывает широкий спектр тем: от загрязнения воздуха до экологического образования. Цель данной работы – провести библиометрический анализ научных публикаций по экологической политике Казахстана на основе двух массивов данных из библиографических каталогов Google Scholar и OpenAlex. Анализ выполнен с применением программного обеспечения VOSviewer, систематизирован по языкам публикаций, тематике, типам источников и институциональной принадлежности авторов. Результаты показывают устойчивый рост научного интереса к экологической политике Казахстана после 2010 года, где пик публикационной активности приходится на 2022–2024 гг. (62, 70 и 82 публикации соответственно). Среди публикаций, отобранных в Google Scholar, выделяются четыре ключевые тематические группы: исследования по зелёной экономике, экологической безопасности и охране окружающей среды, экологическому законодательству и регуляторным реформам, а также экологическому образованию. Анализ массива OpenAlex показывает аналогичную структуру научных интересов, но с иным содержательным акцентом: преобладают работы по вопросам энергетической безопасности, климатической политики, постсоветской политической экономии и устойчивого развития. В обоих наборах данных основную долю составляют научные статьи, что отражает устойчивую академическую направленность исследований. Для будущих исследований рекомендуется более глубокое изучение конкретных аспектов изменения политики, особенно в области экологического образования и определения «изменения политики» в контексте Казахстана, чтобы лучше понять его последствия.

КЛЮЧЕВЫЕ СЛОВА: экология, экологическая политика, экологическая стратегия, зелёная экономика, библиометрический обзор, стратегическое управление, устойчивый рост.

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INTRODUCTION

Environmental challenges have emerged as pressing global concerns, necessitating the development of comprehensive policies to mitigate not only ecological degradation but also promote sustainable development and green growth mechanisms (Runhaar, 2016). Across the globe, governments, civil society organizations, businesses, and individual citizens are increasingly collaborating to devise and implement effective environmental policies (Islam et al., 2014). These policies are inherently complex, as pointed out by numerous scholars as Wirl (1999) and Head (2025), requiring the integration of diverse stakeholder interests and a coordinated approach to achieve meaningful solutions. The case of Kazakhstan presents a particularly compelling context for studying environmental policy, given the country's unique socio-economic landscape and its reliance on natural resources.

Kazakhstan, the largest landlocked country in Central Asia, faces a "natural resource curse" dilemma, where the drive for economic growth, primarily fueled by oil and gas exploitation, conflicts with environmental sustainability goals (ADB, 2024). Since gaining independence in 1991, Kazakhstan has embarked on a journey of policy reform, aiming to strike a balance between economic development and environmental protection. The nation's environmental issues encompass a broad spectrum, including air and water pollution, waste management, climate change impact, biodiversity conservation, and the sustainable use of natural resources (Ospanova, 2014; UNECE, 2025).

Environmental governance in Kazakhstan is shaped not only by government initiatives but also by the active engagement of non-governmental organizations such as Greenwomen Kazakhstan and the Biodiversity Conservation Fund of Kazakhstan, private enterprises including Recycle Birge and Environmental Resources Management (hereinafter – ERM), and international partners such as the Central Asia Regional Economic Cooperation program (hereinafter – CAREC) and UNDP Kazakhstan.

While *Recycle Birge* conducts social events to promote awareness about waste management issues (Rhythm Foundation, 2021), ERM serves as an eco-consulting firm specialising in environmental protection and environmental auditing (ERM, 2024).

In recent decades, Kazakhstan has introduced several legislative measures to enhance its environmental framework. Notably, the Environmental Codes of 2007 and 2021 have introduced significant regulatory changes, such as the "polluter pays" principle, the "remedial" principle, and the adoption of Best-Available-Technologies (hereinafter – BAT) aimed at reducing harmful emissions (Kumar & Makhmudova, 2022). These legislative developments are complemented by large-scale national projects like the *2030 Agenda*, *Carbon Neutrality Strategy 2060*, *Green Economy Concept*, and *Zhasyl Kazakhstan*, which align with global *Sustainable Development Goals* (hereinafter – SDGs) and emphasise green energy transition, pollution control, and ecosystem restoration (UNECE, 2025).

Despite the growing body of literature addressing Kazakhstan's environmental issues, there remains a notable gap in research specifically focused on the dynamics of environmental policy change within the country. While numerous studies examine the status and effectiveness of environmental policies, fewer investigations explore how these policies evolve, adapt, or are reformed in response to internal and external pressures. Addressing this gap is critical for understanding the mechanisms driving policy transformation, especially in the context of Kazakhstan's transition to a green economy.

This paper seeks to fill this gap by conducting a comprehensive bibliometric literature review of 92 environmental policy change studies in Kazakhstan on the Google Scholar research engine. By analyzing scholarly works published in English, Russian, and Kazakh, this study aims to identify the key themes, trends, and gaps in existing research. Then, 560 research articles from the OpenAlex bibliographic catalogue covering environmental policy change studies in Kazakhstan were analysed. For the bibliometric literature analysis, the main research trends, themes, publication types, and sources of institutions are identified. The findings of this review not only contribute to the academic discourse on environmental governance but also offer practical insights for policymakers seeking to enhance the sustainability of Kazakhstan's developmental strategies.

LITERATURE REVIEW

The concept of policy change encompasses a range of theoretical perspectives and typologies, reflecting its multifaceted nature. At its core, policy change refers to modifications in the structure, objectives, or mechanisms of existing policies, often in response to evolving socio-political and environmental challenges. Scholars like Lester and Stewart (1996) described policy change as the replacement or adjustment of existing policy frameworks to accommodate new realities. This transformation can be incremental, involving gradual adjustments, or radical, characterized by comprehensive overhauls (Lindblom, 1979).

Policy change is often equated with policy innovation, where new policies emerge to address previously unrecognised issues, or policy reform, which involves revising existing policies to enhance their effectiveness. Peters & Hogwood (1985) categorize policy change into four primary types: (1) policy innovation, which introduces entirely new policy sectors; (2) policy succession, where existing policies are replaced or modified; (3) policy maintenance, focusing on adapting policies to maintain their relevance; and (4) policy termination, which involves the discontinuation of outdated or ineffective policies. Capano and Howlett (2009) further expand on this typology, identifying four patterns of policy change: cyclical change (periodic revisions without altering the status quo), dialectical change (transformative change through synthesis and conflict resolution), linear change (predictable, evolutionary shifts), and teleological change (goal-oriented transformation driven by specific policy objectives).

To explain the dynamics of policy change, several theoretical frameworks have been developed. The Advocacy Coalition Framework (hereinafter – ACF), proposed by Jenkins-Smith and Sabatier (1993), posits that policy change occurs through the interaction of coalitions that advocate for specific policy beliefs, often triggered by external shocks or shifts in the socio-political environment. This framework highlights the role of policy-oriented learning, where stakeholders adapt to changing conditions to achieve a stable coalition consensus.

The Path Dependency Theory, as articulated by Pierson (2000), emphasised the influence of historical policy decisions, which constrain future policy options. This theory suggests that policy trajectories are shaped by critical junctures and reactive sequences, leading to a lock-in effect where earlier decisions become self-reinforcing, making policy shifts challenging.

The punctuated equilibrium theory by Baumgartner and Jones (1991) argued that policy change is characterised by long periods of stability punctuated by brief episodes of significant change. This framework suggests that policy subsystems are resistant to change due to institutional inertia, with major shifts occurring only when existing structures are disrupted by political, economic, or social upheavals. Kingdon's Multiple Streams Approach (hereinafter – MSA) posits that policy change materialises when three independent streams (problems, policies, and politics) converge at a critical juncture, creating a "policy window" that facilitates transformative action. The policy stream deals with the feasibility, effectiveness, and soundness of policy solutions to the policy problem, while the politics stream is concerned with balancing public opinion and public support with the political climate by policymakers. This convergence is essential for mobilising support, aligning policy solutions with political priorities, and addressing recognised societal problems.

Environmental policy change has been extensively studied across various regions, focusing on the evolution of regulatory frameworks, technological innovations, and governance strategies. Jordan et al. (2004) and Kraft (2021) examined the global progression of environmental policies, highlighting the transition from command-and-control approaches to market-based mechanisms like emissions trading schemes. Kemp (2000) and Jaffe et al. (2002) explored the role of environmental regulations in driving technological advancements, emphasising the concept of "policy-induced innovation".

Studies on environmental policy integration, such as those by Nilsson (2005) analysed how sustainability objectives are embedded into national policy frameworks, enhancing the effectiveness of environmental governance. Regional analyses, like Calel and Dechezlepretre (2016) examination of the European carbon market, provide insights into policy diffusion and the transfer of best practices across borders. Similarly, Keeley and Scoones (2014) explored policy processes in Africa, while Tosun (2013) compared environmental policy changes in emerging democracies of Eastern Europe and Latin America.

While there is extensive research on environmental policy at the global level, studies focusing on Kazakhstan are comparatively limited. Early works by Matter (1993) and Bowers (1993) examined the legacy of Soviet-era environmental issues, particularly the impact of nuclear contamination and industrial pollution. Subsequent studies have explored the evolution of Kazakhstan's environmental governance in the post-Soviet period, including the adoption of the 2007 and 2021 Environmental Codes, which introduced comprehensive regulatory measures for pollution control and resource management.

Recent scholarship highlights Kazakhstan's efforts to transition to a green economy, driven by policies promoting renewable energy, waste reduction, and sustainable development. Kazbekova (2022) analyzed stakeholder dynamics in implementing green economy policies, revealing challenges in achieving effective collaboration between governmental and non-governmental actors. Gulbrandsen et al. (2017) examined the influence of international emissions trading systems on Kazakhstan's environmental policy, using the policy diffusion framework to assess how external models shape domestic regulations.

Bibliometric analysis work on environmental policy studies in the context of Kazakhstan has also been covered by several researchers. For instance, Meidute-Kavaliauskiene et al. (2024) conducted a bibliometric review analysis studying sustainable development goals in Kazakhstan’s academic landscape. According to the paper, the authors found that there is a lack of studies that cover the practical applications of sustainable development goals in Kazakhstan. Moreover, in terms of number of publications by academic institutions, Nazarbayev University, along with Al-Farabi Kazakh National University and Eurasian National University, are the top leaders, while Buketov Karaganda University and Abai Kazakh National Pedagogical University are ranked 13th and 14th place.

As same as Meidute-Kavaliauskiene et al. (2024) article, the article by Gafu et al. (2024) have also thoroughly examined the sustainable development goals research aspects, where the scholars analysed 7092 Scopus-indexed Kazakhstani publications for the period 2015 to 2023. The study results highlight the following three main key findings. First, from 2015 to 2023, a 10% decline in the number of publications related to sustainable development goals in Kazakhstan has been noted. Second, publications that cover sustainable development goals in Kazakhstan are less available to open access than international papers. And third, there is less academic attention directed towards sustainable development goals 1, 5, 14, and 17, unlike sustainable development goals 3, 4, 7, 8, and 10.

Another paper by Kangalakova et al. (2025) also conducted a bibliometric literature review analysis investigating the greening business aspects by looking into the Scopus database for the period from 1992 to 2024, where a total of 660 publications were examined. The scholars have also used the VOS Viewer software to conduct an in-depth analysis. Based on the research results, the scholars identified that there was a rapid growth of publications noticeable from 2019 to 2024 on greening business studies, where the United Kingdom leads in terms of the number of publications in this research field. The author also identified several key research directions for greening business aspects, namely the focus on green technologies, green financing mechanisms, and the adoption of greening mechanisms in the business sector.

Despite these contributions, there remains a notable gap in the application of policy change theories to Kazakhstan's environmental policy landscape. Most studies focus on descriptive analyses of policy outcomes rather than the underlying processes driving policy change. This review identifies a critical need for research that applies theoretical frameworks like the ACF and the MSA to the study of environmental policy dynamics in Kazakhstan.

MATERIALS AND METHODS

First, this study adopts a systematic bibliometric literature review approach to explore the landscape of environmental policy change research in Kazakhstan. The research articles were identified via Google Scholar research engine and the OpenAlex research database. First, in terms of Google Scholar, a total of 92 articles written in English, Kazakh, and Russian were used for the analysis, while 560 articles were examined from the OpenAlex bibliographic catalogue database.

By definition, a bibliometric analysis is used for uncovering emerging research trends, patterns, and helps to identify knowledge gaps (Donthu et al., 2021). For this, the VOS Viewer software program

is applied to study specifically articles covering "environmental policy change studies in Kazakhstan".

For the bibliometric literature review analysis, the most prevailing research trends, source of publication types, source of educational institutions, and main research gaps within the existing body of literature are identified. As a reference, we have used the bibliometric study approach used by Alsmadi and Alzoubi (2022) in the study on 'green economy', where the scholars investigated the publication trends and distribution of journals based on the number of journal publications. However, for this study, we have not covered the aspects regarding keywords.

The methodology involves three key phases: bibliometric literature search strategy; inclusion and exclusion criteria; data extraction and analysis; content analysis procedure; and reliability and validity.

To ensure comprehensive coverage, a structured search was conducted using Google Scholar and OpenAlex databases, which provide access to a wide array of academic articles, conference papers, and reports. The search was performed using a set of predefined keywords, namely, environmental policy change Kazakhstan, ecological policy change Kazakhstan, and environmental policy dynamics Kazakhstan. These terms were also translated and used in Russian and Kazakh to capture a broader range of sources.

The search process included articles published up to 2025, ensuring the most current research is considered. To enhance the rigour of the search, Boolean operators (e.g., OR) and truncation symbols were employed to refine search results. Additionally, reference lists of key articles were manually screened to identify relevant studies that may not have been captured through the database search.

Inclusion and Exclusion Strategy

To ensure the relevance and quality of the selected studies, specific inclusion and exclusion criteria were applied. Articles were included if they: a) focused on environmental policy studies within the context of Kazakhstan; b) were published in peer-reviewed journals, conference proceedings, or reputable academic sources; c) were available in English, Russian, or Kazakh; and d) addressed themes related to environmental studies, environmental policy dynamics, green economy, or sustainability.

Conversely, studies were excluded if they: a) focused solely on environmental issues without addressing policy aspects; b) were opinion pieces, editorials, or lacked empirical or theoretical analysis; or c) were inaccessible in full text or published in non-academic sources.

A total of 92 articles from *Google Scholar* and 560 articles from *OpenAlex* were selected for detailed analysis after applying these criteria (see Appendix 1, 2 and 3).

Data Extraction and Analysis

The selected 92 and 560 articles were systematically analysed using a content analysis framework, which involves categorising and synthesising qualitative data to identify patterns, themes, and trends. The analysis was structured around three key dimensions: (1) Year of Publication: Articles were categorized by their publication year to identify temporal trends in research focus and volume; (2) Thematic Focus: Each article was examined to determine its primary research focus, such as green growth and economy, environmental protection, legislative policy changes, and environmental education. This categorization helped in mapping the dominant areas of research within the broader theme of environmental policy change in Kazakhstan. (3) Language of Publication: To assess the accessibility and linguistic distribution of research, articles were grouped based on their language - English, Russian, or Kazakh. (4) Publication Type: Used to identify the type of publications of the articles, such as research articles, conference papers, book chapters, dissertations, thesis, blogs, or other types. And (4) *Source of Educational Institution*: This section analysed which academic or educational institutions have published how many articles. This analysis provides insights into the regional and international engagement with environmental policy issues in Kazakhstan.

Content Analysis Procedure

The content analysis for the literature review of 92 articles was conducted using a mixed-methods approach, combining qualitative and quantitative techniques. Initially, a qualitative review was performed to extract themes and insights from each article using the VOS Viewer software program. This was followed by a quantitative analysis, where the frequency of publications by year, language, and thematic focus was tabulated. Visual aids such as tables, pie charts, and bar graphs were utilized to present the data clearly and concisely.

Moreover, a deeper qualitative analysis was

conducted on a subset of studies that explicitly addressed the dynamics of policy change. These articles were further analysed using theoretical frameworks like the ACF and the MSA to understand the application of these theories in the context of Kazakhstan's environmental policies.

Reliability and Validity

To enhance the reliability of the findings, a cross-verification process was employed, where two independent ecology expert reviewers from Kazakhstan assessed the relevance and categorisation of selected articles. To find the Kazakhstani ecology experts, the social media platform *LinkedIn* was used. For the selection process, a convenience sampling method was used. Discrepancies were resolved through discussion to ensure consistency in the analysis. Additionally, this review adhered to best practices in systematic literature review methodologies, including clear documentation of search strategies, inclusion criteria, and analysis procedures, thus ensuring transparency and replicability. The independent reviews with the two Kazakhstani ecology experts were conducted online via Zoom platform, which were held in April 2025.

RESULTS

This section presents the findings of the systematic literature review, focusing on the distribution of research articles by publication year, thematic focus, and language of publication. The analysis is based on a total of 92 scholarly articles on environmental policy change in Kazakhstan, identified through a rigorous selection process. The results are organized into three subsections: (1) Publication Trends, (2) Thematic Distribution, and (3) Linguistic Analysis. Additionally, a brief comparative analysis of theoretical frameworks and visual data representation of the study is presented.

As shown in Figure 1, the thematic analysis highlights four dominant areas of research within the context of environmental policy change in Kazakhstan.

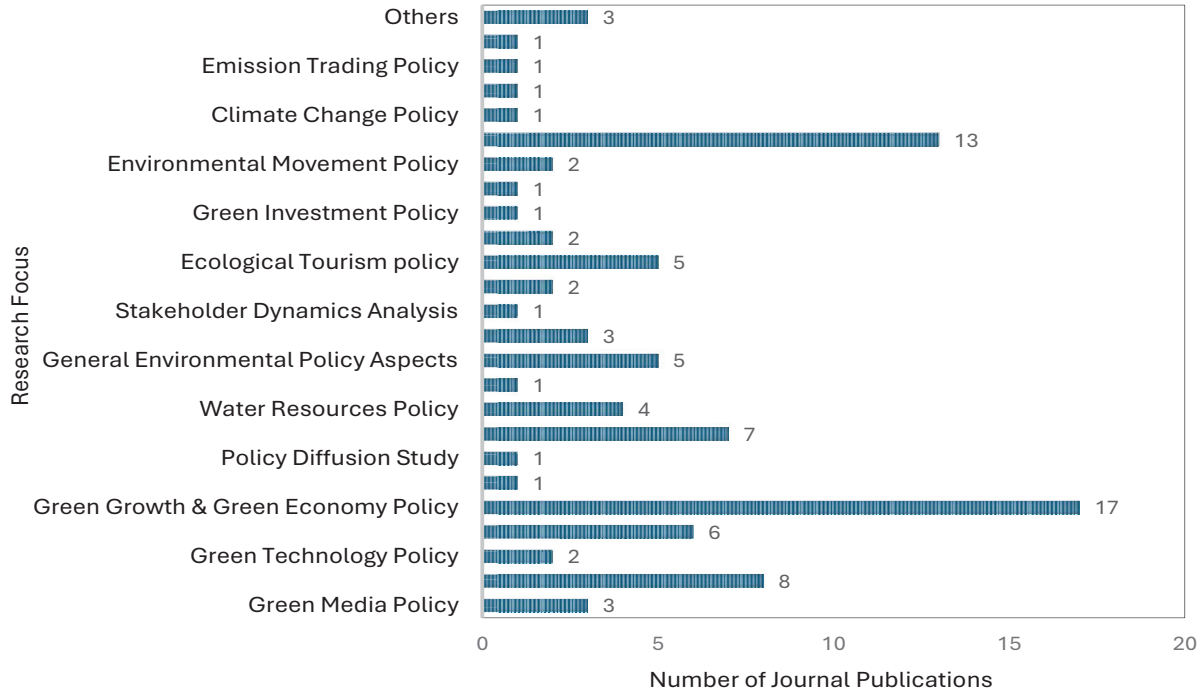

Figure 1. Thematic analysis

First, the Green Growth and Green Economy Policy thematic area accounted for the largest share of the literature, with 17 publications. Studies in this category primarily explore Kazakhstan's transition towards sustainable economic practices, focusing on green technology, renewable energy initiatives,

and the implementation of green economic strategies. Key contributors include Kozlova (2012) and Kazbekova and Kazbekov (2016), who analyzed the mechanisms for enhancing green economy development in Kazakhstan. Second, the Environmental Protection and Safety thematic area comprised of 13 publications. This theme addresses issues related to pollution control, ecosystem preservation, and safety regulations. Notable studies include Uruzgaliyeva & Usmanov (2022), who investigated the role of political mechanisms in addressing environmental security in the Caspian region, and Tastanbekova (2015), who focused on the management of protected areas in Kazakhstan. Third, the Environmental Law and Regulatory Changes thematic area included 8 publications, emphasizing the evolution of legal frameworks and regulatory policies. Researchers such as Baideldinov et al. (2013), Jangabulova and Salykhbaeva (2014) explored the impact of legal reforms on environmental governance, particularly following the adoption of the 2021 Environmental Code.

And fourth, the *Environmental Education and Awareness* thematic area can be characterized as a "growing area of interest", with six publications, highlighting the importance of educational initiatives in promoting sustainable development. Studies like Kakimova (2013) and Kumar (2022) examine the effectiveness of environmental education policies in raising awareness and fostering pro-environmental behaviors among the public.

The analysis of the linguistic distribution of the research articles reveals a relatively balanced representation across three languages, as shown below in Figure 2.

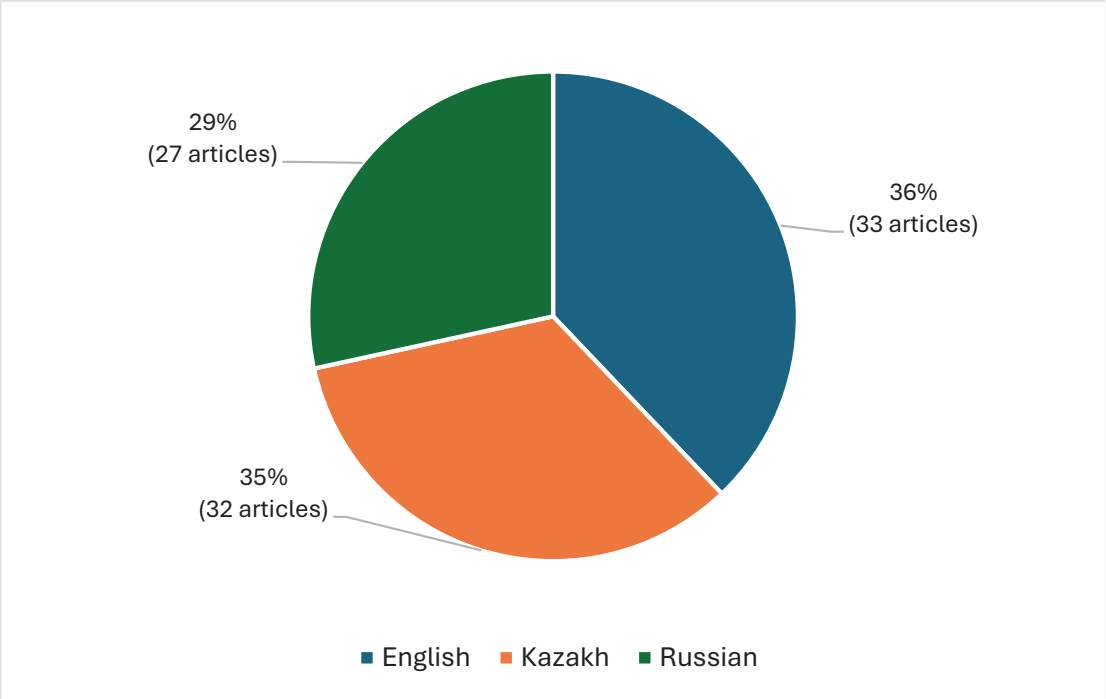

Figure 2. Linguistic analysis

The predominance of English-language publications reflects Kazakhstan's integration into the global academic discourse on environmental policy. However, the significant proportion of articles in Kazakh and Russian underscores the importance of local language research in addressing region-specific environmental challenges. Notably, studies published in Kazakh often focus on national policies, while Russian-language research tends to engage with comparative analyses involving other post-Soviet states.

First, according to the public trend analysis, most of the publications have emerged during the post-2015 period. Here, an upward rising trend can be noted, with the greatest number of publications releasing in 2022 (62 publications), 2023 (70 publications), 2024 (82 publications), and first half of 2025 (48 publications). Therefore, similar in our literature review analysis, most of the publications have emerged after 2010. The results of the analysis are shown below in Figure 3.

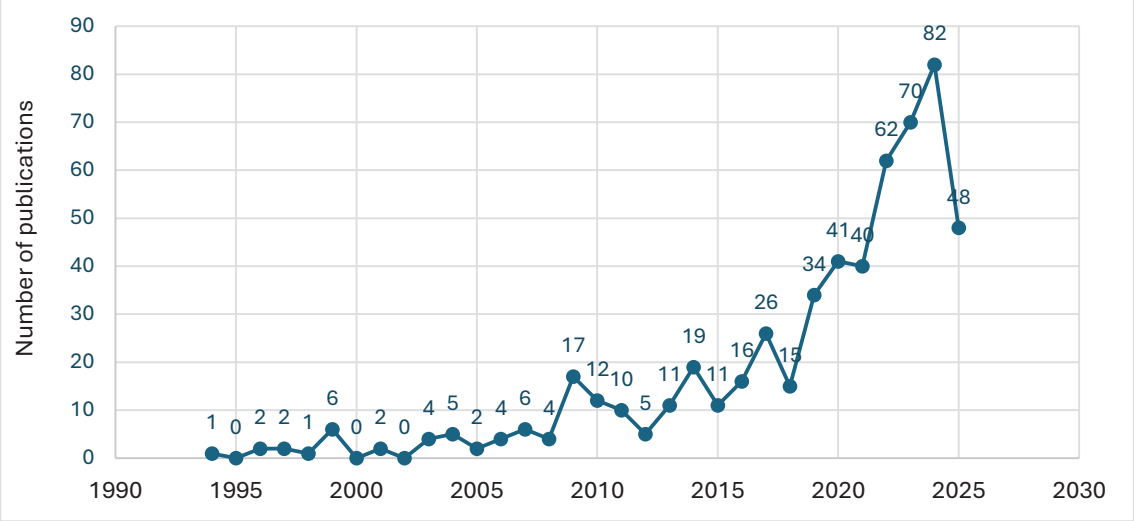

Figure 3. Publication trends (OpenAlex Data)

Second, in terms of thematic focus, which included a total of 193 topic groups, the nine most prevailing topics included the following: (1) energy security and policy; (2) energy, environment, and economic growth; (3) influence of climate on human conflict; (4) soviet & post-soviet political economy; (5) regional socio-economic development trends; (6) climate change policy and economics; (7) diverse aspects of tourism research; (8) agricultural development and environmental polices; (9) sustainable development policies.

Third, in terms of the content of the 560 research articles, the following can be pointed out. First, in terms of publication types, a significant majority of the works published were '*research articles*', followed by '*book type*', '*book chapters*', and '*other types*'. The full results see in Table 1 below.

Table 1. Publication Type Analysis

Source	Total Publications
Research Articles	442
Book Type	36
Book Chapters	23
Other Types	59

Note: compiled by the authors based on the OpenAlex database

Lastly, the institutions that have published the most research articles were Al-Farabi Kazakh National University followed by L.N. Gumilyov Eurasian National University, and Nazarbayev University. On the other hand, the highest number publications published by foreign educational institutions were by the Russian Academy of Sciences and Chinese Academy of Sciences. The full list can be seen below in Table 1.

Table 2. Source of Institution Analysis

No.	Educational Institution	Publications
1	Al-Farabi Kazakh National University	30
2	L.N. Gumilyov Eurasian National University (Kazakhstan)	12
3	Nazarbayev University (Kazakhstan)	10
4	Turan University (Kazakhstan)	9
5	D. Serikbayev East Kazakhstan State Technical University	9
6	Karaganda University of Kazpotrebsoyuz (Kazakhstan)	9

7	Astana Medical University (Kazakhstan)	9
8	Russian Academy of Sciences	8
9	Chinese Academy of Sciences	8
10	University of International Business (Kazakhstan)	8
11	Karaganda Buketov State University (Kazakhstan)	5
12	Innovative University of Eurasia (Kazakhstan)	5
13	Narxoz University (Kazakhstan)	5
14	National Academy of Sciences of the Republic of Kazakhstan	5
15	KIMEP University (Kazakhstan)	5
16	Almaty Management University (Kazakhstan)	4

Note: compiled by the authors based on the OpenAlex database

DISCUSSION

The findings of this bibliometric literature review reveal several key insights into the current state of research on environmental policy change in Kazakhstan. While there has been a notable increase in scholarly interest over the past decade, significant research gaps remain, particularly in the application of theoretical frameworks to understand the dynamics of policy change. Consequently, the study highlights the growth in environmental policy research post-2010; dominance of green economy and sustainability themes; limited application of policy change theories; language barriers and research accessibility; and implications for policy and practice.

The surge in publications after 2010 aligns with Kazakhstan's legislative milestones, such as the introduction of the Environmental Code in 2007 and its subsequent revision in 2021. These reforms have catalyzed academic inquiry into how Kazakhstan is addressing its environmental challenges within the broader context of sustainable development. The increase in research output suggests a growing recognition of the importance of environmental policy in shaping the country's socio-economic landscape. However, the predominance of descriptive studies indicates that much of the existing literature focuses on documenting policy developments rather than critically analyzing the factors driving these changes.

The thematic analysis indicates that green growth and green economy policies dominate the literature, reflecting Kazakhstan's strategic shift towards sustainable economic practices. This focus is likely driven by the government's commitment to international frameworks, such as the United Nations SDGs and the Paris Agreement. The emphasis on green economy research highlights Kazakhstan's efforts to balance economic growth with environmental sustainability, particularly through initiatives like renewable energy adoption and emissions reduction strategies. While the focus on green economy policies is commendable, it has overshadowed other critical areas of environmental policy, such as waste management, biodiversity conservation, and climate adaptation. Future research should aim to diversify the thematic focus, exploring underrepresented areas to provide a more holistic understanding of Kazakhstan's environmental policy landscape.

A critical gap identified in this review is the limited application of established policy change theories to the study of environmental policies in Kazakhstan. Despite the existence of robust frameworks like the ACF, Path Dependency Theory, and the MSA, only a handful of studies have utilized these theories to analyze Kazakhstan's policy dynamics. For instance, Kazbekova (2022) employed the policy learning theory to examine stakeholder engagement in green economy initiatives, while Gulbrandsen et al. (2017) applied the multiple streams framework to assess the diffusion of emissions trading policies. However, these applications are isolated examples rather than part of a broader trend. The underutilization of theoretical frameworks suggests that future research could benefit from a more rigorous application of policy change theories to deepen our understanding of how environmental policies are formulated, implemented, and adapted over time.

The linguistic analysis reveals a balanced distribution of research across English, Russian, and Kazakh languages, reflecting both local and international scholarly engagement. However, the accessibility of research findings may be limited by language barriers. English-language publications are more likely to reach a global audience, contributing to international discourse on environmental gover-

nance. In contrast, Russian and Kazakh publications often focus on region-specific issues and may not be widely disseminated beyond Central Asia. This linguistic divide highlights the need for more bilingual or translated research efforts to bridge the gap between local and global academic communities.

The insights gained from this review have significant implications for both policymakers and researchers. The concentration of studies on green economy policies underscores the importance of aligning Kazakhstan's national strategies with global sustainability targets. Policymakers can leverage these findings to refine their approaches, particularly by fostering collaboration between governmental agencies, NGOs, and the private sector to achieve more comprehensive and integrated environmental outcomes. Moreover, the identified research gaps suggest that future studies should prioritize exploring the dynamics of policy change, particularly in under-examined areas like environmental education, waste management, and water resources. Applying theoretical frameworks could also enhance the analytical rigor of future research, offering deeper insights into the drivers of policy evolution in Kazakhstan.

If comparing both results from *Google Scholar* and *OpenAlex* bibliometric literature reviews, the following main conclusions can be pointed out.

First, both reviews showed that most publications related to environmental policy studies have emerged during the post-2010 and post-2015 periods.

Second, in terms of thematic analysis, there is a big difference in results of these two reviews. While among the 92 articles environmental education, green economy, environmental legislation, and environmental protection were the main researched themes, among the 560 environmental articles from Open Alex the focus was more broadly covered, such as focusing on energy security, the interrelationship between the environment and economic growth, climate change, and post-soviet political economy.

Third, in terms of publication type analysis, a significant bulk of publications were published as research articles, while a small percentage from both Google Scholar and OpenAlex database were published as conference papers or book chapters. Nevertheless, one article as a blog has been uncovered in the analysis.

Lastly, in terms of source of educational institutions, the following main points can be highlighted. Most publications from both Google Scholar and OpenAlex database were published by two main Kazakhstani educational institutions: Al-Farabi Kazakh National University and Eurasian National University, followed by Karaganda Buketov University, Turan University, and Nazarbayev University. Thus, highlighting that state universities in Kazakhstan are the leading educational institutions, when it comes to publications addressing environmental policy issues in the context of Kazakhstan. Moreover, Russian academic institutions have also shown strong interest in publishing about Kazakhstani environmental policies aspects, such as Russian Academy of Sciences, Perm State University or Omsk University.

CONCLUSION

This study has undertaken a systematic literature review to examine the current state of research on environmental policy change in Kazakhstan. By analyzing 652 scholarly articles across English, Russian, and Kazakh languages via a bibliometric literature review, the paper provides a comprehensive overview of the thematic trends, theoretical applications, and research gaps within this field. The findings reveal a growing scholarly interest in Kazakhstan’s environmental policies during post-2010 and post-2015 periods, particularly following significant legislative reforms such as the Environmental Codes of 2007 and 2021. However, this increasing volume of research is largely descriptive, focusing on documenting policy developments rather than critically engaging with the underlying mechanisms driving policy change. First, the analysis indicates that research on environmental policy in Kazakhstan is predominantly centered on green growth and green economy initiatives. This reflects the country's strategic pivot towards sustainable economic development, aligning with global sustainability frameworks like the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement. While this focus on green economy policies is essential, it has inadvertently overshadowed other critical areas such as waste management, biodiversity conservation, and climate adaptation. The literature highlights the need for a more diversified research agenda that addresses these underexplored areas.

Second, a significant bulk of publications were published as research articles, while a small percentage were published as conference papers or book chapters. This points to the growing importance of research works written on different environmental themes. Third, most environmental policy-related publications from both Google Scholar and OpenAlex databases were published by the following two main Kazakhstani educational institutions, namely Al-Farabi Kazakh National University and Eurasian National University. However, universities such as Karaganda Buketov University, Turan University, and Nazarbayev University have also been active. And fourth, there is a significant lack of research publications in the field of 'environmental policy change', especially in applying various theoretical applications such as policy learning theories, path dependency theory, Hall's three-order policy change framework, or advocacy coalition framework.

All in all, the bibliometric literature review highlights both the progress made in understanding environmental policy change in Kazakhstan, while also identifying significant gaps that warrant further exploration. By addressing the research gap regarding the lack of policy change' theoretical frameworks, future research can contribute to more effective and sustainable environmental policy frameworks, supporting Kazakhstan's efforts to achieve its national and international environmental goals. Applying a 'policy change' theoretical framework helps scholars to better understand why specific environmental policies change, evolve, transform, or completely disappear over time. The integration of theoretical perspectives and a broadened research focus will not only enrich the academic discourse but also provide practical insights for policymakers striving to navigate the complexities of environmental governance in a rapidly changing world.

A significant gap identified in this review is the limited application of established policy change theories, such as the ACF, Path Dependency Theory, and the MSA. The scarcity of theoretically grounded studies suggests that much of the existing research lacks the analytical depth required to fully understand the dynamics of environmental policy change in Kazakhstan. By leveraging these frameworks, future research could provide more nuanced insights into how policies are formulated, implemented, and adapted in response to internal and external pressures. To address the identified gaps, several recommendations are proposed for future research. First, researchers should diversify their studies to include underrepresented topics such as climate resilience, ecological restoration, and transboundary environmental governance. Expanding the thematic scope would provide a more comprehensive understanding of Kazakhstan's environmental policy landscape. Second, future studies should integrate policy change theories to analyze the factors influencing environmental policy shifts in Kazakhstan. This would enhance the analytical rigor of research and contribute to a deeper understanding of the drivers of policy evolution. Third, encouraging research collaboration across languages (English, Russian, and Kazakh) and promoting the translation of key findings can enhance the accessibility of research and facilitate knowledge exchange between local and international scholars. And fourth, there is a need for more in-depth, empirical case studies and longitudinal analyses that assess the effectiveness of environmental policies over time. Such studies could provide critical insights into best practices and challenges in policy implementation, thereby contributing to more robust and adaptive environmental governance in Kazakhstan.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: YK; research design: YK; data collection: YK; analysis and interpretation: FA; writing draft preparation: FA and YK; supervision: FA; correction of article: FA and YK; proofread and final approval of article: FA and YK. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Alsmadi, A. A., & Alzoubi, M. (2022). Green economy: Bibliometric analysis approach. *International Journal of Energy Economics and Policy*, *12*(2), 282-289. https://doi.org/10.32479/ijeep.12758

ADB. (2024). *Kazakhstan's Resource Economy: Diversification Through Global Value Chain.* Asian Development Bank Organization and the Islamic Development Bank, 1-120. Retrieved July 22, 2025, from https://www.adb.org/sites/default/files/publication/1000726/kazakhstan-resource-economy.pdf

Baideldinov, D.L., Kuderin, I.K., & Izbasarova, A.D. (2013). Problems of the Development of the Environmental Policy and Law in the Republic of Kazakhstan. *Nowa Polityka Wschodnia, 2(5).* Retrieved July 22, 2025, from

https://heinonline.org/HOL/LandingPage?handle=hein.journals/nowa2013&div=28&id=&page

Baumgartner, F. R., & Jones, B. D. (1991). Agenda dynamics and policy subsystems. *The Journal of Politics*, *The Journal of Politics, 53*(4), 1044-1074. https://doi.org/10.2307/2131866

Bowers, S. R. (1993). Soviet and post-Soviet environmental problems. *The Journal of Social, Political and Economic Studies*, *18*(2), 131-158. Retrieved July 22, 2025, from https://digitalcommons.liberty.edu/cgi/viewcontent.cgi?article=1084&context=gov_fac_pubs

Calel, R., & Dechezlepretre, A. (2016). Environmental policy and directed technological change: evidence from the European carbon market. *Review of Economics and Statistics*, *98*(1), 173-191. https://doi.org/10.1162/REST_a_00470

Capano, G., & Howlett, M. (2009). Introduction: The determinants of policy change: Advancing the debate. *Journal of Comparative Policy Analysis*, *11*(1), 1-5. https://doi.org/10.1080/13876980802648227

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

ERM. (2024). Environmental Resources Management. Retrieved July 22, 2025, from https://www.erm.com/about/locations/kazakhstan/

Gafu, G., Hernández-Torrano, D., Terlikbayeva, N., & Zhanseitova, A. (2024). Mapping the Landscape of SDG Research in Kazakhstan: A Machine Learning–Based Approach. *Journal of the Knowledge Economy*, *16*, 15879-15904. https://doi.org/10.1007/s13132-024-02543-2

Gulbrandsen, L. H., Sammut, F., & Wettestad, J. (2017). Emissions trading and policy diffusion: complex EU ETS emulation in Kazakhstan. *Global Environmental Politics*, *17*(3), 115-133. https://doi.org/10.1162/GLEP_a_00418

Head, B. W. (2025). Designing for complexity and uncertainty–policy instruments for complex environmental issues. *Policy Design and Practice*, *8*(3) 291-304. https://doi.org/10.1080/25741292.2025.2474323

Islam, M. J., Ferdous, L., & Begum, M. A. (2014). The environmental policies and issues to ensure safe environment. *International Journal of Innovative Research in Engineering & Science*, *3*(10), 1-9. https://doi.org/10.13140/2.1.1173.2481

Jaffe, A. B., Newell, R. G., & Stavins, R. N. (2002). Environmental Policy and Technological Change. *Environmental and Resource Economics*, *22*, 41-70. https://doi.org/10.1023/A:1015519401088

Jangabulova, A. & Salykhbaeva, A. (2014). Formation and development of legal bases for environmental policy of Kazakhstan. *Bulletin of Law*, *Al-Farabi Kazakh National University*, *2*(70), 178-182. Retrieved July 22, 2025, from https://bulletin-law.kaznu.kz/index.php/journal/article/download/273/269/

Jenkins-Smith, H. C., & Sabatier, P. A. (1993). The study of public policy processes. In *The nation's health* (pp. 135–142). Jones & Bartlett Learning.

Jordan, A., Wurzel, R. K., & Zito, A. R. (2004). 'New' Environmental Policy Instruments: An Evolution or a Revolution in Environmental Policy? In *New Instruments of Environmental Governance?* (1st Edition, pp. 194-216), Routledge Publishing.

Kakimova, A. (2013). *Educational policy for sustainable development in Kazakhstan* (Publication No. 29149954) [Doctoral dissertation, Universidade do Porto]. ProQuest Dissertations & Theses Global.

Kangalakova, D., Satpayeva, Z., Nurkenova, M., & Nyussupova, G. (2025). Trends and research networks in greening business: A bibliometric analysis. *Environmental Economics*, *16*(1), 102-113. http://dx.doi.org/10.21511/ee.16(1).2025.08

Kazbekov, B. & Kazbekova, Zh. (2016). Improvement of 'Green Economy' development mechanisms in Kazakhstan. *International Multidisciplinary Scientific Geo-conference: SGEM,* Sofia, Bulgaria, *1*, 927. Retrieved July 22, 2025, from https://www.proquest.com/openview/1a6af8d8458e3ed778a3bf9633fe0ee7/1?pq-origsite=gscholar&cbl=1536338

Kazbekova, D. (2022). Stakeholder dynamics in environmental policy making in Kazakhstan. *Australian and New Zealand Journal of European Studies*, *14*(2), 81-93. https://doi.org/10.30722/anzjes.vol14.iss2.15837

Keeley, J., & Scoones, I. (2014). *Understanding Environmental Policy Processes: Cases from Africa.* Routledge Publishing, London, 1-240. https://doi.org/10.4324/9781849773621

Kemp, R. (2000). Technology and Environmental Policy—Innovation Effects of Past Policies and Suggestions for Improvement. In *Innovation and the Environment*, OECD Proceedings Publishing, 1, 35-61.

Kingdon, J. W. (1995). *Agendas, alternatives, and public policies* (2nd ed.). HarperCollins College Publishers.

Kozlova, M. (2012). Zelenaya ekonomika kak paradigma ustoychivogo razvitiya Respubliki Kazakhstan [Green economy as a paradigm of sustainable development of the Republic of Kazakhstan]. *Bulletin of Innovative Eurasian University, 3*(47), 61–66. Retrieved July 22, 2025, from https://vestnik.ineu.edu.kz/files/bulletins/bulletin_2012_3(47).pdf#page=61 (In Russ)

Kraft, M.E. (2021). *Environmental Policy and Politics* (8th ed.). Routledge Publishing, 1-416. https://doi.org/10.4324/9781003106265

Kumar, Y. (2022). Local eco-activist's perspectives on environmental awareness issues in Kazakhstan. *Kazakhstan Spektrum*, *4*(104), 54-82. https://doi.org/10.52536/2415-8216.2022-4.04

Kumar, Y., & Makhmudova, G. (2022). Analysis of

Kazakhstan's New Environmental Code: Focus on environmental awareness aspects. *The 19th KIMEP International Research Conference*, 450-467. Retrieved July 22, 2025, from https://www.kimep.kz/about/files/2024/10/KIRC-2022-Proceedings-final-1.pdf#page=450

Lester, J. P., & Stewart, J. (1996). *Public policy: An evaluative approach*. West Publishing Company.

Lindblom, C.E. (1979). Still muddling, not yet through. *Public Administration Review, 39*(6), 517-526. https://doi.org/10.2307/976178

Matter, R. M. (1993). *The nuclear contamination of Kazakhstan* (Master's thesis). Graduate Program in International Studies, Old Dominion University. Retrieved July 22, 2025, from https://digitalcommons.odu.edu/cgi/viewcontent.cgi?article=1191&context=gpis_etds

Nilsson, M. (2005). Learning, Frames, and Environmental Policy Integration: The Case of Swedish Energy Policy. *Environment and Planning C: Politics & Space, Sage Publishing, 23*(2), 207-226. https://doi.org/10.1068/c0405j

Ospanova, S. (2014). *Assessing Kazakhstan's policy and institutional framework for a green economy*. International Institute for Environment and Development, 1-33. Retrieved July 22, 2025, from https://www.iied.org/sites/default/files/pdfs/migrate/16559IIED.pdf?

Peters, B. G., & Hogwood, B. W. (1985). In search of the issue-attention cycle. *The Journal of Politics*, *47*(1), 238-253. Retrieved July 22, 2025, from https://fbaum.unc.edu/teaching/articles/Hogwood_JOP_1985.pdf

Pierson, P. (2000). Increasing returns, path dependence, and the study of politics. *American Political Science Review*, *94*(2), 251-267. https://doi.org/10.2307/2586011

Rhythm Foundation. (2021). *Snowballing Social Responsibility for the Environment in Kazakhstan*. Rhythm Foundation Organization. Retrieved July 22, 2025, from https://www.rythmfoundation.org/snowballing-social-responsibility-for-the-environment-in-kazakhstan/

Runhaar, H. (2016). Tools for integrating environmental objectives into policy and practice: What works where? *Environmental Impact Assessment Review*, *59*, 1-9. https://doi.org/10.1016/j.eiar.2016.03.003

Tastanbekova, R. E. (2015). Sovremennoe sostoyanie osobo okhranyaemykh prirodnykh territorii v Respublike Kazakhstan [Current state of specially protected natural areas in the Republic of Kazakhstan]. *Vestnik KazNU. Seriya geograficheskaya*, 41(2), 353-357. Retrieved July 22, 2025, from https://bulletin-geography.kaznu.kz/index.php/1-geo/article/view/261 (In Russian)

Tosun, J. (2013). *Environmental policy change in emerging market democracies: Eastern Europe and Latin America compared*. University of Toronto Press.

UNECE. (2025). *Review of Environment Statistics in Kazakhstan 2024.* UNECE Organization, 1-31. Retrieved July 22, 2025, from https://unece.org/sites/default/files/2025-04/Sector%20Review%20Environment%20Statistics%202024%20Kazakhstan.pdf

Uruzgaliyeva, M., & Usmanov, R. (2022). Aspiy oñiriniñ ekologiialyq qauipsizdigi mäselelerin sheshudıñ sayasi tetikteri: Qazaqstan Respublikasy men Resey Federatsiyasy mysalynda [Political mechanisms for addressing environmental security issues of the Caspian region: The case of the Republic of Kazakhstan and the Russian Federation]. *Journal of Qogam jane Daiur, 2*(74), 78–90. https://doi.org/10.52536/2788-5860.2022-2.06 (In Kazakh)

Wirl, F. (1999). Complex, dynamic environmental policies. *Resource and Energy Economics*, *21*(1), 19-41. https://doi.org/10.1016/S0928-7655(98)00031-1

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Appendix 1

List of English language research articles on environmental policy studies

No.	English language articles (n=33)
1	Kazbekova, D. (2022). Stakeholder dynamics in environmental policy making in Kazakhstan. *Australian and New Zealand Journal of European Studies*, 14(2), 81-93. https://doi.org/10.30722/anzjes.vol14.iss2.15837
2	Nugumanova, L. & Frey, M. (2017). Environmental governance and policy in Kazakhstan. ECONSTOR, Leibniz Institute for East and South European Research, Germany, IOS Working Paper, 1-53. URL: https://www.econstor.eu/handle/10419/162149
3	Baideldinov, D.L., Kuderin, I.K., & Izbasarova, A.D. (2013). Problems of the Development of the Environmental Policy and Law in the Republic of Kazakhstan. *Nowa Polityka Wschodnia,* Poland, Book Chapter, 2(5). https://heinonline.org/HOL/LandingPage?handle=hein.journals/nowa2013&div=28&id=&page
4	Gulbrandsen, L. H., Sammut, F., & Wettestad, J. (2017). Emissions trading and policy diffusion: complex EU ETS emulation in Kazakhstan. *Global Environmental Politics*, MIT Press Direct, 17(3), 115-133. https://doi.org/10.1162/GLEP_a_00418
5	Sabonis-Helf, T. (2003). Catching Air? Climate change policy in Russia, Ukraine and Kazakhstan. Climate Policy, Taylor & Francis Online, 3(2), 159-170. https://doi.org/10.3763/cpol.2003.0319
6	Kakimova, A. (2013). Educational Policy for Sustainable Development in Kazakhstan. *Universidade Do Porto*, Dissertation Thesis, 1-24. https://www.proquest.com/openview/0cbcc879ff7fe17222a34e8366cdcf75/1?pq-origsite=gscholar&cbl=2026366&diss=y
7	Howie, P., Gupta, Sh., Park, H., & Akmetov, D. (2020). Evaluating policy success of emissions trading schemes in emerging economies: comparing the experiences of Korea and Kazakhstan. Climate Policy, Taylor & Francis Online, 20(5), 577-592. URL: https://doi.org/10.1080/14693062.2020.1751030
8	Yan, H., Lai, C., Akshalov, K., Qin, Y., Hu, Y., & Zhen, L. (2020). Social institution changes and their ecological impacts in Kazakhstan over the past hundred years. Environmental Development, Elsevier. URL: https://doi.org/10.1016/j.envdev.2020.100531
9	Kumar, Y. (2022). Local eco-activist's perspectives on environmental awareness issues in Kazakhstan. Kazakhstan Institute for Strategic Studies, 104(4), 54-82. URL: https://ecogosfond.kz/wp-content/uploads/2023/12/VZGLJaDY-MESTNYH-JeKOAKTIVISTOV-NA-PROBLEMY-JeKOLO-GIChESKOGO-PROSVEShhENIJa-V-KAZAHSTANE-1.pdf
10	Onyusheva, I., Ushakov, D., & Van, H.T. (2018). The eco-problems and green economy development in Kazakhstan: An analytical survey. International Journal of Energy Economics and Policy, 8(2), 148-153. URL: https://www.econjournals.com.tr/index.php/ijeep/article/view/6274
11	Turgel, I., Bozhko, L., Biserov, E., & Naizabekov, A. (2020). Priorities of the state environmental policy of Russia and Kazakhstan: global agenda and regional projection. Environmental and Climate Technologies, 24(1), 638-652. URL: https://doi.org/10.2478/rtuect-2020-0039
12	Abdildin, Y., Nurkenov, S.A., & Kerimray, A. (2021). Analysis of green technology development in Kazakhstan. International Journal of Energy Economics and Policy, 11(3), 269-279. URL: https://www.econjournals.com.tr/index.php/ijeep/article/view/10897
13	Saimova, Sh., Makenova, G., Skakova, A., Moldagaliyeva, A., Beisembinova, A., Berdiyarova, Zh., & Imanbekova, B. (2020). Towards a low-carbon economic sustainable development: scenarios and policies for Kazakhstan. International Journal of Energy Economics and Policy, 10(5), 638-646. URL: https://www.zbw.eu/econis-archiv/bitstream/11159/7988/1/1757029044_0.pdf
14	Alimbaev, T., Utebaeva, A., Akhmetzhanova, N., Asankanov, A. (2017). The environmental situation and the environmental movement in Kazakhstan. Karaganda Buketov University Bulletin, 85(1), 13-18. URL: https://history-philosophy-vestnik.ksu.kz/index.php/history-philosophy-vestnik/article/view/135/108
15	Kazbekov, B., & Kazbekova, Zh. (2016). Improvement of 'Green Economy' development mechanisms in Kazakhstan. International Multidisciplinary Scientific GeoConference: SGEM, Sofia, Conference Paper, 1. URL: https://www.proquest.com/openview/1a6af8d8458e3ed778a3bf9633fe0ee7/1?pq-origsite=gscholar&cbl=1536338
16	Yelshibayev, R.K. (2018). Priority tasks of economic policy of Kazakhstan while shifting to the Green Growth Model. Statistics, Accounting, and Audit, Almaty Humanitarian-Economic University, 71(4), 65-71. URL: https://elibrary.ru/item.asp?id=36782059
17	Omarova, A.T., Jazykbayeva, B.K., Orynbassarova, Y.D., & Grelo, M.F. (2018). Model of environmental governance in Kazakhstan. Karaganda Buketov University Bulletin, Buketov Business Review, 91(3), 88-96. URL: https://economy-vestnik.ksu.kz/index.php/economy-vestnik/article/view/588/530

18	Assanova, M.A. (2015). Public Policy and model of sustainable development in the Republic of Kazakhstan. Asian Social Science, Canadian Center of Science and Education, 11(6), 237-243. URL: https://doi.org/10.5539/ASS.V11N6P237
19	Tursynbayeva, B.Zh., Mukhambetkaliyeva, G.M., Auyesbay, K.A., & Baigabylov, N.O., (2020). National policy and the media in the formation of environmental awareness among students of Kazakhstan. Centre for Academic Social Action, Media Watch, Sage Journals, 11(3), 428-438. URL: https://doi.org/10.15655/mw_2020_v11i3_202929
20	Mitrofanskaya, Y., & Bideldinov, D. (1999). Modernizing Environmental Protection in Kazakhstan. Georgetown University Bulletin, International Environmental Law Review, 12(1), 177-206. URL: https://www.proquest.com/docview/225523799?sourcetype=Scholarly%20Journals
21	Al-Fati, I. (2008). Environmental developments and report Kazakhstan. Eastern & Central European Journal on Environmental Law, 12(1 & 2). URL: https://heinonline.org/HOL/LandingPage?handle=hein.journals/eceuje-vl12&div=4&id=&page
22	Koshkinbaeva, A.S., Zhumagulova, Sh.R., Zhanaliyeva, A.Z., Bizhanova, A.R., & Khamzina, Sh.S. (2019). Environmental safety of modern Kazakhstan: general legal analysis. Journal of Environmental Management and Tourism, ASERS Publishing, 10(1). URL: https://doi.org/10.14505//jemt.v10.1(33).03
23	Mukhtarova, K., & Zhidebekkyzy, A. (2015). An analysis of green technologies development in Kazakhstan: problems and perspectives. Journal of Economic Research & Business Administration, Al-Farabi Kazakh National University, 111(5), 1. URL: https://be.kaznu.kz/index.php/math/article/view/1062/1023
24	Amirbekova, D., Narbaev, T., & Kussaiyn, M. (2022). The research environment in a developing economy: reforms, patterns, and challenges in Kazakhstan. Publications Journal, MDPI Journal, 10(4), 1-19. URL: https://doi.org/10.3390/publications10040037
25	Denissova, O., Belgibayeva, A., & Suieubayeva, S. (2023). Evaluation of the effectiveness of the "Green" growth policy pursued at the regional level in the Republic of Kazakhstan. University of International Business named after K. Sagadiyev, Eurasian Journal of Economic and Business Studies, 67(4), 74-88. URL: https://doi.org/10.47703/ejebs.v67i4.302
26	Assylbekov, D., Nadeem, A., Aslam Hossain, Md., Akhanova, G., & Khalfan, M. (2021). Factors influencing green building development in Kazakhstan. Buildings, MDPI Journal, 11(12), 1-19. URL: https://doi.org/10.3390/buildings11120634
27	Khamzina, Sh.Sh., Satybaldiyeva, G.K., Boribay, E.S., Ussubaliyeva, S.D., Kildibekova, B.E., & Esengaraeva, G.E. (2023). The role of Green Media in solving environmental problems in the Republic of Kazakhstan. Rivista Di Studi Sulla Sostensibilita, 2023(1), 183-197. URL: https://www.francoangeli.it/riviste/Scheda_rivista.aspx?IDArticolo=74329
28	Salimzhanova, A.S., Sardinas, J.C., & Yanovskaya, O.A. (2013). "Green Growth" in Kazakhstan: Political Leadership, Business Strategies and Environmental Fiscal Reform for Competitive System Change. International Journal of Industrial and Systems Engineering, Inderscience Journals, 7(12). URL: https://www.academia.edu/100088380/Green_Growth_In_Kazakhstan_Political_Leadership_Business_Strategies_And_Environmental_Fiscal_Reform_For_Competitive_System_Change
29	Iskakov, B.M., Pyagay, A.A., Rakhimbekova, A.T. (2021). Global experience of transition to a "Green" economy. Kazakh Scientific-Research Institute of Agriculture and Land Cultivation, (2), 62-69. URL: https://scholar.archive.org/work/on3nwjto7fcsrpzuyzjejz56be/access/wayback/https://www.jpra-kazniiapk.kz/jour/article/download/472/436
30	Kassymzhanova, N.A., & Dutta, M. (2016). Policy of the Republic of Kazakhstan in the field of sustainable development. Bulletin of Karaganda Buketov University, History & Philosophy Series, 83(3), 44-51. URL: https://history-philosophy-vestnik.ksu.kz/index.php/history-philosophy-vestnik/issue/download/57/34#page=44
31	Mukhtarova, F. (2013). Translating water policy innovations into Kazakhstan. In Book: Water Governance, Policy and Knowledge Transfer, 1st Edition, Book Chapter, Routledge Publishing. ISBN: 9780203102992.
32	Obydenkova, A. (2024). Sustainable Development and Actors of Regional Environmental Governance: Eurasia at the Crossroads. In Book: Sustainable Development, Regional Governance, and International Organizations, 1st Edition, Book Chapter, Routledge Publishing. ISBN: 9781003468998.
33	Batyrbayev, N.M. (2018). Ecological education of the population as an important component of environmental policy. Journal of Actual Problems of Jurisprudence, Al-Farabi Kazakh National University, 88(4), 113-117. URL: https://elibrary.ru/item.asp?id=47424359

Appendix 2

List of Russian language research articles on environmental policy studies

No.	Russian language articles (n=27)
1	Chumachenko, T.N. (2018). O reformirovanii ekologisheskoi politikii Respubliki Kasachstan. [About reform of environmental policy of the Republic of Kazakhstan]. The National Pedagogical University named after Abai Journal. URL: https://sp.kaznpu.kz/docs/jurnal_file/file20190422061550.pdf#page=37 (In Russian).
2	Rakhimbekova, A.T. (2021). Ekologisheskaya politika i primery strategii ozelenii ekonomiki [Environmental policies and examples of greening strategies of the economy]. 2nd International Forum "Peacekeeping Potential of Islam in the development of Interfaith Relations", Stavropol, Russian Federation, Conference Paper, 166-170. URL: https://www.idnk.ru/images/nauka/konferenc/02_21.pdf#page=166 (In Russian).
3	Assanova, G.K., Adilbektegy, G.A., & Sain, E.D. (2023). Problemy ekologii v Kasachstane v perviye gody nezavisimosti [Ecological problems in Kazakhstan in the first years of independence]. Valikhanov Institute of History and Ethnology Journal, 10(4), 677-691. URL: https://doi.org/10.51943/2710-3994_2023_36_4_675-691 (In Russian).
4	Ospanova, G.K., Dosmagambetova, B.B., Darmenbaeva, A.A. (2023). Znachenie mezhdunarodnovo opita politiki razvitiiya zelyonoi ekonomiki dlya Kasachstan [The importance of international experience in green economy development policy for Kazakhstan]. Karaganda University of Kazpotrebsouz, 383-389. URL: https://elibrary.ru/item.asp?id=54119310 (In Russian).
5	Esenbekova, A.B. (2016). K probleme ustoichivovo razvitiya ekonomiki i eyo zavisimosti ot globalnovo izmenenie [To the problems of the sustainable development of the economy and its dependence on global climate change]. National Academy of Sciences of the Republic of Kazakhstan, 5(309), 302-308. URL: http://nblib.library.kz/elib/library.kz/Jurnal/%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4-05-2016/Esenbekova%20A.B.pdf (In Russian).
6	Kozlova, M.V. (2012). Zelyonaiya ekonomika kak paradigma ustochivovo razvitiya Respubliki Kasachstan [Green economy as a paradigm of sustainable development in the Republic of Kazakhstan]. Innovative University of Eurasia, Pavlodar city, (3), 61-66. URL: https://vestnik.ineu.edu.kz/files/bulletins/bulletin_2012_3(47).pdf#page=61 (In Russian).
7	Temirbekova, E.T. (2016). Perspektivy razvitiya zelyonoi ekonomiki v Kasachstane [Prospects for the development of a green economy in Kazakhstan]. Kyzylorda State University Bulletin, 40(11-2), 131-136. URL: https://elibrary.ru/item.asp?id=28090592 (In Russian).
8	Varavin, Y.V., Kozlova, M.V., & Shmakov, A.V. (2017). Ozenka ekologo-ekonomicheskovo razvitiya regionov Kasachstana i politika podderzhka zelyonoi ekonomiki na regionalnom urovne [Evaluation of Kazakhstan regions ecological and economic development and support policy of the "green" economy at the regional level]. Karaganda Buketov University Bulletin, 85(1), 61-69. URL: https://bbr.buketov.edu.kz/index.php/economy-vestnik/article/view/33 (In Russian).
9	Turkenov, T.K., Eliyrich, I.V., Talikova, G.T. (2015). Problema ekologisheskovo obrazovniya i vospitaniya detei doshkolnowo vozrasta v gosudarstvennyh normativnyh dokumentah Respubliki Kasachstan [The problem of environmental education and education of preschool children in state regulative documents of the Republic of Kazakhstan]. Academy Bolashak, Karaganda, Kazakhstan, Conference Paper, 40-42. URL: https://elibrary.ru/item.asp?id=25425878 (In Russian).
10	Aitzhanova, D.A. (2016). Ocenka faktorov i vozmozhnostej perehoda kazahstana k zelenoj ekonomike v sovremennyh uslovijah razvitija [Assessment of factors and opportunities for Kazakhstan's transition to a green economy in modern development conditions]. Institute of Economics of the Science Committee under the Ministry of Higher Education and Science of Kazakhstan, 37(1), 98-114. URL: https://elibrary.ru/item.asp?id=37000627 (In Russian).
11	Artikbaeva, G.T. (2015). Sravnitel'nyj analiz normativno-pravovyh osnov ekologicheskoj politiki v Rossijskoj Federacii i Respublike Kazahstan [Comparative analysis of normatively legal bases of ecological politics in Russian Federation and Republic of Kazakhstan]. Omsk University Bulletin, Historical Science Series, 7(3), 110-114. URL: https://cyberleninka.ru/article/n/sravnitelnyy-analiz-normativno-pravovyh-osnov-ekologicheskoy-politiki-v-rossiyskoy-federatsii-i-respublike-kazahstan (In Russian).
12	Aliyeva, G. & Laumulin, M. (2021). Transgranichnoe ekologicheskoe sotrudnichestvo kazahstana i rossii: problemy i perspektivy [Transboundary environmental cooperation between Kazakhstan and Russia: problems and Prospects]. Central Asia and the Caucasus, 22(4), 140-151. URL: https://www.ca-c.org/index.php/cac/article/view/734 (In Russian).

13	Buribayeva, Zh.A. (2024). Sovershenstvovanie gosudarstvennoj politiki respubliki kazahstan v oblasti ekologicheskoj bezopasnosti [Improving state policy of the Republic of Kazakhstan in the field of environmental safety]. Academy of Public Administration under the President of the Republic of Kazakhstan, Master's Dissertation, 1-73. URL: https://repository.apa.kz/bitstream/handle/123456789/1432/%D0%91%D1%83%D1%80%D0%B8%D0%B1%D0%B0%D0%B5%D0%B2%D0%B0.pdf?sequence=1&isAllowed=y (In Russian).
14	Ormysheva, T.A., & Akzharov, B.K. (2014). Problemy razvitija ekologicheskogo dvizhenija v Respublike Kazahstan [Problems of ecological movement development in the Republic of Kazakhstan]. Al-Farabi Kazakh National University Bulletin, International Relations and International Law Series, 65(1), 65-69. URL: https://rmebrk.kz/journals/2148/29386.pdf#page=65 (In Russian).
15	Askeyeva, G.B., & Bekeyeva, L.K. (2012). Ekologicheskaja politika obse v respublike kazahstan [Environmental Policy of OSCE in the Republic of Kazakhstan]. Eurasian National University. URL: https://geum.ru/next/art-70702.leaf-10.php (In Russian).
16	Yerkinbayeva, L.K., & Kalymbek, B. (2020). K voprosu o cifrovizacii ekologicheskoj informacii v respublike kazahstan [On the issue of digitalization of environmental information in the Republic of Kazakhstan]. Kazakh-American University Journal, 50(4), 38-42. URL: https://www.researchgate.net/profile/Nurlan-Nurseiit/publication/347926889_NOVAA_MODEL_EKONOMICESKOGO_ROSTA_V_KITAE_BUDET_LI_ONA_USPESNOJ_A_NEW_MODEL_OF_ECONOMIC_GROWTH_IN_CHINA_WILL_IT_BE_SUCCESSFUL/links/5fe775a8a6fdccdcb8074ce9/NOVAA-MODEL-EKONOMICESKOGO-ROSTA-V-KITAE-BUDET-LI-ONA-USPESNOJ-A-NEW-MODEL-OF-ECONOMIC-GROWTH-IN-CHINA-WILL-IT-BE-SUCCESSFUL.pdf#page=38 (In Russian).
17	Matveyeva, E.V. (2020). Ekologicheskaja politika postsovetskih gosudarstv v reshenii problemy global"nogo izmenenija klimata [Some aspects of environmental policy of the post-soviet states to ensuring sustainable development]. Perm State University Bulletin, Political Science Series, 1-12. URL: https://cyberleninka.ru/article/n/ekologicheskaya-politika-postsovetskih-gosudarstv-v-reshenii-problemy-globalnogo-izmeneniya-klimata.pdf (In Russian).
18	Baymbetov, N.S., & Idirisova, B.Sh. (2012). Problemy ekologicheskoj bezopasnosti Respubliki Kazahstan [Problems of environmental safety of the Republic of Kazakhstan]. Al-Farabi Kazakh National University Bulletin, Law Series, 62(2), 129-138. URL: https://rmebrk.kz/journals/1194/48691.pdf#page=129 (In Russian).
19	Lantukh, K.S., & Perevozova, O.V. (2022). Osveshhenie ekologicheskih problem v internet-smi rossii i kazahstana [Coverage of environmental issues in the online media of Russia and Kazakhstan]. South Ural State University Journal, Socio-Humanitarian Series, 22(3), 115-122. URL: https://cyberleninka.ru/article/n/osveschenie-ekologicheskih-problem-v-internet-smi-rossii-i-kazahstana (In Russian).
20	Lapteva, N.G., & Umerbaeva, R.E. (2012). Nekotorye voprosy pravogo mehanizma ekologo-informacionnoj politiki Kazahstana [Some questions of the right mechanism ecological-information policy of Kazakhstan]. KAZNU Bulletin, Law Series, 62(2), 143-146. URL: https://bulletin-law.kaznu.kz/index.php/journal/article/download/1543/1489 (In Russian).
21	Muhanova, A.T., & Aitmuhanova, D.U. (2025). Mezhdunarodnoe sotrudnichestvo v reshenii ekologicheskih problem v usloviah modernizacii: osnovniye napravleniya i perspectivy pravovo razvitiya [International Cooperation in Solving Environmental Problems in the context of Globalization: Main Directions and Prospects for Legal Development]. Kh. Dosmukhamedov Atyrau State University, 76(1), 526-536. URL: https://doi.org/10.47649/vau.25.v76.i1.44
22	Akhetova, A.A. (2017). Gosudarstvennaja politika rk v oblasti ohrany okruzhajushhej sredy: vozmozhnosti, problemy i perspektivy. o kazahstanskoj iniciative "zelenyj most" [State policy of the RK in the field of environmental protection: opportunities, problems, and prospects]. About the Kazakhstan initiative "Green Bridge"]. Astrakhan Technical State University, 283-285. URL: https://elibrary.ru/item.asp?id=30049040 (In Russian).
23	Kurmanova, A.K. & Kanatbayeva, E. (2014). Pravovoe obespechenie ekologicheskoj bezopasnosti v respublike kazahstan [Legal ensurance of environmental safety in the Republic of Kazakhstan]. Zhubanov Aktobe Regional University Bulletin, 143-148. URL: https://rmebrk.kz/journals/3270/81558.pdf#page=143 (In Russian).
24	Chichenkov, D.E. (2018). Problemy obespechenija ekologicheskoj bezopasnosti i ih reshenie [Problems of ensuring environmental safety and their solution]. Kokshetau Technical University Bulletin, 242-245. URL: http://repositsc.nuczu.edu.ua/bitstream/123456789/8459/1/%D0%9A%D0%BE%D0%BA%D1%88%D0%B5%D1%82%D0%B0%D1%83%2015.03.2018.pdf#page=242 (In Russian).

25	Akopova, E.A. (2014). Sistema organov gosudarstvennogo upravlenija v sfere ohrany okruzhajushhej sredy v respublike kazahstan [System of state management bodies in the sphere of environment in Kazakhstan]. Al-Farabi Kazakh National University, Law Series, (3), 42-51. URL: http://dx.doi.org/10.14420/ru.2014.3.6 (In Russian).
26	Smoilov, S.Zh. (2014). K voprosu o pravovom obespechenii mehanizma ekonomicheskogo regulirovanija ohrany okruzhajushhej sredy i prirodopol'zovanija v Respublike Kazahstan [On the question of legal support mechanism for economic regulation of environmental protection and natural resources in the Republic of Kazakhstan]. Al-Farabi Kazakh National University, Law Series, 69(1), 181-186. URL: https://rmebrk.kz/journals/2232/69031.pdf#page=181 (In Russian).
27	Jangabulova, A.K., & Salykhbaeva, A.T. (2014). Stanovlenie i razvitie pravovyh osnov ekologicheskoj politiki Respubliki Kazahstan [Formation and development of legal bases for environmental policy of Kazakhstan]. Al-Farabi Kazakh National University, Law Series, 70(2), 178-182. URL: https://bulletin-law.kaznu.kz/index.php/journal/article/download/273/269/ (In Russian).

Appendix 3

List of Kazakh language research articles on environmental policy studies

No.	Kazakh language articles (n=32)
1	Kapassova, G.M., Artykbayeva, G.T., Musagazhinova, A.A., & Altybasarova, M.A. (2021). Khazakhstan Respublisanin khazirgi samanghy ekologialiykh sayasatyn zhanghartu maselery[On the problem of modernizing the modern environmental policy of the Republic of Kazakhstan]. The National Pedagogical University named after Abai, Socio-Political Series, 73(1). URL: http://dx.doi.org/10.51889/2021-1.1728-8940.05 (In Kazakh).
2	Baizhumanova, A.S. (2011). Eulganyn ekologilyq madenietinin qalyptasy maselesi [The problem of the formation of personal ecological culture]. Al-Farabi Kazakh National University, Philosophy Series, 36(1), 167-170. URL: https://bulletin-philospolit.kaznu.kz/index.php/1-pol/article/download/726/702 (In Kazakh).
3	Sansyzbayeva, G.N., Ashirbekova, L.Zh., & Nurgalieva, K.O. (2018). «Jasyl» tehnologiylardyn damyy – qazaqstannyn turaqty damyynyn basym bagyty retinde [Development of "Green" Technologies as priority direction of sustainable development of Kazakhstan]. Narxoz University, Central Asian Economic Review, 3(121), 154-163. URL: https://caer.narxoz.kz/jour/article/view/260/261 (In Kazakh).
4	Maykotova, G., Abdiraman, E., & Ornykhbay, T. (2023). Qazaqstandagy ekologiylyq jyrnalistikanyn damy erekselikteri [Features of the development of environmental journalism in Kazakhstan]. Eurasian National University, Journalism Series, 144(3), 103-121. URL: https://doi.org/10.32523/2616-7174-2023-144-3-103-121 (In Kazakh).
5	Satbayeva, G.S. (2015). Turaqty damydagy ekologiylyq bilim jane tarbie [Environmental education and training for sustainable development]. National Academy of Sciences of the Republic of Kazakhstan, Agricultural Sciences Series, 2(26), 103-108. URL: https://rmebrk.kz/journals/851/89749.pdf#page=103 (In Kazakh).
6	Ensegenov, A.S. (2022). Su resustaryn basqarydagy memlekettik saysat [State policy in water resources management]. Academy of Public Administration under the President of the Republic of Kazakhstan, 1-66. URL: https://repository.apa.kz/handle/123456789/1036 (In Kazakh).
7	Satieva, M.T., & Sapabekova, D.O. (2024). «Jasyl investiziyalardy» damytudagy memlekettik retteydin roli [The role of state regulation in the development of "green investment"]. Kyrgyz National University of Zhusupa Balasagyna, 118(2), 263-268. URL: https://vestnik.knu.kg/wp-content/uploads/2024/08/%E2%84%96-2-2024.-2-%D0%B8%D1%8E%D0%BB%D1%8F.pdf#page=263 (In Kazakh).
8	Khussainova, A. (2022). Qazaqstan respublikasynyn ekologiyalyq saysaty (sayasi -quqyqtyq qyrlary) [Environmental policy of the Republic of Kazakhstan (Political and Legal Aspects)]. Kazakhstan Institute for Strategic Studies, 73(1), 6-22. URL: https://journal-kogam.kisi.kz/index.php/kd/article/download/85/52 (In Kazakh).
9	Sarkulova, G.S. (2023). Khazakhstanin Kaspiy aimaghyndaghy ekologialykh sayasaty [Environmental policy of Kazakhstan in the Caspian Region]. Agrarian Technical University named after Zhangyr Khan, Uralsk, Kazakhstan, 71(1-2), 360-369. URL: https://www.elibrary.ru/item.asp?id=65670386 (In Kazakh).
10	Nysanbayeva, A.M., & Syzdykova, G.Zh. (2021). Ortalyq aziya onirindegi transsekaralyq ozender maseleleri boiynsha ortalyq aziya elderinin su saysaty [Water Policy of the Central Asian countries on transboundary rivers in the Central Asian region]. The National Pedagogical University named after Abai, 68(1), 1-10. URL: https://doi.org/10.51889/2021-1.1728-5461.23 (In Kazakh).
11	Kyzdarbekova, A.S., Kanabekova, M.A., Nizamdinova, A.K., & Popesko, B. (2023). «Jasyl ekonomikaga» kosy jagdaiyndagy ekologiyalyq komplaens tujyrymdamasyn qoldanydagy tayuekelder jane ony damyty joldary [Concept of environmental compliance in the transition to the green economy and ways of its development]. Turan University Bulletin, 99(3), 9-22. URL: https://doi.org/10.46914/1562-2959-2023-1-3-9-22 (In Kazakh).
12	Aitkazina, M., Akisheva, N., & Karshalova, A. (2024). Zhasyl ekonomikany yntalandyru uyshyn memlekettiyk kharzhylykh retteudin innovazialykh khuraldaryn paidalanudyn aelemdyk taezherebesy[The world practice of using innovative instruments of state financial regulation to stimulate the green economy]. Eurasian National University, Economic Series, (2), 267-279. URL: https://doi.org/10.32523/2789-4320-2024-2-267-279 (In Kazakh).
13	Kumarbekuly, S. (2024). EKHTA-DA Ekoturizmdi zhusuge asyurudin yumdykh-khukhykhtykh aspektilery [Organizational and legal aspects of implementing ecotourism SPNA]. International University of Tourism and Hospitality Bulletin, 2(4), 73-100. URL: https://journal.iuth.edu.kz/index.php/main/article/download/120/103 (In Kazakh).

14	Nurtaza, G., & Byulegenova, B. (2025). Ekologialyk sayasay zhane turakhty damu: Khazakhstan ushyn mindetter men mumkindikter [Environmental Policy and Sustainable Development: Challenges and Opportunities for Kazakhstan]. Kazakhstan Institute for Strategic Studies, 85(1), 39-49. URL: https://doi.org/10.52536/2788-5860.2025.85.1.003
15	Mazhenova, Zh.A. (2013). Ekologialykh turizmnin damu tendenzialary [Progress of ecological tourism trends]. Al-Farabi Kazakh National University, Geography Series, 37(2), 86-91. URL: https://bulletin-geography.kaznu.kz/index.php/1-geo/article/download/683/569 (In Kazakh).
16	Uruzgaliyeva, M. & Usmanov, R. (2022) Kaspiy onirinin ekologialikh khaupsizdiyk maseleryn sheshedu-in sayasy tetiktery: Khazakhstan Respublikasy men Reseiy Federaziasy mysalynda [Political mechanisms for addressing environmental security issues of the Caspian region: The case of the Republic of Kazakhstan and the Russian Federation]. Kazakhstan Institute for Strategic Studies, 74(2), 78-90. URL: https://doi.org/10.52536/2788-5860.2022-2.06 (In Kazakh).
17	Teleuyev, G., Bekturganov, A., & Zhussipova, B. (2025). Zhanuarldardin khukhykhtykh rezhimnin ekologialykh zhane biozenetikalykh aspektiliery [Ecological and Biocenotic Aspects of the Legal Regime of Animals]. Eurasian National University, Law Series, 151(2), 185-197. URL: https://doi.org/10.32523/2616-6844-2025-151-2-185-197
18	Zhaxybekova, F.S. (2021). Ekologialykh khylmysktykhka kharsy kuyres zhurgizudegi khylmystykh sayasat [Criminal policy in the fight against environmental crime]. Institute of Legislation and Legal Information of the Republic of Kazakhstan, 64(1), 184-190. URL: https://vestnik.zqai.kz/index.php/vestnik/article/view/52/45 (In Kazakh).
19	Kurmanbayeva, A.B., Alimkulova, N.I., & Serikpayev, N.E. (2013). Ekologialykh khauypsizdikti khukhykhtykh khamtamaszy etudin keiybir maselery [Some legal problems of environmental safety]. Al-Farabi Kazakh National University, Law Series, 66(2), 239-243. URL: https://rmebrk.kz/journals/1200/88876.pdf#page=239 (In Kazakh).
20	Kharazhanov, M.D., Khanatov, A.K., & Ahmetova, A.Zh. (2016). Ekologialakh Khauypsizdikke khol sughatyn khylmystykh khukhykh buzyshylakhtargha kharsy kuresudinh keiybir maselery [Some problems of struggle against criminal offenses, encroaching on ecological safety]. Institute of Legislation and Legal Information of the Republic of Kazakhstan, 43(2), 47-54. URL: https://vestnik.zqai.kz/index.php/vestnik/article/view/536/521 (In Kazakh).
21	Tastanbekova, R.E. (2015). Khazakhstan Respublikasindaghy erekshe khorgalatyn tabighi aumakhtardyn khazirgi zhaghdaiyi [The current state of protected areas in the Republic of Kazakhstan]. Al-Farabi Kazakh National University, Geography Series, 41(2), 353-357. URL: https://bulletin-geography.kaznu.kz/index.php/1-geo/article/view/261 (In Kazakh).
22	Boribay, E.S., Yessimova, D.D., & Satybaldiyeva, G.K. (2024). Khazakhstandaghy ekologialykh turizmnin khazirgi damu tendenzialary [Current development trends ecological tourism in Kazakhstan]. Narxoz University, Central Asian Economic Review, 2024(1), 80-91. URL: https://doi.org/10.52821/2789-4401-2024-1-80-91 (In Kazakh).
23	Baikushikova, G.S. (2012). Ortalykh Aziya aiymaghynda ekologialiykh khaupsizdiktiy khamtamasyz etudin ontailandyru zholdary [Optimization ways of enhancing environmental security in Central Asia]. Al-Farabi Kazakh National University, International Relations and International Law Series, 59(3), 61-65. URL: https://bulletin-ir-law.kaznu.kz/index.php/1-mo/article/view/669 (In Kazakh).
24	Kuralbekova, G.A. (2021). Shyghys Khazakhstan oblysyndaghy ekologialykh bilim beru maselelery: Sayasi Taldau [Environmental education in East Kazakhstan region problems: political analysis]. Eurasian National University, Conference Paper, XVI International Scientific Conference of Students and Young Scientists “Gylym Jane Bilim – 2021”, 7005-7008. URL: https://repository.enu.kz/handle/enu/7297?show=full (In Kazakh).
25	Aitkhazy, A. (2014). “Zhasyl Ekonomikanin” damitiyudin negizy baghyttary [Main directions of development of “Green Economy”]. Eurasian National University, Conference Paper, Proceedings of the IX International Scientific Conference for students and young scholars “Science and Education – 2014”, Astana, April, 5346-5249. URL: https://ecogosfond.kz/wp-content/uploads/2023/11/Zhasyl-jekonomikany-damytudy-negizgi-ba-yttary.pdf (In Kazakh).
26	Ziyavdinova, A.K., Tleubergenova, K.A., Karmenova, N.N., Ashimov, T.T., Tokhsabayeva, M.E., Satybaldiyeva, A.U., & Mahanova, A.S. (2017). Khazakhstanda ekologialiakh turizmdy damyitu mumkindiktery men khazhettilery [Opportunities and prospects for development of ecological tourism in Kazakhstan]. Atlas Sosyal Bilimler Dergisi Ana Sayfa (Turkey), 43-47. URL: https://dergipark.org.tr/en/download/article-file/1177802 (In Kazakh).

27	Ospanova, A.K., & Zakirova, D.I. (2021). Ekologiyalikh politika v formirovanii zirkuliarnoiy ekonomiki [Environment Policy in the formation of circular economy]. Turan University Bulletin, 91(3), 180-186. URL: https://doi.org/10.46914/1562-2959-2021-1-3-180-186 (In Kazakh).
28	Dugalova, G.N. (2020). "Zhasyl ekonomikanin" mani zhane Khazakhstan Respublikasyndaghy onyn damu basymdikhtary [The meaning of the "Green Economy" and its development priorities in the Republic of Kazakhstan]. Turan University Bulletin, (1), 40-46. URL: https://vestnik.turan-edu.kz/jour/article/view/1044
29	Nurtileu, K., Serikova, A.Zh., & Tursynova, T.T. (2025). Khazakhstandagy iyshky turizmnin khazirgi damu uidisteri zhane onyn aleymettik-ekonomikalykh bolashaghy [Current development processes of domestic tourism in Kazakhstan and its socio-economic future]. International Scientific Center "Endless Light in Science', Geographical Sciences Series, 23-28. URL: https://cyberleninka.ru/article/n/aza-standa-y-ishki-turizmni-azirgi-damu-deristeri-zh-ne-ony-leumettik-ekonomikaly-bolasha-y-1
30	Alibekova, Gh.K. (2011). Ekologialykh khaupsizdik maselesy sayasi tuyrakhtylykh kepili retinde [Environmental security issue - political stability as a guarantee]. Al-Farabi Kazakh National University, Series of Philosophy, Cultural Science, and Political Science, 36(1), 51-54. URL: https://bulletin-philospolit.kaznu.kz/index.php/1-pol/article/download/673/650 (In Kazakh).
31	Dulambayeva, R.T., & Boluspayev, Sh.A. (2013). Khazakhstannin "Zhasyl" ekonomikany damiytu mumkindiktery [Prospects for the "Green" economy of Kazakhstan]. Academy of Public Administration under the President of the Republic of Kazakhstan, 38(2/3), 56-61. URL: https://repository.apa.kz/handle/123456789/227 (In Kazakh).
32	Dugalova, G.N. (2019). Zhasyl khurylstyi damytudin alemdik tazhiribesy zhane ony Kazakhstan Respublikasynda paidalanu [Global experience in the development of "Green" construction and its use in the Republic of Kazakhstan]. Narxoz University, Central Asian Economic Review, 6(129), 59-69. URL: https://caer.narxoz.kz/jour/article/view/99/100 (In Kazakh).

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Determinants of Public Procurement Activity in Kazakhstan: Evidence from Regional Panel

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ABSTRACT

Public procurement is an important tool for providing public services and regional development, but its effectiveness varies significantly between regions, especially in Kazakhstan. The purpose of this study is to assess the impact of fiscal dependence and socio-economic conditions on the level of disruption of public procurement and intensity of procurement activities in Kazakhstan using a panel econometric approach with two-way fixed effects models, which allows taking into account unchangeable regional characteristics and general economic shocks. The empirical base of the study consists of a unique panel dataset on 458 districts and 17 cities of Kazakhstan covering 2016-2024 and includes 432,438 contracts worth 2.65 trillion tenge in total. The results show that, on average, 3.14% of contracts are declared invalid, corresponding to 0.87% of total purchase price.. The most stable factor disrupting purchases is inflation. An increase in the CPI by 1 point leads to an increase in failed contracts by 0.3-0.4 percentage points ($p<0.01$). Dependence on inter-budget transfers has a weak and unstable impact. Purchasing activity is significantly related to the labour market situation. Rising unemployment reduces both the number and value of contracts. Higher wages contribute to increasing their number. Inflation is a key constraint on public procurement effectiveness. In the future, research can be expanded by using more detailed regional socio-economic data and by disaggregating procurement by type of procedure and sector.

KEYWORDS: Regional Economy, Regional Development, Budget, Fiscal Strategy, Public Procurement, Government Spending, Finance, Financial Potential

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Детерминанты активности государственных закупок в Казахстане: анализ на основе региональных панельных данных

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АННОТАЦИЯ

Государственные закупки являются одним из важных инструментом обеспечения общественных услуг и регионального развития, однако их эффективность существенно различается между регионами, особенно в Казахстане. Целью данного исследования является оценка влияния фискальной зависимости и социально-экономических условий регионов на уровень срыва государственных закупок и интенсивность закупочной деятельности в Казахстане. В работе используется панельный эконометрический подход с применением моделей с двухсторонними фиксированными эффектами, позволяющих учитывать неизменяемые региональные особенности и общеэкономические временные шоки. Эмпирическая база исследования включает уникальный панельный массив данных по 458 районам 17 регионов и городов Казахстана за 2016-2024 гг., охватывающий 432 438 контрактов государственных закупок на общую сумму 2,65 трлн тенге. Результаты показали, что в среднем 3,14% контрактов были признаны несостоявшимися, что соответствует 0,87% совокупной стоимости закупок. Наиболее устойчивым фактором срыва закупок выступает инфляция: увеличение регионального ИПЦ на 1 пункт приводит к росту доли несостоявшихся контрактов на 0,3–0,4 п.п. ($p < 0,01$). Влияние зависимости от межбюджетных трансфертов носит слабый и нестабильный характер. Закупочная активность существенно связана с ситуацией на рынке труда: рост безработицы снижает как количество, так и стоимость контрактов, тогда как более высокий уровень заработной платы способствует увеличению их числа. В целом инфляция выступает ключевым ограничителем эффективности государственных закупок. В дальнейшем исследования могут быть расширены за счёт использования более детализированных районных социально-экономических данных, дезагрегации закупок по видам процедур и секторам.

КЛЮЧЕВЫЕ СЛОВА: региональная экономика, региональное развитие, бюджет, фискальная стратегия, государственные закупки, государственные расходы, финансы, финансовый потенциал

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INTRODUCTION

Public procurements are one of the largest channels of government spending worldwide, serving as a key instrument for delivering public services, stimulating local economies, and promoting inclusive growth. In many developing and transition economies, including Kazakhstan, procurement also remains a focal point of reform efforts aimed at improving transparency, efficiency, and competitiveness. However, the functioning of procurement systems remains unbalanced. Weak competition, administrative bottlenecks, and regional disparities in capacity often translate into procurement failures – delayed or cancelled tenders, unfulfilled contracts, and inefficient allocation of public resources.

Kazakhstan offers an exciting case for examining these issues. Since the mid-2010s, the country has undertaken a series of procurement reforms, including the introduction of e-procurement, new rules for transparency and competitive bidding, and gradual alignment with OECD standards (OECD, 2019; UNEP, 2021). While these reforms have improved access to procurement information and reduced corruption risks, substantial variation persists across regions. Some areas benefit from stronger administrative capacity, more industrial development, and higher private-sector participation, whereas others face limited competition and frequent contract failures. Understanding these geographic and economic patterns is essential not only for improving procurement outcomes but also for advancing the government's broader agenda of fiscal decentralization and regional equity.

For example, Casady et al. (2023) found that lack of competition is the main reason for these cancellations, highlighting how limited bidder participation can derail tenders. In transition economies, an overly rule-bound approach – a form of "bureaucratic safety" – often generates excessive levels of passive waste of public resources (Nemec et al., 2020), indicating that excessive proceduralism leads to inefficient use of public funds. This evidence underscores that weak competition, administrative inefficiencies, and uneven regional capacity are closely linked to tender cancellations, delays, and suboptimal resource use in public procurement.

Other studies on public procurement performance have emphasized the roles of transparency, competition, and administrative capacity in determining efficiency and failure (Casady et al., 2023; Xu and Wang, 2024). The development economics literature highlights how disparities in local governance and infrastructure translate into uneven outcomes in public investment (OECD, 2019). Empirical research in Kazakhstan remains scarce, however, particularly at the regional level. Existing reports by OECD (2019) and UNEP (2021) highlight progress in e-procurement but point to persistent variation in capacity and compliance across subnational governments.

This paper examines regional and local variation in public procurement performance across Kazakhstani regions over the period 2016-2024. Using a unique region-level panel dataset covering the number and value of procurement contracts, as well as the share of failed contracts, our study analyzes how procurement activity varies across regions and time. These outcomes reflect the scale and scope of public spending and capture inefficiencies and administrative capacity constraints. By linking these indicators to regional measures of economic development – such as gross regional product (GRP) per capita, transfer dependency, consumer price index (CPI), urbanization rate, unemployment rate, and SME activity, and other unobservable regional characteristics and year trends – the paper explores how local economic conditions influence procurement outcomes.

Therefore, our contributions are threefold. First, a unique dataset is compiled on public procurements at the third administrative fiscal level (district). Second, the first comprehensive review of Kazakhstan's procurement system from a regional perspective is provided. Third, by systematically linking procurement outcomes to key economic indicators over the years and across multiple regions in a panel dataset, this study provides one of the first quantitative assessments of the relationship between regional economic development and procurement performance in Kazakhstan.

The findings aim to inform ongoing policy discussions on procurement reform, fiscal decentralization, and regional development. Identifying regions where procurement failures are concentrated can help policymakers target capacity-building and monitoring resources more effectively. Moreover, understanding the economic determinants of procurement outcomes contributes to broader debates on how to align public expenditure management with equitable and efficient development.

LITERATURE REVIEW

This study is related to several strands of literature. Public procurement is widely understood as a key interface between government capacity and economic development. Large cross-country studies show that public procurement accounts for 12-20% of GDP and plays a central role in transforming fiscal resources into public goods, services, and infrastructure (Bosio et al., 2022). Procurement outcomes, such as contract amounts, competition levels, single-bidding, or contract failures, are shaped not only by formal regulations but also by the underlying institutional and administrative capacity of procuring entities (Khorana et al., 2024; Kundu et al., 2025).

From a theoretical perspective, procurement performance depends on three broad determinants: economic capacity, administrative and institutional capability, and macroeconomic conditions. The previous studies are based on principal-agent and incomplete-contracts theory, fiscal federalism, transaction-cost economics, and the Tanzi framework in public finance. These theories predict that procurement outcomes vary with regional economic capacity (GRP per capita), market integration (trade per capita), administrative transaction costs (regional fixed effects), and macroeconomic stability (CPI). Within this framework, our primary variable of interest – regional transfer dependence – corresponds to classical fiscal federalism predictions: reliance on intergovernmental transfers may relax budget discipline, reduce incentives for oversight, or encourage overcommitment to procurement projects.

A growing empirical literature examines how regional economic development shapes procurement behavior. Multiple studies show that jurisdictions with higher GDP or GDP per capita tend to spend more through public procurement (Bosio et al., 2022; Fazekas and Czibik, 2021). Kutlina-Dimitrova and Lakatos (2016) identified that GDP per capita increases the probability of cross-border procurement awards in EU Member States, suggesting that wealthier and more open economies participate more actively and competitively in procurement markets.

At the subnational level, economic capacity remains a strong predictor of procurement performance. Fazekas and Czibik (2021) find that regional GDP per capita is strongly correlated with procurement quality indicators – transparency, competition, and corruption risk – across European regions. Casady et al. (2023) demonstrated that local tax revenue per capita significantly determines Danish municipalities' procurement capacity and contract completion rates, highlighting the role of fiscal capacity in enabling contractual commitments.

Inflation has long been recognized as a key macroeconomic factor affecting public spending. While moderate inflation may temporarily increase nominal government revenues (Mauro et al., 2015), sustained inflation erodes real budgets and raises procurement costs – a classical "Tanzi effect" (Tanzi, 1977). Recent studies confirm that high inflation reduces the number of bids and increases contract prices due to risk premiums and price uncertainty (Klimavičiūtė et al., 2024; Kubiczek et al., 2023). These dynamics suggest that inflationary environments may increase procurement failure rates or distort procurement values.

Beyond economic variables, procurement outcomes are heavily influenced by regional administrative capacity. An extensive literature uses detailed contract-level datasets to measure procurement quality, corruption risk, or competition at the regional level. Fazekas and Czibik (2021) construct a multi-dimensional index of procurement quality for European regions, showing large regional disparities and strong associations with socioeconomic development. Related work identifies how political discretion, favoritism, and border effects (Garcıa-Santana and Santamarıa, 2021; Titl et al., 2021; Szucs, 2024) shape procurement prices, competition, and allocation efficiency. Procurement quality, in turn, has significant implications for regional economic growth, firm performance, and resource allocation (Decarolis and Giorgiantonio, 2022; Lisciandra et al., 2022).

However, this emerging literature is still concentrated in Western countries' settings and primarily focuses on governance indicators such as corruption risk, single bidding, or price inefficiencies. Very few studies analyze procurement volumes per capita or procurement failure rates as core outcomes, and almost none examine these at the subnational level over extended panel horizons. Thus, the determinants of procurement intensity and procurement failure remain underexplored, particularly in developing and transition economies like Kazakhstan.

Research on Kazakhstan's procurement system

is comparatively limited and primarily descriptive or legal in nature. Research by OECD (2019) and UNEP (2021) reports progress in digitization and transparency through the e-procurement development, highlighting the importance of regional institutional constraints, but does not provide empirical analysis of regional procurement outcomes.

Empirical studies using Kazakhstan's e-procurement data also remain scarce. Kalyuzhnova et al. (2022) examine local content policies in the extractive sector and show how procurement spending is geographically distributed within a single industry. Ten (2024) provides a comparative analysis, while Tursyn (2025) provides a comprehensive descriptive analysis of procurement trends. However, none of these studies constructs a regional panel, models procurement determinants, or analyzes procurement volumes and failure rates per capita.

This paper addresses these gaps by assembling a unique regional panel dataset on procurement volumes, values, and failure rates, and estimating fixed-effects models that relate procurement outcomes to fiscal dependence, economic capacity, market structure, and inflation. The study contributes to the comparative literature on determinants of public procurement and offers a quantitative assessment of procurement performance at the subnational level in Kazakhstan.

This study addresses the following research question: *How do fiscal dependence and regional economic conditions influence procurement failure and procurement activity across Kazakhstan's regions?*

Building on the theoretical frameworks and empirical evidence from the literature, the following hypotheses are formulated regarding the determinants of procurement failure and procurement activity across Kazakhstan's regions.

H1: *Higher transfer dependence is associated with higher procurement failure rates and lower procurement activity per capita.*

This hypothesis is rooted in fiscal federalism and soft-budget-constraint theory. Regions that rely more heavily on intergovernmental transfers may experience weaker incentives for stringent budget oversight, greater political pressure to initiate projects, or lower administrative capacity to manage procurement processes. These dynamics are expected to increase procurement failures and reduce efficient procurement activity.

H2: *Higher regional inflation (CPI) is associated with higher procurement failure rates and may also increase nominal procurement values.*

The incomplete-contracts framework and the Tanzi effect predict that inflation increases input price volatility, erodes the real value of budgets, and heightens uncertainty in contract execution. These factors increase the likelihood of cancellations, renegotiations, and delays, resulting in higher procurement failure rates.

H3: *Higher regional economic development is associated with greater procurement activity per capita.*

Richer regions typically have greater demand for public services, greater fiscal resources, and more developed markets, which should translate into larger procurement volumes. Prior studies show positive associations between GDP per capita and procurement spending or procurement competitiveness.

DATA AND METHODOLOGY

The electronic public procurement portal (goszakup.gov.kz) serves as the central national platform for administering all public procurement procedures in Kazakhstan. Its functioning is regulated by the Law of the Republic of Kazakhstan "On Public Procurement" and the corresponding Public Procurement Rules, which define the institutional framework and procedural standards. The portal provides comprehensive administrative records covering procurement planning, tender announcements, supplier participation, contract awards, and contract execution.

The primary procurement data were obtained through the official API access token issued by the E-Finance Center JSC, following the standard authorization procedure described on the portal. All downloaded records were stored in a MySQL database. Then, SQL queries are used to isolate contracts for district administrations by selecting customers whose full Russian titles contain the keywords "akim's office" and "district", while excluding entities containing "rural district". This approach targets the third-level budget units directly below region administrations and ensures consistent identification of district-level contracting authorities.

Overall, 458 districts generated 432,438 contracts between 2016 and 2024, totaling 2,649.28 billion Kazakhstani tenge. Over this period, procure-

ment activity showed a generally increasing trend, particularly after 2021. The number of contracts peaked in 2024 at 53,963, suggesting a significant expansion in public contracting activity in recent years.

There is substantial regional variation in both the number and value of public procurement contracts. Kostanay region recorded the highest number of contracts (53,258), while Mangistau region had the lowest (5,400). In terms of total contract value, Astana city led with 1,374.85 billion tenge, whereas Mangistau region again ranked lowest at 25.91 billion tenge. Recent administrative reforms have also split larger territories, such as the former Almaty and East Kazakhstan regions, into new units, including Abay, Zhetisu, and Ulytau, thereby redistributing procurement activity among these emerging jurisdictions.

Out of all these contracts, 3.14% are considered failed, which is 0.87% of the contract value. Failed contracts are defined as failed if the contract was initiated but was later assigned one of the following statuses: "terminated by mutual agreement", "waiting for the contract to be terminated", "terminated unilaterally", or "not locked".

The remaining region-level data on regional GDP, trade, CPI, transfer dependency, unemployment rate, urbanization rate, SME activity, and average wage were extracted from the Bureau of National Statistics website. Ideally, district-level indicators would be used to capture the impact of these factors on public procurement indicators; however, there is no consistent, publicly available data at that level. Once it becomes available, there will be an opportunity for even more detailed analysis in future studies.

This study applies a panel-data framework to examine the determinants of procurement failure and procurement activity across Kazakhstan's regions from 2017 to 2023. The empirical strategy is designed to control for regional heterogeneity in economic structure, administrative capacity, and other unobserved factors that may jointly influence procurement outcomes. To account for these factors, a series of two-way fixed-effects regression models is estimated, which control for both region-specific and year-specific unobserved characteristics.

Two-way fixed-effects models are widely used in empirical research at both the country and subnational levels, such as the regional level. By introducing fixed effects for both regions and years, the estimator effectively compares each region to itself across different periods, ensuring that identification is based on within-region variation rather than potentially biased cross-sectional differences. This methodology is especially relevant for Kazakhstan, where regions differ markedly in fiscal capacity, public-sector professionalism, procurement experience, and exposure to national development programs. Many of these features are deeply rooted and evolve slowly, and at the same time, data for such features is hard to acquire.

The empirical analysis proceeds in two steps. First, procurement effectiveness is assessed by examining the determinants of the share of failed contracts, measured as the total count of failed contracts relative to the total contract count for a given region-year observation. For this purpose, the following two-way fixed effects specification is estimated by equation (1):

$$Y_{rt} = \beta_1 Dependence_{rt} + \beta_2 ln\,(GRP_{rt}) + \\ + \beta_3 CPI_{rt} + \beta_4 X_{rt} + \mu_r + \theta_t + \varepsilon_{rt} \quad (1)$$

where:

Y_{rt} – the share of failed procurement contracts in region *r* in year *t* as our main outcome;

$Dependence_{rt}$ – the key explanatory variable of interest, measured as intergovernmental transfers to region *r* in year *t* divided by its total revenue;

$\ln(GRP_{rt})$ – the gross regional product, expressed in logarithmic form;

CPI_{rt} – annual regional inflation;

X_{rt} – vector of additional time-varying regional control variables (Log SME per capita, Unemployment rate, Urbanization rate, Log average wage);

μ_r – region fixed effects, controlling for time-invariant regional characteristics such as geography, institutional quality, and cultural factors;

θ_t – account for macroeconomic shocks and national policy changes common to all regions;

ε_{rt} – the error term.

To test whether the influence of transfer dependence is non-linear, the paper re-estimates the model in equation (1) by including a squared transfer dependence term, as specified in equation (2): [AK1][AT2]

$$Y_{rt} = \beta_1 Dependence_{rt} + \beta_2 Dependence_{rt}^2 +$$

$$+ \beta_3 ln\,(GRP_{rt}) + \beta_4 CPI_{rt} + \beta_5 X_{rt} + \\ + \mu_r + \theta_t + \varepsilon_{rt} \quad (2)$$

where:

Y_{rt} – the share of failed procurement contracts in region *r* in year *t* as our main outcome;

$Dependence_{rt}$ – the key explanatory variable of interest, measured as intergovernmental transfers to region *r* in year *t* divided by its total revenue;

$Dependence_{rt}^2$ – is the squared dependence term for region r in year t, included to allow for a non-linear relationship;

$\ln(GRP_{rt})$ – the gross regional product, expressed in logarithmic form;

CPI_{rt} – annual regional inflation;

X_{rt} – vector of additional time-varying regional control variables (Log SME per capita, Unemployment rate, Urbanization rate, Log average wage).

To examine whether inflation affects procurement differently in more transfer-dependent regions, an interaction between dependence and CPI is estimated in equation (3): [AK3][AT4]

$$Y_{rt} = \beta_1 Dependence_{rt} + \beta_2 Dependence_{rt} * \\ * CPI_{rt} + \beta_3 ln\,(GRP_{rt}) + \beta_4 CPI_{rt} + \\ + \beta_5 X_{rt} + \mu_r + \theta_t + \varepsilon_{rt} \quad (3)$$

where:

Y_{rt} – the share of failed procurement contracts in region *r* in year *t* as our main outcome;

$Dependence_{rt}$ – the key explanatory variable of interest, measured as intergovernmental transfers to region *r* in year *t* divided by its total revenue;

$Dependence_{rt} * CPI_{rt}$ – is an interaction term testing whether the association between inflation and procurement failures depends on transfer dependence;

$\ln(GRP_{rt})$ – the gross regional product, expressed in logarithmic form;

CPI_{rt} – annual regional inflation;

X_{rt} – vector of additional time-varying regional control variables (Log SME per capita, Unemployment rate, Urbanization rate, Log average wage).

In all specifications, standard errors are clustered at the regional level to allow for serial correlation within regions over time. Then, procurement activity is evaluated by estimating the determinants of two additional outcomes: (1) the log average sum of contracts per capita and (2) the log number of contracts per capita.

RESULTS

In this descriptive analysis, the dynamics of the number of contracts, average contract sums, and failure rates across regions and years between 2016 and 2024 (the latest complete annual data available) are presented. By 2024, it had almost reached 5,000 contracts, which is almost twice the average across all regions and around 4 times higher than Astana and Shymkent. While Astana saw a significant increase in the number of contracts, almost tenfold, between 2016 and 2018, most likely due to Expo 2017, it has since decreased to around 1,000 contracts per year and has remained relatively stable. Shymkent city has seen a steady increase in the number of contracts since 2016, and by 2024, it had overtaken Astana. Across the other 16 regions, Akmola, Kostanay, and Karaganda consistently rank among the top performers, each exceeding 5,000 contracts by 2024. Since 2016, Atyrau, Zhetisu, and Mangistau have consistently had the fewest contracts (~1,000 or fewer). These differences may indicate varying levels of regional procurement readiness. In terms of annual total contracts, as shown in Table 1, Almaty demonstrates the highest growth.

Table 1. Annual total contracts by region 2016-2024

Region	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
Astana city	250	1833	2694	1036	1347	955	1139	1215	1112	11581
Almaty city	807	1244	1564	3404	3371	1538	1659	4611	4940	23138
Shymkent city	466	542	705	535	653	731	1036	1173	1374	7215
Akmola	4030	5813	6072	5724	5675	5409	4574	5184	5706	14866
Kostanay	4673	6574	6452	6366	5532	5205	4608	5202	5349	48187
Karaganda	2747	4896	5012	4536	5376	5015	4935	5434	5264	28781
Aktobe	2081	2755	2775	2815	3357	3349	3222	4048	4379	23835
North Kazakhstan	2407	3499	3493	3478	3610	3521	3027	3340	3645	9303

Almaty	1311	2164	2532	2511	2739	2746	3192	3431	3209	22692
Zhambyl	2191	2853	2913	2951	3240	2913	2710	3098	3127	43215
East Kazakhstan	1830	2420	2724	2493	2803	2584	2415	2606	2817	49961
West Kazakhstan	2062	2584	2817	2573	2470	2732	2166	2516	2649	13786
Turkestan	1774	2833	3835	3854	3008	2571	2462	2398	2345	4957
Pavlodar	1683	3108	2962	2366	2263	2223	2180	2207	2234	30020
Abay	1463	1830	1784	1595	1532	1626	1845	1486	1705	21226
Kyzylorda	1157	1432	1641	1650	1608	1760	1410	1639	1489	25080
Atyrau	841	1223	1162	1126	1008	1003	883	953	1104	22569
Zhetisu	386	598	694	583	617	670	853	718	637	25996
Mangistau	491	658	595	476	463	539	543	588	604	5756
TOTAL	32650	48859	52426	50072	50672	47090	44859	51847	53689	432164

Note: compiled by the authors

Astana dominates, reaching over 40 billion KZT in peak years (2021 and 2023), well ahead of Almaty and Shymkent. While Astana's average values fluctuated, they remained consistently higher even after a decrease in 2018, post Expo 2017. Almaty city maintained a mid-range average contract value (generally around 10 billion KZT) without dramatic shifts until 2022, but by 2024, the average had tripled. Shymkent, on the other hand, displayed modest, relatively stable average values, peaking in 2022 and dropping sharply by 2024. This divergence indicates that although Almaty leads in the number of contracts, Astana processes fewer but significantly larger-value contracts, likely reflecting its capital status and concentration of central government procurements.

When the remaining 16 regions are compared, there is significant volatility, especially since 2020. Karaganda had a dramatic increase in the average sum, from 12,5 million in 2016 to 485,6 million in 2024, a 38-fold increase. Aktobe saw a similar trend with a 23-fold increase in 9 years and overtook Karaganda as the leader in 2024. Regions with the lowest average sum in 2024 are Turkestan, Kostanay, Akmola, and Pavlodar, each with a sum of less than 100 million on average. Turkestan experienced a spike in 2019, when average contracts reached 391,7 million, most likely due to a new region status in 2018, but it gradually decreased to 80,2 million by 2024.

Regarding the contract failure rate shown in Table 3, Shymkent has exhibited a higher failure rate for most of the year, with significant volatility since 2016.

Table 3. Annual contract failure rate for 2016-2024

Region	2016	2017	2018	2019	2020	2021	2022	2023	2024	Overall
Astana city	1,6	2,1	3,0	3,4	3,7	3,5	2,2	3,3	2,2	2,8
Almaty city	2,4	4,1	3,1	4,5	2,5	5,5	3,9	2,1	3,4	3,5
Shymkent city	6,2	7,0	3,6	4,1	8,0	9,3	3,1	6,3	12,2	6,6
Aktobe	3,7	3,4	2,3	1,9	3,0	4,7	4,1	3,9	5,0	2,8
North Kazakhstan	2,0	1,9	1,8	2,0	2,9	3,7	2,6	4,5	4,9	3,0
Akmola	2,7	2,6	2,1	2,0	2,4	2,5	3,1	4,9	4,8	3,6
Zhambyl	3,3	3,0	3,2	2,9	2,5	4,0	3,1	4,6	4,6	3,8
Karaganda	3,4	3,5	3,2	2,0	4,2	3,4	3,2	4,1	4,4	4,0
Abay	1,4	3,9	1,9	2,0	3,5	2,2	2,0	4,4	4,3	2,6
East Kazakhstan	3,0	1,8	2,0	1,7	2,1	2,2	2,3	2,9	4,2	3,5
Mangistau	3,7	2,4	1,2	0,4	1,3	3,0	3,9	6,6	4,0	3,4
Zhetisu	4,4	3,3	3,3	2,9	2,3	3,4	2,2	4,9	3,6	3,5
Pavlodar	2,2	2,7	2,2	1,7	1,8	2,4	2,8	2,9	3,6	2,7
Almaty region	4,6	5,1	3,8	3,7	3,2	2,9	3,4	3,8	3,6	2,4
West Kazakhstan	1,9	1,8	1,9	2,3	1,9	3,0	2,9	4,7	3,4	2,9
Kostanay	3,0	2,8	1,8	1,6	2,8	2,4	2,8	3,7	3,4	2,5
Turkestan	4,5	4,5	1,8	1,7	5,2	3,3	3,3	4,4	3,4	2,9

Atyrau	3,6	3,6	5,1	4,4	5,0	5,6	3,5	2,8	2,5	3,6
Kyzylorda	3,1	3,0	0,9	1,6	1,9	3,1	2,9	2,8	2,0	2,5
MEAN (all regions)	3,2	3,3	2,5	2,5	3,2	3,7	3,0	4,1	4,2	3,3

Note: compiled by the authors

The failure rates were increasing from 2018 to 2021 to almost 9%, then sharply decreased the following year in 2022 to close to 2.5%, only to increase to an even higher level in 2024 to 12.2%, which is the highest failure rate across all regions and republican-level cities, 4 times the country average. Since gaining republican-level status in 2018 and adopting an independent procurement process, it might have contributed to volatility in their rate of success/failure over the years. Volatility was much lower in Almaty and Astana, with overall failure rates between 2% and 4% (except in 2021 in Almaty, which rose to 5,5%). Across the other 16 regions, most of the regions fluctuated around 2% and 5% failure rate, and the majority around 3-4% in 2024. Two regions with the lowest failure rates are Atyrau at 2,5% and Kyzylorda at 2%, the only two below 3%. Both of these regions maintained a relatively low failure rate throughout the years, never exceeding 4%. Mangistau region experience the most volatile failure rates, with a sharp decrease from 2016 to 2019 (from 3,7% to 0,4%), followed by a steady increase to 6,6% through 2023, the highest among all regions across all years. In 2024, it fell to 4% again, back to the country's average.

To sum up, a descriptive review shows significant disparity across republican-level cities and regions for all three procurement indicators, with varying volatility and trend. This warrants further investigation of the determinants of public procurement indicators using econometric techniques that control for variation across regions and years to understand what and how to mitigate the risks that affect the efficient procurement process at the subnational level.

Table 4 reports the main regression results using the share of failed contracts as the dependent variable.

Table 4. Fixed effect regression results for the share of failed contracts

Dependent variable	Share of Failed Contracts			
	1	**2**	**3**	**4**
Transfer dependence	**0.055***	0.044	0.056	-0.268
	(0.029)	(0.035)	(0.043)	(0.325)
Log GRP per capita	-0.001	-0.014	-0.014	-0.010
	(0.011)	(0.011)	(0.011)	(0.011)
CPI	**0.004*****	**0.003*****	**0.003*****	0.002
	(0.001)	(0.001)	(0.001)	(0.002)
Log SME per capita	-	0.003	0.004	**0.008***
	-	(0.002)	(0.002)	(0.004)
Unemployment rate	-	0.011	0.011	0.011
	-	(0.010)	(0.011)	(0.013)
Urbanization rate	-	**0.002****	**0.002****	0.001
	-	(0.001)	(0.001)	(0.001)
Log average wage	-	-0.003	-0.002	-0.021
	-	(0.018)	(0.019)	(0.026)
Dependence squared	-	-	-0.016	-
	-	-	(0.036)	-
Dependence * CPI	-	-	-	0.003
	-	-	-	(0.003)
Number of observations	98	93	93	93
R-squared	0.625	0.707	0.707	0.725
R-squared adjusted	0.515	0.592	0.586	0.610
R-squared within	0.152	0.308	0.309	0.350
R-squared within adjusted	0.118	0.235	0.224	0.270

AIC	-655.0	-637.4	-635.4	-641.1
Note: Statistical significance at * 0.1, ** 0.05, *** 0.01 levels. Standard errors clustered by region are in parentheses. Data are for 2017-2023. All specifications include region and year fixed effects. Transfer dependence is calculated as transfer amounts divided by the region's total revenue. SME includes the number of registered small and medium enterprises and individual entrepreneurs.				

Note: compiled by the authors

All specifications include region and year fixed effects, which account for time-invariant unobserved regional characteristics (e.g., geography, local cultural factors) as well as time-variant macroeconomic and policy shocks common across regions. Standard errors are clustered at the regional level. Across all models, overall fit is strong, with adjusted R-squared values exceeding 0.62.

The results for transfer dependence, measured as the share of intergovernmental transfers in total regional revenue, are mixed. In the base specification (Model 1), which conditions only on economic factors (log GRP per capita and CPI) and fixed effects, transfer dependence is positively associated with the share of failed contracts, with statistical significance at the 10% level. This finding is broadly consistent with fiscal federalism and soft-budget-constraint theories, which propose that regions that rely more heavily on central transfers may face weaker marginal budget discipline, lower incentives to oversee procurement decisions, or more political pressure to initiate projects despite limited administrative capacity. However, this association is not robust: after including additional observed regional characteristics such as log number of SME per capita, unemployment, urbanization rates, and average wages (Models 2-4), the coefficient on Transfer dependence becomes statistically insignificant.

In contrast, inflation, measured by the regional CPI, demonstrates a much stronger and more consistent relationship with procurement failure. In Models 1-3, CPI has a positive coefficient that is statistically significant at the 1% level. A one-unit increase in the CPI index is associated with a 0.3-0.4 percentage-point increase in the failure rate. This aligns with theories of incomplete contracts and the classical "Tanzi effect": inflation erodes the real value of budgets, raises the volatility of input prices, and increases the likelihood of implementation delays, renegotiations, or cancellations. High-inflation environments, thus, create uncertainty for both procuring agencies and suppliers, making contract execution more difficult and increasing the probability of failure.

Urbanization is another significant predictor in some specifications. In Models 2 and 3, the urbanization coefficient is positive and statistically significant at the 5% level. This is intuitive: more urbanized regions tend to handle larger and more complex procurement projects, which may face greater implementation or coordination challenges that can contribute to failures.

Other predictors, including log GRP per capita, unemployment, log number of SME per capita, and average wages, are not statistically significant across all specifications. Furthermore, neither the quadratic term in transfer dependence nor the interaction between transfer dependence and CPI has a significant effect.

Table 5 reports the results of regression analyses with procurement activity, log average sum of contracts per capita, and log contracts per capita as dependent variables.

Table 5. Fixed effect regression results for procurement activity

Dependent variable	Log Average Sum of Contracts Per Capita			Log Contracts Per Capita		
	1	**2**	**3**	**4**	**5**	**6**
Transfer dependence	-0.469	-0.502	**-3.830***	0.602	0.943	0.995
	(1.526)	(0.958)	(1.907)	(0.833)	(0.697)	(1.034)
Log GRP per capita	0.290	-0.416	-0.380	0.251	0.024	0.023
	(0.647)	(0.652)	(0.662)	(0.318)	(0.146)	(0.151)
CPI	0.056	0.111	0.123	0.008	0.034	0.033
	(0.149)	(0.106)	(0.115)	(0.049)	(0.034)	(0.036)
Log SME per capita	-	0.133	0.085	-	**0.154***	0.155
	-	(0.295)	(0.310)	-	(0.087)	(0.095)

Unemployment rate	-	**-1.917****	**-1.759****	-	**-0.777***	**-0.780***
	-	(0.710)	(0.750)	-	(0.403)	(0.434)
Urbanization rate	-	0.066	0.056	-	-0.007	-0.007
	-	(0.043)	(0.039)	-	(0.021)	(0.022)
Log average wage	-	2.480	2.150	-	**1.470****	**1.475****
	-	(1.615)	(1.604)	-	(0.644)	(0.638)
Dependence squared	-		**4.410***	-	-	-0.070
	-		(2.381)	-	-	(1.516)
Number of observations	117	113	113	117	113	113
R-squared	0.946	0.966	0.967	0.946	0.959	0.959
R-squared adjusted	0.931	0.953	0.954	0.931	0.945	0.944
R-squared within	0.009	0.219	0.244	0.027	0.226	0.226
R-squared within adjusted	-0.024	0.153	0.171	-0.005	0.160	0.150
AIC	174.0	131.1	129.3	-24.7	-43.7	-41.7
BIC	245.8	212.9	213.9	47.1	38.1	42.8
Note: Statistical significance at * 0.1, ** 0.05, *** 0.01 levels. Standard errors clustered by region are in parentheses. Data are for 2017-2023. All specifications include region and year fixed effects. Transfer dependence is calculated as transfer amounts divided by the total revenue of the region. SME includes the number of registered small and medium enterprises and individual entrepreneurs.						

Note: compiled by the authors

These models also include region and year-specific fixed effects, with standard errors clustered at the regional level. Transfer dependence shows a statistically significant non-linear relationship with the log average sum of contracts per capita in Model 3. The negative linear term and positive squared term imply that the marginal effect of transfer dependence on procurement spending is initially negative but becomes positive at higher levels of dependence (above 44%). This finding is consistent with the expectation that regions with lower or moderate reliance on central transfers tend to reduce procurement spending. In contrast, regions that are highly dependent on central funding may continue to increase procurement activity due to greater support from the central government.

Most regions in Kazakhstan exceeded the 44% average transfer dependence threshold during 2017-2023. Only two industrial regions and two republican-level cities fall below it: Astana city (37.3%), Mangystau region (31.5%), Almaty city (17.8%), and Atyrau region (13.1%). However, there is no robust evidence that transfer dependence is systematically associated with either procurement spending or the number of contracts across the complete set of models.

The unemployment rate shows a consistent and statistically significant negative relationship with procurement activity. A one-percentage-point increase in unemployment is associated with a 1.8-1.9% decrease in the average sum of contracts per capita (significant at the 5% level) and a 0.8% decrease in the number of contracts per capita (significant at the 10% level).

Average wages are positively and significantly associated with the number of contracts per capita in Models 5 and 6. Regions with a 1% higher average wage level tend to have approximately 1.5% more procurement contracts, holding other factors constant. This relationship does not extend to the value of procurement contracts. There is also a modest positive relationship between log SME per capita and log number of contracts per capita (Model 5), which is intuitive, though not consistently significant across specifications. Log GRP per capita, CPI, and urbanization do not show statistically significant effects in any of the procurement-activity models, even when fixed effects and other controls are included.

Overall, the results in Tables 1 and 2 indicate that inflation is a strong predictor of procurement failures, whereas transfer dependence has limited explanatory power for either procurement failures or procurement activity. By contrast, regional labor market conditions, such as unemployment and income levels, appear to play a more central role in shaping procurement activity across Kazakhstan's regions.

CONCLUSION

This study investigates the determinants of public procurement failure and activity across Kazakhstan, using a unique panel dataset of regional procurement and economic indicators from 2017 to 2023. By combining descriptive statistics with fixed-effects regression models, the study examines how transfer dependence, economic development, inflation, labor-market conditions, and regional administrative capacity influence procurement outcomes across regions.

The findings show that inflation is positively and strongly associated with procurement failure, emerging as a key constraint on procurement outcomes at the regional level. Higher inflation significantly increases the likelihood of contract failure, underscoring the macro-fiscal vulnerability of procurement systems in inflationary environments. Unemployment consistently reduces procurement activity by lowering both the number and the value of contracts per capita, pointing to the importance of regional labor-market conditions. Transfer dependence, by contrast, shows some significant, but limited influence on procurement failure rates and quantities. Notably, the results do not indicate that wealthier regions systematically perform better in procurement once unobserved regional and time factors are accounted for.

Despite its contributions, the paper faces several limitations. First, the analysis relies on administrative procurement data, which may not fully capture informal practices, strategic behavior, or off-budget procurement channels. Second, the empirical approach is observational and cannot establish causal relationships. Further research could explore administrative records in greater detail, including disaggregation by contract type, sectoral patterns, and failure mechanisms, or could exploit institutional reforms or quasi-experimental variation to strengthen causal inference.

Overall, this study provides one of the first quantitative assessments of Kazakhstan's procurement landscape at the regional level and highlights the role of macroeconomic conditions and fiscal decentralization in shaping public procurement outcomes. The findings provide evidence for a consistent and robust influence of inflation on procurement failure. At the same time, the sign of fiscal decentralization and soft-budget constraints driven by transfer dependence is weak. In terms of policy implications, this suggests that ensuring price stability may be a key macroeconomic condition for improving procurement performance across Kazakhstan's regions, complemented by targeted, but likely limited in effectiveness, policies aimed at strengthening intergovernmental fiscal structures and regional economic conditions.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: BY; research design: BY, AT and OZ; data collection: AT and OZ; analysis and interpretation: BY and OZ; writing draft preparation: BY, AT and OZ; supervision: BY; correction of article: BY, AT and OZ; proofread and final approval of article: BY, AT and OZ. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Bosio, E., Djankov, S., Glaeser, E., & Shleifer, A. (2022). Public Procurement in Law and Practice. *American Economic Review*, *112*(4), 1091–1117. https://doi.org/10.1257/aer.20200738

Casady, C. B., Petersen, O. H., & Brogaard, L. (2023). Public procurement failure: The role of transaction costs and government capacity in procurement cancellations. *Public Management Review*, 1–28. https://doi.org/10.1080/14719037.2023.2231945

Decarolis, F., & Giorgiantonio, C. (2022). Corruption red flags in public procurement: New evidence from Italian calls for tenders. *EPJ Data Science*, *11*(1), 16. https://doi.org/10.1140/epjds/s13688-022-00325-x

Fazekas, M., & Czibik, Á. (2021). Measuring regional quality of government: The public spending quality index based on government contracting data. *Regional Studies*, *55*(8), 1459–1472. https://doi.org/10.1080/00343404.2021.1902975

Garcıa-Santana, M., & Santamarıa, M. (2021). *Border Effects in Public procurement: The Aggregate Effects of Governments' Home Bias* (CREI Working Paper). Centre de Recerca en Economia Internacional

Kalyuzhnova, Y., Azhgaliyeva, D., & Belitski, M. (2022). Public Policy Instruments for Procurement: An Empirical Analysis. *Technological Forecasting and Social Change*, *176*, 121472. https://doi.org/10.1016/j.techfore.2022.121472

Khorana, S., Caram, S., & Rana, N. P. (2024). Measuring public procurement transparency with an index: Exploring the role of e-GP systems and institutions. *Government Information Quarterly*, *41*(3), 101952. https://doi.org/10.1016/j.giq.2024.101952

Klimavičiūtė, L., Schito, M., & Barcevičius, E. (2024).

Do firms submit fewer tender bids with high inflation? An analysis of firms' participation in public procurement in the EU. *Journal of Public Procurement*, *24*(4), 478–506. https://doi.org/10.1108/JOPP-12-2023-0093

Kubiczek, J., Wydmański, W., Morawska, I., & Jochymczyk, P. (2023). Uwarunkowania prawno-ekonomiczne rynku zamówień publicznych w czasach wysokiej inflacji w Polsce. *Ruch Prawniczy, Ekonomiczny i Socjologiczny*, *85*(1), 139–154. https://doi.org/10.14746/rpeis.2023.85.1.11

Kundu, O., Uyarra, E., Ortega-Argiles, R., Tirado, M. M., Kitsos, T., & Yuan, P.-Y. (2025). Impacts of policy-driven public procurement: A methodological review. *Science and Public Policy*, *52*(1), 50–64. https://doi.org/10.1093/scipol/scae058

Kutlina-Dimitrova, Z., & Lakatos, C. (2016). Determinants of direct cross-border public procurement in EU Member States. *Review of World Economics*, *152*(3), 501–528. https://doi.org/10.1007/s10290-016-0251-3

Lisciandra, M., Milani, R., & Millemaci, E. (2022). A corruption risk indicator for public procurement. *European Journal of Political Economy*, *73*, 102141. https://doi.org/10.1016/j.ejpoleco.2021.102141

Mauro, P., Romeu, R., Binder, A., & Zaman, A. (2015). A modern history of fiscal prudence and profligacy. *Journal of Monetary Economics*, *76*, 55–70. https://doi.org/10.1016/j.jmoneco.2015.07.003

Nemec, J., Grega, M., & Orviska, M. (2020). Over-bureaucratisation in public procurement: Purposes and results. *Public Sector Economics*, *44*(2), 251–263. https://doi.org/10.3326/pse.44.2.5

OECD. (2019). *Public Procurement in Kazakhstan: Reforming for Efficiency*. OECD Publishing. https://doi.org/10.1787/c11183ae-en

Szucs, F. (2024). Discretion and Favoritism in Public Procurement. *Journal of the European Economic Association*, *22*(1), 117–160. https://doi.org/10.1093/jeea/jvad017

Tanzi, V. (1977). Inflation, Lags in Collection, and the Real Value of Tax Revenue. In *IMF Staff Papers* (1st edn, Vol. 24). International Monetary Fund. https://doi.org/10.5089/9781451956443.024.A007

Ten, V. (2024). Comparative Analysis of Public Procurement Methods of the Republic of Kazakhstan and Other Countries. *InterEULawEast: Journal for the International and European Law, Economics and Market Integrations*, *11*(1), 101–118. https://doi.org/10.22598/iele.2024.11.1.5

Titl, V., De Witte, K., & Geys, B. (2021). Political donations, public procurement and government efficiency. *World Development*, *148*, 105666. https://doi.org/10.1016/j.worlddev.2021.105666

Tursyn, A. O. (2025). Kazakhstan's public procurement landscape: An in-depth review over two years. *Central Asian Economic Review*, *6*, 68–82. https://doi.org/10.52821/2789-4401-2024-6-68-82

UNEP. (2021). *Assessment of Status and Legal Frameworks of Sustainable Public Procurement in the Republic of Kazakhstan*. UNEP.

Xu, L., & Wang, Y. (2024). Identifying Key Causal Factors of "Outsourcing Failure" in Government Procurement of Public Service Based on Interval Type-2 Fuzzy DEMATEL-Prospect Theory. *Journal of Public Affairs*, *24*(4), e2948. https://doi.org/10.1002/pa.2948

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Ambivalence as a Strategic Driver: A Longitudinal SWOT Analysis of Family Business Resilience (2015-2024)

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ABSTRACT

Family businesses (hereinafter – FBs) occupy an important position in the Czech economy and play a key role in ensuring regional development sustainability. The aim of this study is to analyse the strengths, weaknesses, opportunities and threats (SWOT) of Czech family firms and to identify ambivalent factors that can simultaneously enhance business resilience while creating potential vulnerabilities. The empirical basis relies on data from the Resilient Family Business surveys conducted among owners and successors of family enterprises in 2022 and 2024, comprising more than 3,700 open-ended responses. The methodological approach combines quantitative content analysis, comparative SWOT analysis, and correlation and regression techniques to assess the dynamics of the identified factors and their interrelationships. The findings indicate a structural shift from traditional value-based advantages (SEW, trust, cohesion) toward stronger market and technological orientation. Specifically, the results show that key strengths of family firms have intensified: SEW-related factors increased from 67 to 427 mentions, quality from 57 to 135, and innovation and digitalisation from 29 to 95. At the same time, weaknesses have also become more pronounced, particularly the shortage of qualified labour (rising from 52 to 160 mentions), managerial limitations and low digital maturity. Correlation analysis confirms strong associations between innovation and quality, between low digitalisation and weak marketing, and between economic uncertainty and regulatory burdens. Overall, the study provides empirical insights into the evolving perceptions of SWOT factors in Czech FBs and offers broader conclusions on how strategic engagement with ambivalence can strengthen entrepreneurial flexibility and resilience.

KEYWORDS: Family Business, Business Environment, Resilience, Innovation, Innovation Strategy, Strategic Sustainability, Technology

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Амбивалентность как стратегический фактор: продольный SWOT-анализ устойчивости семейного бизнеса (2015-2024)

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АННОТАЦИЯ

Семейные предприятия (далее – СП) занимают значимое место в экономике Чехии, обеспечивая устойчивость регионального развития. Цель исследования – провести анализ сильных и слабых сторон, возможностей и угроз (SWOT) чешских семейных фирм, а также выявить амбивалентные факторы, которые одновременно могут усиливать устойчивость бизнеса и формировать уязвимости. Эмпирическая база основана на данных опросов Resilient Family Business, проведённых среди владельцев и преемников семейных предприятий в 2022 и 2024 гг., и включает свыше 3 700 открытых ответов. Методология сочетает количественный контент-анализ, сравнительный SWOT-анализ, корреляционный и регрессионный анализ для оценки динамики факторов и их взаимосвязей. Результаты показывают структурный сдвиг от традиционных ценностных преимуществ (SEW, доверие, сплочённость) к укреплению рыночной и технологической ориентации. В частности, результаты показали, что ключевые сильные стороны семейных фирм значительно усилились: ценностные факторы SEW выросли с 67 до 427 упоминаний, качество — с 57 до 135, а инновации и цифровизация — с 29 до 95. Одновременно усилились слабости, прежде всего кадровый дефицит (с 52 до 160), управленческие ограничения и недостаточная цифровая зрелость. Корреляционный анализ подтвердил тесную связь между инновациями и качеством, между низкой цифровизацией и слабым маркетингом, а также между экономической неопределённостью и регуляторными барьерами. Таким образом, исследование предоставляет как эмпирическое понимание меняющихся представлений о факторах SWOT в чешских СП, так и более широкие выводы о том, как стратегическая работа с амбивалентностью может повысить гибкость и устойчивость предпринимательства.

КЛЮЧЕВЫЕ СЛОВА: семейный бизнес, бизнес-среда, устойчивость, инновация, инновационная стратегия, стратегическая устойчивость, технологии

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INTRODUCTION

Family businesses (hereinafter – FBs) represent essential economic and social actors both globally and in the Czech Republic. In the Czech context, they constitute approximately one-third of all active enterprises, amounting to around 572,066 economic entities (Czech Statistical Office, 2024). Their role in regional development, labor market stability, and the intergenerational transmission of entrepreneurial values is irreplaceable. FBs are officially defined in the Czech Republic by Government Resolution No. 899/2021 as family-owned corporations or family-operated sole proprietorships (Ministry of Industry and Trade, 2022). A large share of these businesses produce high-value-added goods and thus significantly contribute to the competitiveness of the domestic economy (AMSP CR, 2022).

FBs are typically characterized by high levels of social capital, long-term orientation, and strong personal involvement by owners (Stasa & Machek, 2022). The academic literature offers a wide range of approaches to studying FBs, reflecting differences in cultural, legal, and economic contexts (Petrová, 2024; Staszewska et al., 2024). Despite this diversity, most conceptual frameworks distinguish between internal factors (strategic, organizational, relational) and external factors (economic, technological, environmental, institutional) that jointly shape the performance and competitiveness of FBs (Sedláčková & Buchta, 2006).

From the perspective of sustainability and long-term development, the key concept is business resilience, defined as an organization's ability to adapt to disruptions and recover from crises while maintaining its core values and operational structures (Ali, 2025). Strengths such as stable values, deep process knowledge, loyalty, and flexibility contribute to resilience (Randerson, 2023; Gashi & Smajlaj, 2024), whereas weaknesses, including a lack of strategic management, gaps in digitalization, or intergenerational conflicts, may undermine it (Dewi, 2024). Recent research highlights the importance of socioemotional wealth, innovation capacity, and the professionalization of management, yet these dimensions are often examined in isolation and predominantly using cross-sectional data (Sharma & Sharma, 2024).

Although international literature on family firms has expanded, systematic longitudinal analyses of how strengths, weaknesses, opportunities, and threats (SWOT) evolve and how they interact with resilience remain scarce, particularly in post-transformation economies. Even less attention has been paid to the ambivalent nature of certain factors: those that may simultaneously function as sources of resilience and as potential vulnerabilities, depending on how they are managed. In the Czech environment, studies linking the dynamic development of SWOT factors, ambivalence, and resilience are largely absent despite the considerable economic significance of FBs.

The purpose of this study is to conduct a longitudinal analysis of the strengths, weaknesses, opportunities, and threats of Czech family businesses in 2015, 2022, and 2024, and to identify factors that exhibit an ambivalent nature, simultaneously functioning as sources of resilience and vulnerability. The scientific contribution lies in integrating a time-comparative SWOT perspective with the concept of strategic ambivalence in family firms, applying a mixed-methods design that combines qualitative content analysis of more than 3,700 open-ended responses with quantitative procedures, and providing empirically grounded evidence from a post-transformation economy. In doing so, the study refines existing resilience frameworks by demonstrating how internal and external factors co-evolve over time and formulates implications for public policy, advisory practice, and educational programs aimed at strengthening the long-term sustainability of FBs.

The exclusive focus on the Czech context is deliberate. Czech FBs operate under specific structural and historical conditions, including low formalization, historical caution towards external resources, and a relatively low level of internationalization. These characteristics, rooted in the post-1989 transformation of the economy, differentiate Czech FBs from their Western European or American counterparts. At the same time, they make the Czech Republic a suitable case for a pilot application of the proposed research design in a post-transformation setting, with the potential to extend the approach to international comparative studies between post-socialist and advanced market economies.

LITERATURE REVIEW

Strengths and Weaknesses of Fbs

The strengths of FBs form an essential foundation for their competitiveness and resilience to change. One of the most important strengths is their dynamic capabilities - namely, the ability to respond swiftly to changes in the environment and to adapt internal resources to new conditions (Pike-Bowles et al., 2024). FBs often benefit from high employee loyalty, strong family members' commitment to the enterprise's success, an orientation toward successful generational succession, and long-term sustainability (Meroño-Cerdán et al., 2024). Its importance increases when FBs engage in corporate social responsibility activities, positively affecting both firm reputation and performance (Kim et al., 2024; Jurásek et al., 2021). Innovation capacity is another key strength. Companies that invest in technology and adapt to change tend to exhibit higher levels of resilience (Tajul et al., 2024). FBs often combine an ethical approach to business with environmental responsibility and efficient use of available resources. In certain regions, such as the Visegrad Four (V4), emphasis on values and professional ethics has also been found to increase firms' willingness to adapt to changing market conditions (Jakubcinová et al., 2024).

On the other hand, FBs also face weaknesses that can hinder their ability to respond to contemporary challenges. These commonly include internal conflicts, intergenerational differences in approaches to financing innovation, and the absence of formal management structures (Kidwell et al., 2024). Such conflicts may obstruct decision-making and lower team morale. Many FBs also suffer from a lack of strategic succession planning, which, if left unresolved, can lead to destabilization after the departure of key individuals (Almaharmeh et al., 2024). Another major weakness is excessive caution. FBs often adopt a conservative approach to risk, especially regarding external financing or expansion (Hodgetts & Kuratko, 1992), which may hinder growth and limit responsiveness to new market opportunities (Pan & Zhong, 2024). A further risk is the concentration of decision-making power among family members, which can lead to reduced objectivity, greater risk aversion, and reduced transparency in decision-making (Sheng et al., 2024). FBs also frequently struggle with limited resources, a shortage of expert capacities, and low levels of internationalization. These limitations reduce their ability to access foreign markets and seize global opportunities (Islas-Moreno et al., 2022). Caution in relations with external partners and the absence of global networks can thus be seen as significant barriers to growth and the development of long-term resilience in FBs.

Based on the literature review above, a partial research objective related to the strengths and weaknesses of FBs can be formulated. The study aims to identify, analyze, compare, and evaluate the strengths and weaknesses of FBs and assess their impact on resilience building in a dynamic and evolving business environment. Furthermore, the study seeks to evaluate the ambivalence of certain factors that may simultaneously represent both advantages and weaknesses.

In relation to the strengths and weaknesses of FBs, the following research questions have been defined:

RQ1: How have the strengths of FBs evolved, and how has this development affected their competitiveness and resilience?

RQ2: Which weaknesses have deepened over time, and which have been successfully mitigated?

RQ3: Can ambivalent factors be identified, those that may function as both strengths and weaknesses?

The following hypotheses have been formulated in relation to the strengths and weaknesses of FBs:

H1: There is a strong positive correlation between the level of innovation and the quality of products and services.

H2: There is a moderate positive correlation between business flexibility and technological competence.

H3: There is a strong positive correlation between a low level of digitalization and the underutilization of modern marketing tools such as social media and online strategies.

Opportunities and Threats

FBs operate in a changing external environment that presents both risks and opportunities to strengthen their competitiveness and resilience. Firms that proactively monitor technological trends and implement digitalization tools or artificial intelligence demonstrate greater adaptability and innovation capacity (Fei et al., 2025). Digitalization also streamlines internal processes and enables real-

time responsiveness to customer demands (Magrelli et al., 2022). Another significant opportunity lies in strengthening relationships with customers and other stakeholders. FBs that actively build trust and foster long-term partnerships are better positioned to retain loyalty even during turbulent periods (Rasmi & Ramya, 2023). Education and professional development of both family members and employees represent another crucial element. A higher level of technical and soft skills can enhance the quality of decision-making processes and improve business effectiveness (Ren et al., 2023). Participation in cooperative structures such as clusters also brings tangible benefits. Especially in sectors characterized by higher technological complexity or innovation pressure, clusters can facilitate knowledge sharing, accelerate growth, and support long-term sustainability (Staszewska et al., 2024).

On the other hand, FBs face several external threats that may undermine their stability and long-term development. These include high economic volatility, inflation, regulatory changes, tax burdens, and geopolitical instability (Siuta-Tokarska et al., 2025). Political decisions and legal frameworks often increase the administrative burden and discourage investment, including those financed through grants and other support schemes (Goldie & Chithra, 2024). A shortage of qualified labor represents a significant constraint, particularly in regions with low labor market mobility (Daaboul & Savall, 2024). Aggressive practices by larger market players, including price undercutting or misleading advertising, can negatively affect the market position of smaller family-owned entities (Pan & Zhong, 2024). Another major threat is rapid technological progress, which places high demands on flexibility, investment, and skills. FBs lacking sufficient financial reserves or an innovation-oriented culture may fall behind and lose their competitiveness (Sharma & Sharma, 2024). In this context, the ability to adapt to a changing environment and openness to collaboration play a key role.

It can be argued that opportunities and threats are closely linked to the strategic capabilities of FBs and their ability to manage change. Firms that actively develop their dynamic capabilities and engage in networks are better positioned to withstand external pressures and maintain stability under turbulent conditions (Korár et al., 1998; Staszewska et al., 2024).

Based on the above literature review, a partial research objective concerning the opportunities and threats of FBs can be formulated. The study aims to identify, analyze, compare, and evaluate the opportunities and threats facing FBs, and to assess their impact on resilience building in a dynamic and evolving business environment. Furthermore, the study aims to evaluate the ambivalence of certain factors that may simultaneously function as both opportunities and threats.

The following research questions have been defined in relation to the opportunities and threats of FBs:

RQ4: How have the opportunities for FBs evolved, and what impact has this development had on their competitiveness and resilience?

RQ5: Which threats have intensified over time, and which ones have been successfully mitigated?

RQ6: Is it possible to identify factors that exhibit an ambivalent nature?

The following hypotheses have been formulated in relation to the opportunities and threats of FBs:

H4: There is a strong positive correlation between technological innovations in the areas of digitalization, automation, and robotics and the improvement in the quality of products and services.

H5: There is a strong positive correlation between economic uncertainty and legislative barriers for entrepreneurs.

H6: There is a moderate positive correlation between the shortage of qualified labor and technological threats.

METHODOLOGY AND DATA SOURCES

The empirical data come from the *Resilient Family Business* surveys carried out in 2022 and 2024. In both years, an online questionnaire was distributed via the Czech Association of FBs to owners and successors of FBs formally meeting the definition stipulated by Government Resolution of the Czech Republic No. 899 of 18 October 2021. Selected firm identifiers (e.g., company name, year of establishment) were cross-checked against the ARES Register of Economic Entities to ensure data credibility. In 2024, approximately 1,950 entrepreneurs were contacted; 222 provided complete responses. In 2022, around 1,050 businesses were contacted; 105 completed the questionnaire. The estimated completion time was 30-40 minutes in both waves. Despite relatively low response rates, the sample covers

firms of different sizes, legal forms, and sectors. It can be considered reasonably representative of the sectoral and regional structure of Czech FBs, while recognising the limitations associated with voluntary participation and potential non-response bias.

Questionnaire Design and Variables

The questionnaire structure was adapted from Petlina and Koráb (2015) and refined using recent literature on FBs resilience, particularly the design proposed by Yilmaz et al. (2024). It covered six thematic areas: sociodemographic data, vision and strategy, business and marketing, succession, human resources, and resilience and risk management.

For this article, two types of information are used:

(1) Sociodemographic characteristics of respondents and their firms (e.g., year of establishment, legal form, size, sector).

(2) Open-ended SWOT responses from the Business and Marketing section, in which respondents answered: "What do you consider to be the strengths/weaknesses of your family business that constitute a competitive advantage?"; "What do you consider to be the opportunities/threats for your family business that enable the creation of a competitive advantage?".

Respondents could list up to five strengths and weaknesses and up to five opportunities and threats. Answers ranged from single words to short phrases and full sentences, capturing authentic language and perceptions without predefined categories. The questionnaire was pre-tested on 15 respondents from the target group. Based on their feedback, selected terms and instructions were clarified to reduce ambiguity. Given the open-ended format, reliability was not assessed using conventional psychometric indicators (e.g., Cronbach's alpha). Instead, reliability was supported through a structured coding procedure with independent categorisation by two coders and subsequent consensus.

Analytical Strategy

Given the textual nature of the data, the primary method was quantitative content analysis, specifically word- and category-frequency analysis (Neuendorf, 2017; Krippendorff, 2018). This approach is common in organisational and strategic research where the aim is to map prevailing perceptions without imposing a rigid coding scheme ex ante (Short et al., 2010).

Approximately 800 individual statements were analysed in 2022, and about 2,900 in 2024. The analysis followed these steps:

(1) Creation of a unified dataset of all responses relating to strengths, weaknesses, opportunities, and threats.

(2) Segmentation of responses into meaningful units and assignment of preliminary descriptive codes.

(3) Harmonisation of synonymous or closely related expressions and aggregation into broader thematic categories (e.g., innovation and digitalisation, human resources, quality of products and services, economic uncertainty, legislative and bureaucratic burden).

(4) Independent coding by two coders and resolution of discrepancies by consensus.

(5) Application of a minimum frequency threshold: only factors occurring at least ten times in one of the SWOT categories in at least one reference year were retained for analysis.

This procedure enables the capture of contextually grounded perceptions of business owners and the systematic comparison of categories over time. The main limitations include potential loss of nuance during normalisation and the inherent subjectivity of category formation, despite the use of independent coding and consensus.

To examine temporal development and relationships among SWOT factors, descriptive statistics, correlation analysis, and regression analysis were employed. Frequency tables were compiled for all factors in 2015, 2022, and 2024, forming the basis for comparing the relative prominence of strengths, weaknesses, opportunities, and threats. Pearson's correlation coefficients were calculated using factor frequencies to identify associations within and across SWOT categories and to visualise clusters of factors with similar trajectories. Simple linear regression models were estimated to capture trends in the development of selected factors over time. Given the limited number of time points, these models are interpreted as descriptive trends rather than as causal evidence.

Overall, the methodological design integrates qualitative sensitivity to language and context with quantitative procedures to identify temporal changes and ambivalent factors that may function as both strengths and weaknesses or as opportunities and threats.

RESULTS

The research findings provide a comprehensive overview of the key factors influencing the resilience of FBs. The analysis begins with an examination of strengths and weaknesses, which define the internal characteristics of FBs and their potential ambivalence. This is followed by an analysis of opportunities and threats, representing external factors that affect the long-term sustainability, resilience, and competitiveness of FBs. Particular attention is also paid to the possible ambivalent nature of these external factors.

The analysis of FBs' strengths across 2015, 2022, and 2024 (Appendix 1) shows a clear shift from traditional value-based attributes toward modernization and a higher market orientation. SEW-related factors (loyalty, trust, cohesion) remain the most stable and frequently mentioned strengths, confirming their enduring role in internal stability and continuity.

At the same time, the prominence of quality, innovation, R&D, and digitalisation has increased markedly by 2024, indicating a gradual transition toward more technology-driven competitiveness. Investments in knowledge, professional skills, and management capabilities also intensified, reflecting the growing importance of professionalisation and human capital development. Strengths in flexibility, responsiveness, and market trend awareness highlight the increasing external orientation of FBs.

Overall, the results show that the strongest and most resilient firms combine traditional value-based advantages with innovation capacity, professionalised management, and strategic market orientation. Figure 1 presents the correlation structure of strength categories over time.

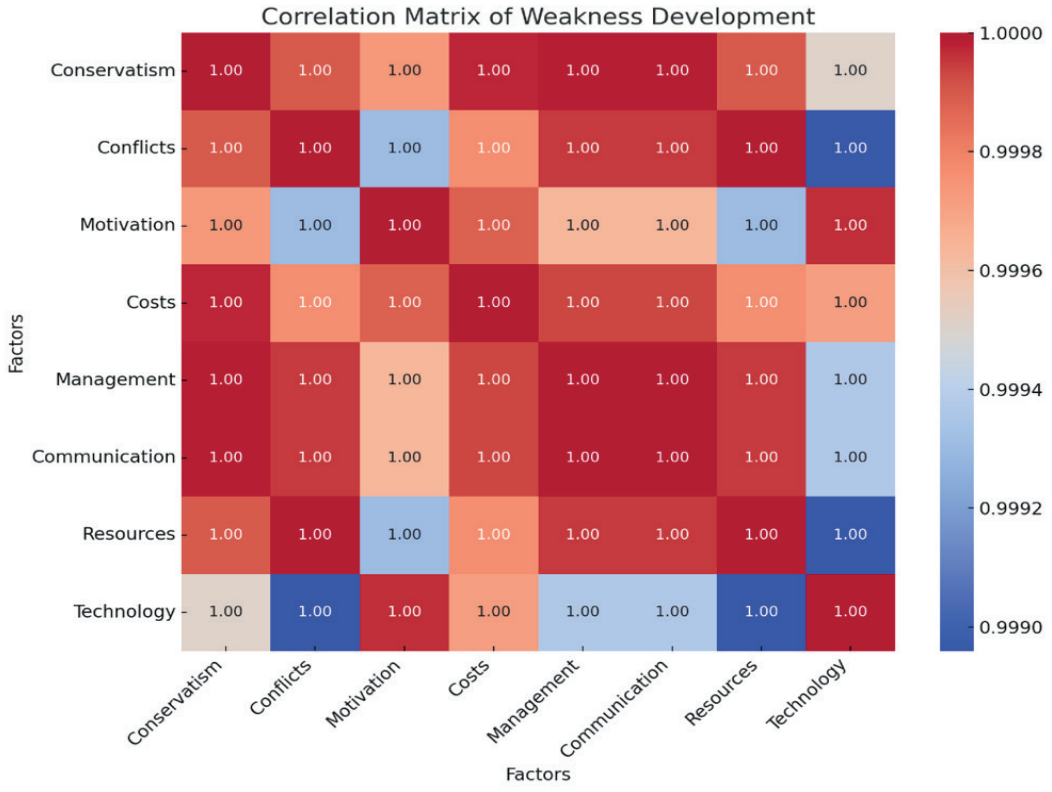

Figure 1. Correlation matrix of the development of strengths over time

The correlation matrix illustrates the interconnections among FBs strengths that emerged from the data. Strong positive correlations were observed between innovation and quality, suggesting that firms pursuing technological advancement simultaneously maintain high output standards. A

strong positive correlation between employees and brand/know-how highlights the critical role of a stable and loyal team in preserving reputation and corporate identity. A moderate correlation between flexibility and technological expertise indicates that adaptable firms often focus on new technologies and digitalization trends.

The analysis of FBs weaknesses across 2015, 2022, and 2024 shows that human resources remain the most significant and increasingly acute challenge (Appendix 2). The frequency of HR-related weaknesses rose substantially over time, reflecting difficulties in finding qualified staff, high workload concentration, low substitutability of key employees, and growing turnover.

Marketing and digitalisation limitations also intensified, as many FBs continue to underutilise online tools and digital channels despite rising awareness of their importance. Weaknesses related to strategic management persisted throughout the period, with many firms lacking a clearly defined vision, planning mechanisms, or professionalised management structures. Technological adaptation, including readiness for AI and advanced digital tools, also emerged as a notable concern in 2024. Conversely, several weaknesses became less relevant. Conservative financial behaviour became less prominent, and succession-related issues, which were significant in 2015, declined as more firms introduced structured succession planning.

Correlation analysis (Figure 2) indicates that HR shortages are strongly associated with rising operating costs, while limited digitalisation correlates with underdeveloped marketing capabilities.

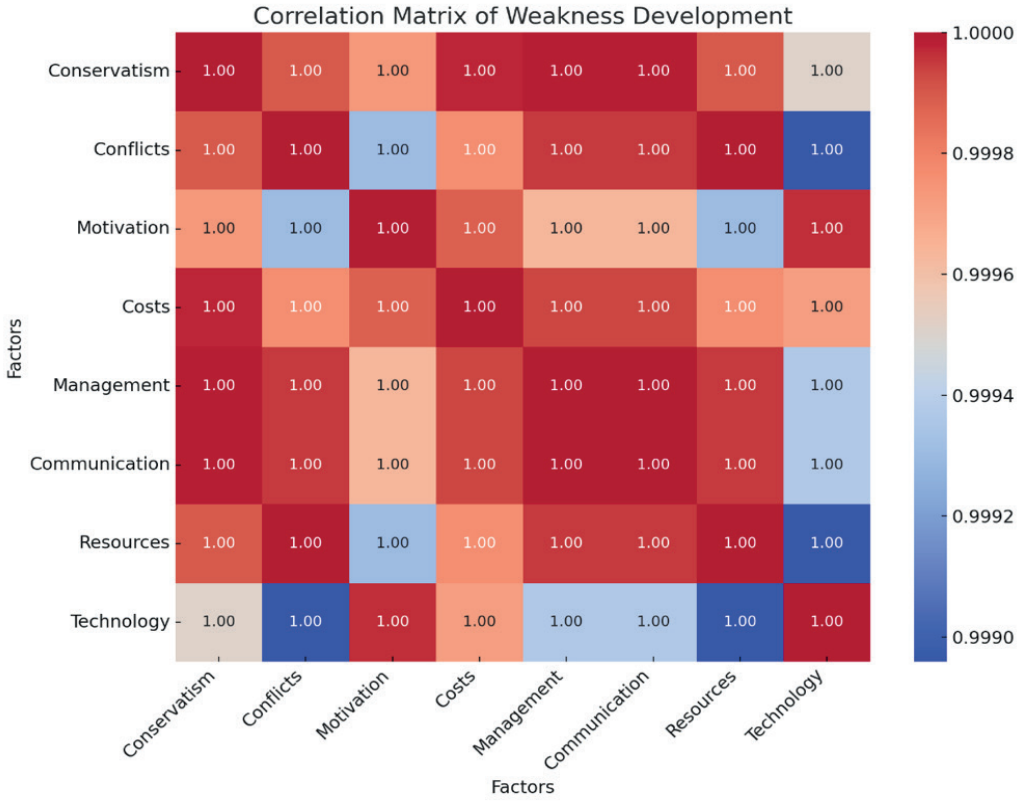

Figure 2. Correlation matrix of the development of weaknesses over time

A high correlation between the failure to adopt new technologies and insufficient marketing suggests that companies lagging in IT and digitalization also tend to underutilize modern marketing tools such as social media and online strategies. A moderate correlation between the absence of a clear vision/strategy and management issues suggests that a lack of a defined corporate direction may lead to ineffective leadership and a poor organizational structure. Although the correlation matrix shows

very high levels of association among nearly all weakness factors, the overall directions and relative relationships between them remain consistent and interpretable.

Based on the findings of the correlation and regression analyses, the following conclusions can be drawn regarding the tested hypotheses:

(1) H1: There is a strong positive correlation between the level of innovation and the quality of products and services. The correlation analysis results partially support this hypothesis. The research indicates that firms investing in innovation and R&D simultaneously place strong emphasis on delivering high-quality products and services. A significant positive correlation was recorded; however, the quantitative value of the coefficient and the corresponding p-value do not permit a definitive statistical conclusion about causality.

(2) H2: There is a moderate positive correlation between business flexibility and technological knowledge. The available data support this hypothesis. A moderate correlation was found between flexibility and the degree to which businesses are oriented toward new technologies and digitalization. This suggests that firms open to change and adaptation tend to adopt new technological tools more readily.

(3) H3: There is a strong positive correlation between low levels of digitalization and the underutilization of modern marketing tools. This hypothesis is clearly supported by the data. Firms lagging in digitalization also tend not to use modern marketing channels such as social media, online campaigns, or analytical tools. The relationship demonstrates a close interconnection between a firm's digital maturity and its marketing sophistication.

In summary, all three hypotheses are empirically supported, though the strength of evidence varies. The interpretations are primarily based on correlation coefficients, contextual findings, and a qualitative analysis of the development of strengths and weaknesses over time.

AMBIVALENT NATURE OF STRENGTHS AND WEAKNESSES

The research identified several factors that appeared repeatedly in both the strengths and weaknesses of family firms. These ambivalent factors cannot be classified as purely positive or negative; their impact depends on context, managerial approach, and the stage of business development. This dual character is highly relevant for resilience, as a factor that functions as a strength under certain conditions may become a weakness in another context, and vice versa. Recognising ambivalence is therefore essential for understanding the dynamic nature of family firms and for designing management strategies that deliberately convert such factors into sources of competitive advantage. The key ambivalent domains identified in the analysis are summarised in Table 1.

Table 1. Ambivalence of strengths and weaknesses

Ambivalent factor	Strengths	Weaknesses	Relationship to building resilience
Conservatism vs. stability of family values.	Deeply rooted SEW values. These elements provide strong support in times of crisis and allow natural adaptability to changing market conditions.	Stable and unchanging SEW values can lead to conservatism, reluctance to use external investment, rigid management, and slow adaptation to trends such as digitalisation or innovation.	Balancing stability with adaptability is key to strengthening resilience. RFs should maintain their continuity of values while also being open to new management strategies, more flexible financial models, and modern technologies.
Human resources: key strength and risk	FBs often rely on cohesion, strong relationships, and high employee loyalty. Teams are often highly committed and loyal to the company, which reduces recruitment costs and increases stability.	The current problem is the lack of qualified staff, low levels of substitutability and high workload for key people. Turnover and generational clashes between traditional and modern approaches can create conflicts.	To increase resilience, it is necessary to invest in training, create a clear succession system, and put in place professional HR strategies that allow for a flexible response to changes in the labour market.

Flexibility: a strength that can become a weakness	FBs are often highly flexible in decision-making, product-market fit and time management. This enables them to respond effectively to market changes and maintain a competitive advantage.	Excessive flexibility can lead to management chaos, inefficient work organisation, overworking of key people and work-life imbalance.	The solution is to put in place clear management processes and strategies that maintain flexibility but minimise the negative effects of excessive improvisation.
Technology: a key factor for growth and a barrier	Strengths in 2024 include knowledge of new technologies, digital tools and trend management methods.	On the other hand, FB faces difficulties in implementing digitalization, IT and AI solutions, this advantage is not fully exploited in the case of especially small companies.	FB needs to balance access to old and new technologies, educate employees and gradually integrate modern tools without undermining the company's traditional values.
Marketing: un/untapped potential for growth	FBs often have strong brands, quality know-how and product uniqueness, and have built strong customer relationships based on personal communication.	The lack of effective marketing, digital promotion and the absence of social networks weakens their ability to reach new customers and expand.	To strengthen resilience, it is essential to professionalize marketing strategies, leverage digital tools and work proactively on branding.

Note: compiled by the authors

Based on the findings, RQ3 can be addressed as follows: several factors display a clearly ambivalent nature, functioning simultaneously as strengths and weaknesses depending on the internal conditions and managerial practices of family firms. The stability of values and traditions supports cohesion and continuity, yet excessive conservatism may hinder innovation and slow adaptation to changing market conditions. Human resources also reveal a dual character: strong team loyalty and cohesion enhance internal stability, but high dependence on key individuals and limited substitutability create vulnerabilities, especially in periods of rapid growth or succession. Flexibility, often considered a competitive advantage, may lead to inefficiencies and overload when not supported by formalised processes and clear organisational structures. Technological development presents similar ambivalence: digitalisation and modern technologies offer significant potential for improved efficiency and competitiveness, yet limited expertise, financial constraints, or resistance to change may transform technology into a constraint rather than an asset. Marketing follows the same pattern; while strong personal relationships and long-term customer trust are traditional strengths of family firms, insufficient formalisation of marketing activities and limited digital outreach may restrict growth opportunities. Overall, these findings show that ambivalent factors do not represent weaknesses per se but rather indicate critical areas in which the balance between stability and innovation determines the firm’s adaptive capacity and resilience.

The analysis of opportunities in family firms (FFs) captures their evolution over the years 2015, 2022, and 2024. An overview of the main categories and their frequency is presented in Table 4.

Table 2. Comparison of the evolution of RF opportunities over time

Opportunities year 2015	Opportunities year 2022	Frequency of answers	Opportunities year 2024	Frequency of answers
Strategic location of the Czech Republic and access to foreign markets	Customer demand for quality goods, increasing demand for Fairtrade and ECO products	23	Market - customers - interest in ecological technologies, biomass burning, vegetarianism	176

Support for employment and job development	Support for local entrepreneurs over multinationals, government support for innovation, support for R&D	23	Technology - IT, robotics, digitalisation, automation, product innovation, process innovation, artificial intelligence	118
Customer pressure for quality	Technology, automation, robotization, IT, digitalization.	20	Expansion - not only abroad, expansion of sales portfolio, industry development, e-shop, infrastructure	75
High customer confidence in RF products	Economic situation of the country, dramatically rising energy prices, inflation, crisis	20	Legislation - green deal, boiler replacement, environment, subsidies, ESG support	74
Tax advantages in some sectors of the economy (agriculture)	Competition (its prices, incompetence, problems, low quality, etc.).	18	Suppliers, external cooperation - relationships, diversification, chains, external cooperation, sharing of experience via internet, synergies of services offered	36
Advantages for lending in certain sectors of the economy	Possibility of entering foreign markets, ebusiness abroad.	13	Marketing - leveraging opportunities, evolving social networks, WOM	23

Note: compiled by the authors according to: Petlina & Koráb (2015), Petrů & Pavelka (2022, 2024)

Based on the data presented in Table 2, it is possible to answer RQ4: How have the opportunities for family firms (FFs) evolved over time, and what impact does this development have on their competitiveness and resilience? The evolution of opportunities for FFs between 2015 and 2024 reveals a distinct shift from passively perceived external conditions (e.g., the strategic location of the Czech Republic, advantageous financing schemes) toward actively shaped opportunities, such as technological innovation, environmental trends, legislative changes, and digital transformation. The most significant growth has occurred in customer preferences for sustainability. By 2024, market demand for environmentally friendly products and healthy lifestyles will constitute a key opportunity, both for developing new product lines and for strengthening corporate reputation. Firms capable of responding to this shift are more likely to attract new customers and differentiate themselves from competitors.

Technology, digitalization, and automation, previously marginal themes in 2015, have emerged as major drivers of change. Perceiving these areas as opportunities enhances firms' capacity to improve efficiency, product quality, and internal process optimization. Legislation and the subsidy framework (e.g., Green Deal, ESG initiatives, boiler replacement schemes) are no longer viewed as obstacles but as systemic opportunities. Firms have begun to capitalize on public support for ecological projects and innovations, thereby increasing their investment capacity and stability in the face of external shocks.

Market expansion abroad, once closely linked to geographic advantages, is now more often associated with e-commerce and digital exports. However, it remains less emphasized than other factors, suggesting that its potential has yet to be fully realized. Conversely, opportunities such as external collaboration and digital marketing (e.g., social media, online advertising) have remained relatively static over time. This trend may reflect either the low strategic prioritization of these tools within FFs or insufficient capacity for their implementation- both of which may undermine their future growth potential.

Figure 3 shows the correlation matrix of the development of opportunities over time.

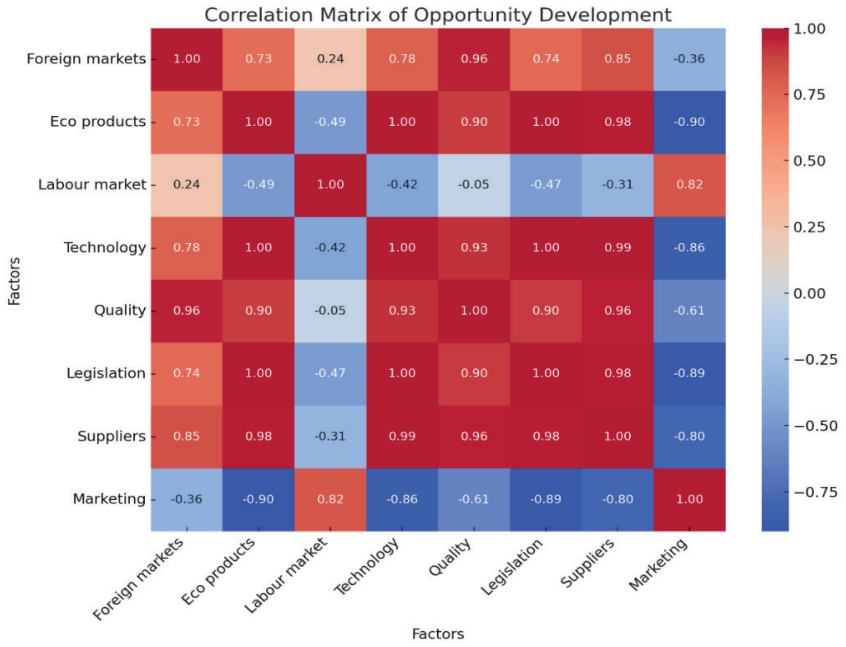

Figure 3. Correlation matrix of the development of FBs opportunities

The correlation matrix illustrates the interrelationships between individual opportunity factors over time. A strong positive correlation between technological advancements and customer pressure for quality confirms that innovations in digitalization, automation, and robotics act as key drivers in enhancing product and service quality. A similarly high correlation was found between legislative initiatives (e.g., the Green Deal, ESG) and the development of environmentally friendly products, indicating that sustainability-oriented regulations motivate firms to invest in ecological solutions. A moderate correlation between the Czech Republic's strategic location and the potential for foreign market expansion suggests that the country's geographic position may facilitate the growth of e-commerce and export activities.

The main threat categories and their frequencies across the three reference years are summarised in Table 3.

Table 3. Comparison of the evolution of threats to the RF over time

Threats year 2015	Threats year 2022	Frequency of answers	Threats year 2024	Frequency of answers
Lack and unavailability of market information	Price (energy, water, materials, commodities, fuel), price market instability, price volatility	44	Economy in general - consequences of inflation, price increases in general, threat of energy shortages, economic uncertainty, external financing, investor outflows, migration, war	220
Barriers to attracting external investors	Government apparatus, bureaucracy, tax burden, subsidy policy, corruption, legislation.	43	Politics, legislation, administration - different VAT rates , high credit charges, PRIBOR, unstable, chaotic, bureaucracy, unexpected government decisions.	167
Strained relations between RF and local communities (envy, etc.)	Global geopolitical changes, war conflict, unpredictability or Covid impacts.	41	Competition - unfair competition, competitors overpaying employees, foreign competition, competitors' pricing strategies	103

Limited availability of skilled labour and strategic resources	Inflation, economic situation in the Czech Republic, crisis, its impact on business and customer purchasing options, poverty, rising wage costs	33	Labor market - lack of skilled craftsmen, dysfunctional education system - no skilled workers, reluctance of young people to work in manufacturing	53
Low competitiveness with corporates (price, wages, advertising, etc.)	Employees (staff turnover, lack of interest in work, qualifications), labour market, education system	21	Technology - threat of artificial intelligence affecting the labour market, technological and cyber threats	37
Obligation to green operations and associated high costs	Competition in the sector (international transport companies, chains, corporations, etc.)	14	Customers - customer demands for change, changing preferences, irregularity of orders, need to establish new relationships, inability to pay.	35

Note: compiled by the authors according to: Petlina & Koráb (2015), Petrů & Pavelka (2022, 2024)

The analysis of threats faced by FFs shows a clear shift in perceived risks between 2015, 2022, and 2024. Earlier concerns such as limited market information and barriers to attracting investors declined in relevance, while external macro-level threats intensified sharply. Economic uncertainty and price volatility became the most prominent threat in 2024, driven by inflation, rising input costs, and unstable energy markets. Regulatory pressure and administrative burden also increased, reducing predictability and complicating strategic planning.

Geopolitical developments, including war-related disruptions and global instability, emerged as significant new threats that influence firm decision-making. Labour shortages likewise intensified, reflecting structural constraints in the education system and reduced interest in skilled professions. Technological disruption, particularly concerns surrounding AI and digitalisation, remained present but relatively stable, indicating limited practical adoption among many FFs.

Correlation analysis shows strong associations between economic uncertainty, regulatory burdens, and price volatility, confirming the growing interconnectedness of external threats (Figure 4).

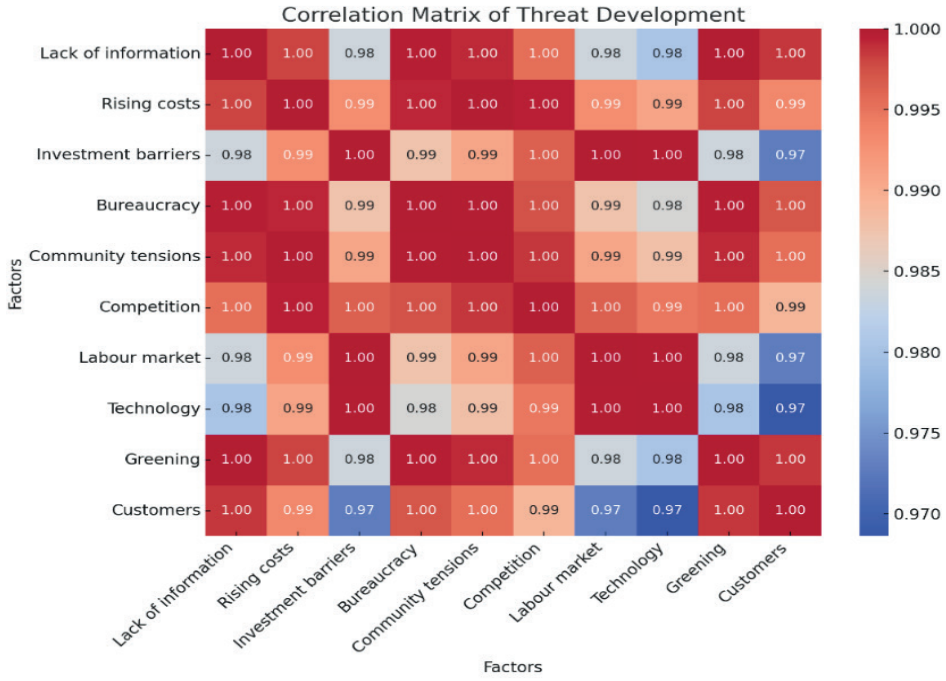

Figure 4. Correlation matrix of threat development over time

The correlation matrix illustrates the interrelationships among individual threat factors over time. A strong positive correlation between economic uncertainty and legislative barriers confirms that an unstable economic environment is often accompanied by more frequent government interventions and increasing administrative burdens for entrepreneurs. The high correlation between geopolitical risks and price volatility reflects the direct impact of wars, global economic instability, and trade sanctions on market price fluctuations. A moderate correlation between the shortage of qualified labour and technological threats suggests that automation and artificial intelligence are perceived as partial solutions to workforce shortages. However, they also introduce new challenges for the labour market.

Based on the results of correlation and regression analyses, the following conclusions can be drawn regarding the tested hypotheses:

(1) H4: There is a strong positive correlation between technological innovations in digitalisation, automation, and robotics, and improvements in product and service quality. This hypothesis is partially supported by the analytical findings.

(2) H5: There is a strong positive correlation between economic uncertainty and legislative barriers for entrepreneurs. This hypothesis is strongly supported by empirical data. Correlation analysis reveals that growing economic instability such as inflation, price volatility, and recession risks is closely associated with heightened concerns among business owners regarding unpredictable legislative environments and administrative burdens.

(3) H6: There is a moderate positive correlation between the shortage of qualified labour and technological threats. The findings also support this hypothesis, although the strength of correlation is not as pronounced as in the previous cases. The analysis shows that firms facing shortages of skilled labour increasingly seek substitutes in automation and digital solutions.

In conclusion, all three hypotheses find support in the data, although their validation relies primarily on a combination of quantitative correlation results and contextual interpretation of the evolving opportunity and threat landscape over time.

AMBIVALENT NATURE OF OPPORTUNITIES AND THREATS IN FAMILY FIRMS

The research confirms the existence of factors within the opportunity–threat framework that cannot be clearly classified into a single category. These ambivalent factors possess a dual character: they may constitute a significant advantage or pose a substantial risk, depending on the industry context, strategic orientation, firm size, and adaptive capacity. Their influence on the resilience of family firms is primarily determined by the level of strategic management, investment capacity, innovativeness, and readiness for change. Table 4 presents a summary of factors that simultaneously represent both opportunities and threats for family firms highlighting their ambivalent nature.

Table 4. Ambivalence of opportunities and threats

Ambivalent factor	As an opportunity	As a threat	Impact on building resilience
Economic situation and price volatility	Growing demand for durable and price stable products	Rising inflation, volatility of raw material prices, high operating costs	Firms with financial stability and flexible pricing management will better manage price volatility, while less resilient firms will face liquidity problems.
Technological advances (AI, digitalisation)	Automation and digitalisation to reduce costs and increase efficiency	Threat of job losses, cyber threats	Firms that invest in technology may gain a competitive advantage, while those that neglect innovation may be left behind.
Legislative changes (Green Deal, ESG)	Support for sustainable projects, new subsidy opportunities	Increased regulation, need for green investments	Firms ready for new environmental standards can benefit from subsidies and enhance brand credibility, while firms with high environmental costs may be at risk.
Globalisation and geopolitical changes	Opportunity to expand into new foreign markets	Risk of wars, sanctions and disruption of supply chains	FBs able to diversify markets and manage the risks of expansion may gain new opportunities, while dependence on one market increases vulnerability.

Labour market and availability of skilled workers	Diversification of the labour market, arrival of new talent	Shortage of skilled workers, rising wage costs	Organisations with a sophisticated human resource development strategy and attractive employment conditions will be more resilient to labour market challenges.

Note: compiled by the authors

Based on the findings, an answer can be formulated to RQ6: Can factors with an ambivalent character be identified? Yes, the research clearly identified several factors with an ambivalent nature, whose impact on the resilience of FFs varies depending on both external and internal conditions of the enterprise.

Economic conditions increase instability and operational costs, yet firms capable of maintaining price stability and quality can convert such turbulence into a competitive advantage. Technological advancement, including AI, digitalisation, and automation, enhances efficiency but simultaneously raises risks related to job displacement, investment requirements, and the need for new competencies. Legislative developments, particularly in the areas of ESG and the Green Deal, create opportunities through access to funding and incentives for sustainable practices, while also imposing additional regulatory and administrative burdens. Globalisation supports expansion into new markets but increases exposure to geopolitical disruptions and supply chain risks. The labour market likewise exhibits duality: persistent shortages of skilled workers constitute a major barrier, whereas the ability to attract and develop talent represents an important source of future competitiveness.

Overall, these ambivalent factors act simultaneously as opportunities and constraints. Family firms that effectively manage such dualities demonstrate stronger adaptive capacity and greater resilience under volatile conditions.

CONCLUSION

This study provides a comprehensive and data-driven analysis of the evolving dynamics of strengths and weaknesses, opportunities and threats (SWOT) in Czech family firms (FFs) over the period 2015–2024. In contrast to previous research, which often focused on isolated aspects of FFs, this study offers a longitudinal perspective that combines qualitative and quantitative methods, including the identification of ambivalent factors. These have not yet been systematically explored in the context of strategic management and organizational resilience.

A key contribution of this research is the confirmation of the ambivalent nature of several critical factors particularly technological innovation, legislative change, globalization, and labour market developments. The ability of FFs to recognize and strategically navigate such dualities appears to be a core pillar of their resilience. These findings enrich the theoretical understanding of family firm resilience while offering actionable insights for practice.

The results indicate that FFs with clearly defined strategies, openness to innovation, and effective management of human and technological resources exhibit the highest potential for long-term stability, sustainable growth, and resilience to external shocks. The study shows that adaptability, agile decision-making, and the ability to balance traditional values with modern managerial approaches are key determinants of FF competitiveness. Based on the findings, the following strategic recommendations are proposed for family firms:

(1) Invest in digitalization and technological innovation to enhance efficiency and enable flexible responses to changing market conditions.

(2) Strengthen strategic management and marketing, particularly in online communication, brand positioning, and export strategies.

(3) Focus on effective human resource management, including competency development, intergenerational knowledge transfer, and employee motivation.

(4) Leverage public support instruments (e.g., subsidies, regulatory frameworks) to foster innovation and sustainability, while minimizing the negative impacts of bureaucratic burden.

(5) Diversify market presence to reduce dependence on specific sectors and enhance the firm's ability to respond to geopolitical and macroeconomic risks.

In conclusion, family firms represent an indispensable part of both the economic and societal fabric. Their future will depend on the extent to which they can integrate stability with adaptability,

tradition with innovation, and a strong identity with openness to change.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: NP and OC; research design: NP and OC; data collection: NP; analysis and interpretation: NP and OC; writing draft preparation: OC; supervision: NP; correction of article: NP and OC; proofreading and final approval of article: NP and OC. All authors have read and agreed to the published version of this manuscript.

REFERENCES

Ali, S. A. (2025). Purpose-driven resilience: A blueprint for sustainable growth in micro- and small enterprises in turbulent contexts. *Sustainability*, *17*(5), 2308. https://doi.org/10.3390/su17052308

Almaharmeh, M. I., Shehadeh, A., Alkayed, H., Aladwan, M., & Iskandrani, M. (2024). Family ownership, corporate governance quality and tax avoidance: Evidence from an emerging market—the case of Jordan. *Journal of Risk and Financial Management*, *17*(2), 86. https://doi.org/10.3390/jrfm17020086

AMSP ČR. (2022). *Výzkum inovací v malých a středních firmách: Závěrečná zpráva*. Retrieved October 5, 2025, from https://amsp.cz/wp-content/uploads/2022/10/Inovace-2022-pruzkum-koment-AMSP-CR.pdf

Czech Statistical Office. (2024). *Statistika podnikatelských subjektů podle právní formy*. Retrieved October 5, 2025, from https://csu.gov.cz/domov

Daaboul, M., & Savall, A. (2024). Organization development intervention to develop human resource practices in a family business. *Organization Development Journal*, *42*(2), 47–63

Dewi, L. (2024). The role of family support in entrepreneurial endeavors: Perspectives from family-owned businesses. *Research Square*. https://doi.org/10.21203/rs.3.rs-4003999/v1

Fei, S., Wu, R., Liu, H., Yang, F., & Wang, N. (2025). Technological innovations in urban and peri-urban agriculture: Pathways to sustainable food systems in metropolises. *Horticulturae*, *11*(2), 212. https://doi.org/10.3390/horticulturae11020212

Gashi, R., & Smajlaj, V. (2024). The power of women in the success of business family: A case study of Kosovo, Albania and North Macedonia. *Humanities and Social Sciences Letters*, *13*(1), 25–44. https://doi.org/10.18488/73.v13i1.3973

Goldie, S. J., & Chithra, J. (2024). A study about family businesses in Kanyakumari District. REST Journal on Banking, *Accounting and Business*, *3*(3), 44–49. https://doi.org/10.46632/jbab/3/3/7

Hodgetts, R. M., & Kuratko, D. F. (2000). *Effective small business management* (7th ed.). Wiley

Islas-Moreno, A., Muñoz-Rodríguez, M., Santoyo-Cortés, V. H., Martínez-González, E. G., Aguilar-Gallegos, N., & Morris, W. (2022). The role of conflict in the adoption of governance practices in family businesses. *Journal of Family Business Management*, *12*(4), 959–980. https://doi.org/10.1108/JFBM-03-2021-0019

Jakubcinova, M., Petrů, N., Večerová, V., & Belás, J. (2024). SMEs' attitudes towards business ethics in the V4 countries: Are there differences according to the entrepreneurs' legal form, company size, gender and education? *Transformations in Business & Economics, 23*(3), 42–59.

Jurásek, M., Petrů, N., Caha, Z., & Belás, J., Jr. (2021). Values of family businesses in Czech Republic in the context of socioemotional wealth. *Economics and Sociology, 14*(2), 184–208. https://doi.org/10.14254/2071-789X.2021/14-2/10

Kidwell, R. E., Eddleston, K. A., Kidwell, L. A., Cater, J. J., & Howard, E. (2024). Families and their firms behaving badly: A review of dysfunctional behavior in family businesses. *Family Business Review, 37*(1), 89–129. https://doi.org/10.1177/08944865241226739

Kim, S., Bae, J., & Kang, S. (2024). The cross-cutting pursuit of family values: When and how do family firms engage in corporate environmental responsibility. *Corporate Social Responsibility and Environmental Management, 31*(4), 2749–2769. https://doi.org/10.1002/csr.2714

Koráb, V., Kulaudová, F., Roldán Salgueiro, J. L., & Sánchez Apellaniz García, M. (1998). Jak pracují malé rodinné firmy. In *Jak pracují malé rodinné firmy* (s. 53–67). Brno: Vysoké učení technické v Brně

Krippendorff, K. (2018). *Content analysis: An introduction to its methodology* (4th ed.). Sage Publications

Magrelli, V., Rovelli, P., Benedetti, C., Überbacher, R., & De Massis, A. (2022). Generations in family business: A multifield review and future research agenda. *Family Business Review*, *35*(1), 15–44. https://doi.org/10.1177/08944865211069781

Meroño-Cerdán, Á. L., Molina-Castillo, F., López-Nicolás, C., & Ruiz-Nicolás, J. (2024). Growth and performance: Business model innovation in family firms. *Businesses, 4*(2), 211–224. https://doi.org/10.3390/businesses4020014

Ministry of Industry and Trade. (2022). *Změna definice rodinného podniku v České republice*. Retrieved October 5, 2025, from https://mpo.gov.cz/cz/podnikani/rodinne-podnikani/zmena-definice-rodinneho-podniku--v-ceske-republice---265670/

Neuendorf, K. A. (2017). *The content analysis guidebook* (2nd ed.). Sage Publications

Pan, Z., & Zhong, R. (2024). Does the governance model of husband-and-wife shareholding lead to underin-

vestment? *Highlights in Business, Economics and Management*, *25*, 39–48. https://doi.org/10.54097/0xgmkj75

Petrová, I. (2024). Uncertainty in small family enterprises in Bulgaria: Socio-cultural strategies for stabilisation and economic development. *Slovenský národopis*, *72*(2), 179–197. https://doi.org/10.31577/SN.2024.2.16

Petlina, A., & Koráb, V. (2015). Family business in the Czech Republic: Actual situation. *Trendy ekonomiky a managementu*, *9*(23), 32–42.

Petrů, N., Crnadak, O., & Černohorský, A. (2024). Artificial intelligence and its future in education management. In *Proceedings of the 26th International Scientific Conference* (pp. 51–74). https://doi.org/10.37355/LK-2023-04

Petrů, N., & Pavelka, J. (2024). *Odolná rodinná firma 2024: Studie mezi rodinnými firmami, průzkum odolnosti rodinného podnikání – souhrnná výzkumná zpráva*. Vysoká škola finanční a správní, a.s.

Petrů, N., & Pavelka, J. (2022). *Průzkum Asociace rodinných firem – studie odolnosti rodinného podnikání: Závěrečná výzkumná zpráva.* Vysoká škola finanční a správní, a.s.

Pike-Bowles, A., Townes, J., & Chinyamurindi, W. (2024). The role of strategic flexibility and dynamic capabilities on family business performance. *The Southern African Journal of Entrepreneurship and Small Business Management, 16*(1), a767. https://doi.org/10.4102/sajesbm.v16i1.767

Randerson, K. (2023). Food for thought: Family entrepreneurship in four questions. *Boletín de Estudios Económicos*, *78*(234), 57–76. https://doi.org/10.18543/bee.2752

Rasmi, P., & Ramya, K. (2023). Influence of family involvement towards financial access in msmes — a perspective. *SDMIMD Journal of Management*, *14*(2) 35-46. https://doi.org/10.18311/sdmimd/2023/32587

Ren, P., Botero, I. C., & Fiet, J. O. (2023). Not all crises are the same: the effects of crisis triggered successions in family firms. *Journal of Family Business Management*, *14*(3), 621-642. https://doi.org/10.1108/jfbm-01-2023-0009

Sedláčková, H., & Buchta, K. *Strategická analýza*. 2. přeprac. a dopl. vyd. Praha: C.H.Beck, 2006. ISBN 8071793671

Sharma, S., & Sharma, P. (2024). Temporal Depth & Directionality: Competitive Advantage for Sustainable Family Enterprises. *European Journal of Family Business*, *14*(1), 5-18. https://doi.org/10.24310/ejfb.14.1.2024.18462

Sheng, D., Cheng, H., & Yin, M. (2024). Housing developers' heterogeneous decision-making under negative shock after the high-growth era: evidence from the chinese real estate economy. *Mathematics, 12*(12), 1798. https://doi.org/10.3390/math12121798

Short, J.-C., Ketchen, D. J., Jr., Combs, J. G., & Ireland, R. D. (2010). The concept of "opportunity" in entrepreneurship research: Past accomplishments and future challenges. *Journal of Management, 36*(1), 40–65. https://doi.org/10.1177/0149206309342746

Siuta-Tokarska, B., Kowalik, M., & Juchniewicz, J. (2025). Factors in the development of family businesses in the SME sector: Analysis and assessment of their importance in strategic enterprise management. *Sustainability, 17*(5), 1821. https://doi.org/10.3390/su17051821

Stasa, M., & Machek, O. (2022). Social Capital in the Family Business Literature: A Systematic Review and Future Research Agenda. *Family Business Review*, *35*(4), 415–441. https://doi.org/10.1177/08944865221125520

Staszewska, J., Smolarek, M., Foltys, J., Wotzka, D., & Frącz, P. (2024). The possibilities of cooperation among family firms within a cluster environment. *European Research Studies Journal*, *27*(2), 132–154. https://doi.org/10.35808/ersj/3375

Tajul, U., Wardani, H. A., Lela, D., Nurfitriya, M., & Fauziyah, A. (2024). The Influence of Family Business Creativity on Business Competition. *Proceedings Series on Social Sciences & Humanities*, *15*, 142–146. https://doi.org/10.30595/pssh.v15i.942

Yilmaz, Y., Craig, J. B., Duran, P., Memili, E., Sharma, P., & Zellweger, T. (2024). Resilience in family businesses: A systematic literature review. *Family Business Review*, *37*(1), 60–88. https://doi.org/10.1177/08944865231223372

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Appendix 1

Comparison of the evolution of RF strengths over time

Strengths - year 2015	Strengths - year 2022	Frequency of answers	Strengths - year 2024	Frequency of answers
Mutual agreement between individuals sharing common interests arising between family members working in a family business, SEW type flexibility, stable corporate culture, relationship building, etc.	SEW perseverance, reliability, professionalism, creativity, loyalty, diligence, dedication, helpfulness, professionalism, diligence, honesty, modesty, integrity, decency, punctuality, trustworthiness, correctness, responsibility, cohesiveness, family background, etc.	67	SEW - active family involvement, intergenerational connections, traditions, family ties, loyalty, family ties, traditions, intergenerational transmission, flexibility, emphasis on trust, loyalty and relationships.	427
A commitment leading to all family members seeking mutual benefit being prepared to submit to given demands at some personal sacrifice. The family considers the business as its "own" creation.	Quality (of work, products, services, personnel, leadership, etc.).	57	Quality, striving to maintain high quality, helps build and maintain customer trust. RF also strives to ensure that the reputation associated with quality is maintained across generations.	135
Typical knowledge for own activities (family secrets, family know-how, detailed knowledge of the customer).	Knowledge (competition, industry, sector, PPO customers, digital, technology, production, languages, education, skills, professionalism of management).	39	Employees (professionalism, team, reliability, stable cadre, team camaraderie, passion for the cause, dedication, trust, mutual respect, respect, humility, friendly environment, lifelong learning, cooperation).	125
Flexibility of work, time and money: family employees devote all their time to ensure the successful development of the company.	Brand, know-how, product design, uniqueness.	35	Innovation, R&D, patents (innovative products, in-house development department, cooperation with universities, inspiration, creativity, certification, AI, automation, robotics, digitalisation).	95
Long-term planning in relation to passing the business on to the next generation.	Innovation, R&D, patents.	29	Brand, know-how, competitive advantage, product design, provision of complementary services, uniqueness, non-repeatability, patents.	91
Stable workplace culture.	Flexibility (time, decision-making, adapting products to requirements, adaptability, flexibility).	26	Knowledge of new technologies, languages, competition, industry trends, trend management tools, use of AI tools.	60

Note: compiled by the authors based on Petlina & Koráb (2015), Petrů & Pavelka (2022, 2024)

Appendix 2

Comparison of the development of RF weaknesses

Weaknesses - year 2015	Weaknesses - year 2022	Frequency of answers	Weaknesses - year 2024	Frequency of answers
Strong family ties, family ties make the family business more conservative. Reluctance to use external financial resources because of strong responsibility to family.	Human resources (lack of qualified people willing to work, turnover, etc.).	52	Human resources (few key employees, their high workload, low level of substitutability, low motivation of employees, lack of qualified employees on the labour market, turnover, lack of interest of employees in personal development etc.).	160
Lack of skilled labour within the family, high potential for intergenerational conflict.	Insufficient marketing (marketing communication, lack of social networks, outdated website).	29	Competition (dependence on dominant partner, size of firm limiting larger orders, dependence on protected workshop performance, lower productivity, low export share, slow growth, low added value, data security).	79
Existence of an inefficient incentive system.	High costs (lack or exhaustion of finance, credit burden).	25	Management, personalities of managers (no/adjusted processes, middle management, organisation, delegation of responsibility)	72
The need for high quality channels of communication between the family and the family business.	Lack of vision, mission, strategy, processes (professional management, planning, organizing, creativity, not evaluating effectiveness).	24	Resources (limited finances, limited production capacity, disaggregated production space, working conditions in the plant, wear and tear of equipment).	71
Absence/difficulty in selecting a successor.	Limited capacity (development, space, showrooms, inappropriate company location).	18	Marketing (non-existence, lack of knowledge of the concept).	48
High demand for flexibility - work-life imbalance.	Knowledge (competitors, industry, sector, PPO, digital, technology, production, languages), education, skills, management professionalism).	13	Failure to cope with the advent of new technologies (inability or unwillingness to use IT and AI).	43

Source: compiled by the authors according to: Petlina & Koráb (2015), Petrů & Pavelka (2022, 2024)

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Reducing Project Uncertainty through Data-Driven Management: A Bibliometric Analysis

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ABSTRACT

In the context of accelerated digitalization and increasing complexity of project activities, research in the field of Data-Driven Project Management (hereinafter – DDPM) remains fragmented, which limits a holistic understanding of its intellectual structure and development dynamics, despite the active introduction of digital technologies. The purpose of this study is to identify the intellectual structure, development dynamics, and dominant research trajectories of DDPM based on a bibliometric analysis of scholarly publications. The methodological basis of the study was the bibliometric analysis of scientific publications using the tools Bibliometrix and Biblioshiny. The empirical database includes 1,149 articles and reviews indexed in the Scopus database for the period 2000-2025. The results of the study showed that with an average annual growth rate of 18.83%, articles account for 1,012 documents (88.1%), reviews – 137 (11.9%). The average number of citations per publication was 25.13, and the analysis of co-citations and keywords revealed the dominance of clusters related to machine learning, predictive analytics, and risk management. The results confirm that DDPM is fundamentally changing project management by improving decision support and maximizing resource efficiency, which directly reduces financial risks and uncertainty. The prospects for further research are related to the use of the results obtained by researchers when planning future scientific work, as well as practitioners and decision makers, for the strategic implementation of data analysis tools aimed at creating more sustainable, cost-effective and high-performance projects.

KEYWORDS: Digital Economy, Economics of Management, Strategic Project Management, Project Efficiency, Intellectual Evolution, Artificial Intelligence, Data Analytics, Bibliometric Analysis

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Снижение неопределённости в управлении проектами на основе данных: библиометрический анализ

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АННОТАЦИЯ

В условиях ускоренной цифровизации и усложнения проектной деятельности исследования в области Data-Driven Project Management (далее – DDPM) остаются фрагментированными, что ограничивает целостное понимание его интеллектуальной структуры и динамики развития, несмотря на активное внедрение цифровых технологий. Целью данного исследования является выявление интеллектуальной структуры, динамики развития и доминирующих исследовательских траекторий управления проектами, ориентированного на данные (DDPM), на основе библиометрического анализа научных публикаций. Методологической основой исследования послужил библиометрический анализ научных публикаций с использованием инструментов Bibliometrix и Biblioshiny. Эмпирическая база включает 1149 статей и обзоров, проиндексированных в базе данных Scopus за период 2000-2025 гг. Результаты исследования показали, что при среднем годовом темпе роста 18,83%, при этом на статьи приходится 1012 документов (88,1%), на обзоры – 137 (11,9%). Среднее число цитирований на публикацию составило 25,13, а анализ со-цитирования и ключевых слов выявил доминирование кластеров, связанных с машинным обучением, прогнозной аналитикой и управлением рисками. Результаты подтверждают, что DDPM фундаментально меняет управление проектами за счет улучшения поддержки принятия решений и максимизации эффективности ресурсов, что напрямую снижает финансовые риски и неопределенность. Перспективы дальнейших исследований связаны с использованием полученных результатов исследователями при планировании будущих научных работ, а также практиками и лицами, принимающими решения, для стратегического внедрения инструментов анализа данных, направленного на формирование более устойчивых, экономически эффективных и высокопроизводительных проектов.

КЛЮЧЕВЫЕ СЛОВА: цифровая экономика, экономика управления, стратегическое управление проектами, эффективность проектов, интеллектуальная эволюция, искусственный интеллект, анализ данных, библиометрический анализ

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INTRODUCTION

Project management today is undergoing a significant shift, shaped by rising levels of complexity and uncertainty, as well as the accelerated technological progress associated with the Industry 4.0 and 5.0 eras (Hashfi & Raharjo, 2023). Modern projects increasingly operate in automated, interconnected, and information-intensive settings, requiring advanced methods for decision-making, risk control, and efficient resource utilization (Vergara et al., 2025). As a result, traditional step-by-step project management approaches, which emphasize structured planning and process control (PMI, 2021) are becoming less effective at handling the uncertainty and instability of modern projects, which can contribute to wasted resources, greater exposure to risk, and weaker performance outcomes. Although data-driven methods and artificial intelligence (hereinafter – AI) have become vital tools for addressing project challenges, the literature still provides only a fragmented view of their combined influence on project management, especially in relation to emerging trends, uncertainty mitigation, and efficiency improvements (El Khatib & Falasi, 2021). This gap necessitates a focused investigation to consolidate current knowledge and chart future research directions.

The scientific novelty of this research is grounded in its targeted structural-functional approach, which addresses the limitations inherent in existing literature reviews on this topic. The growing body of systematic and bibliometric reviews in this area is acknowledged. For example, Salimimoghadam et al. (2025) consolidated knowledge on the general opportunities, enablers, and barriers of AI in project management, while Adebayo et al. (2025), and Hanafy and Hanafy (2025) provided valuable, yet sector-specific, examinations of AI/ML applications across the construction project life cycle. However, these existing works, by prioritizing technological trends and specific phase applications, lack a focused structural analysis of the Data-Driven Project Management (hereinafter – DDPM) field itself. A twofold contribution is articulated. First, the study provides the first functional alignment of bibliometric network analysis (co-citation and keyword co-occurrence) explicitly aimed at examining the specific contributions of DDPM to two critical project success drivers: uncertainty reduction and efficiency improvement. This systematic approach shifts the analytical focus from descriptive trend mapping toward actionable performance-oriented insights. Second, the intellectual evolution of DDPM is firmly situated within the framework of a strategic economic imperative, addressing the pressing need to enhance productivity in the construction sector and thereby linking micro-level project technology adoption with macro-level economic objectives.

The relevance of this study is underscored by the general interest in leveraging advanced analytics and AI for operational excellence across industries (Dhamija & Bag, 2020). However, current research still lacks thorough explanations regarding the conceptual structure and thematic progression of DDPM as a distinct area of study (Hashfi & Raharjo, 2023). This study demonstrates its theoretical significance by mapping the evolving field to establish foundational knowledge, and its practical significance by offering insights that can enhance real-world project execution and strategy formulation for researchers, practitioners, and policymakers.

Furthermore, the economic relevance of this research is further underscored by the critical role of the construction sector. While construction significantly contributes to the Gross Domestic Product (hereinafter – GDP) and the formation of societal welfare, it globally remains one of the least digitized and most fragmented industries, struggling with low labor productivity (Bühler et al., 2025; Cucos & Turcan, 2025). This deficiency directly hinders broader economic growth and limits the potential for commensurate wage increases, thereby impacting overall societal prosperity. Consequently, the adoption of DDPM and AI is not merely a technological upgrade but a strategic economic imperative aimed at radically boosting labor productivity and, as a result, stimulating macroeconomic progress and enhancing national competitiveness.

Therefore, the object of this study is the body of academic literature on DDPM. At the same time, the subject is the intellectual structure, key trends, impact on uncertainty reduction, and contribution to efficiency improvement within this field. The purpose of this study is to identify the intellectual structure, development dynamics, and dominant research trajectories of DDPM based on a bibliometric analysis of scholarly publications. To achieve this aim, the study sets forth the following objectives: (1) to identify and analyze the key publication

trends, influential authors, and prominent research outlets in DDPM; (2) to map the intellectual structure through co-authorship, co-citation, and keyword co-occurrence networks, revealing collaboration patterns and thematic clusters; (3) to define the specific ways data-driven approaches contribute to uncertainty reduction in project environments; (4) to assess the role of data-driven methods in improving project efficiency and overall performance.

LITERATURE REVIEW

Project management has evolved progressively in response to changing business environments, technological advancements, and increasing market demands. Early research emphasized the growing complexity, uncertainty, and dynamism of project environments, calling for a fundamental rethinking of how projects are conceptualized, planned, and executed (Lenfle & Loch, 2010). Historically, dominant project methodologies were largely linear and sequential, prioritizing predictability and control (Osemeike et al., 2024). More recent studies highlight the continued adaptation of project management practices to digital transformation and shifting market conditions (Marnewick & Marnewick, 2022).

For decades, traditional project management approaches, such as the Waterfall model, dominated various industries. While effective for projects with well-defined requirements, stable environments, and predictable outcomes, these linear models show significant limitations in today's volatile, uncertain, complex, and ambiguous (hereinafter – VUCA) world (De Meyer et al., 2002). The essential assumption of stable requirements and predictable development often clashes with the reality of modern projects, which frequently face rapid technological shifts, dynamic market conditions, and complex interdependencies (Jørgensen & Wallace, 2000). These methodologies are characterized by a sequential progression through distinct phases, initiation, planning, execution, monitoring, and closure, with a strong emphasis on upfront planning and documentation (Leong et al., 2023).

In response to the limitations of traditional models, especially in software development and innovation-driven sectors, agile and adaptive methodologies gained importance. Frameworks like Scrum, Kanban, and Lean project management prioritize flexibility, iterative development, continuous feedback, and collaboration (Moniruzzaman, 2013). Agile principles emphasize delivering value incrementally, adapting to change over adhering strictly to a plan, and fostering self-organizing teams (Koi-Akrofi et al., 2019). This shift allowed projects to respond more effectively to evolving requirements, manage risks more dynamically, and deliver products that better meet user needs in rapidly changing contexts. The iterative nature of agile approaches permits continuous learning and adjustment, making them particularly well-suited for environments where requirements are fluid or difficult to define entirely at the outset (Steegh et al., 2025).

While Agile provides the necessary procedural and cultural flexibility, the actual advancement in managing complexity and risk comes from leveraging computational power to understand and mitigate uncertainty systematically. Managing uncertainty in projects, particularly in safety-critical environments such as civil-nuclear and aerospace, is crucial due to the potentially catastrophic consequences of failure. Project managers in these complex socio-technical environments must understand the sources of uncertainty and navigate them effectively to achieve successful outcomes. One approach to managing uncertainty is the “uncertainty kaleidoscope”, which helps identify and understand the sources of uncertainty in projects (Saunders et al., 2015). Additionally, strategies such as pre-defined semantics and incremental process program development can help manage process uncertainty in software projects by preventing code duplication and handling both predictable and unpredictable uncertainties (Chou, 2008). Furthermore, employing evidence-based software engineering principles and systematic literature reviews can identify methods and practices to reduce uncertainties, thereby improving project performance and success (Marinho et al., 2018).

In construction and infrastructure projects, managing uncertainty involves creating a flexible working environment and fostering learning among team members (Ranasinghe et al., 2021). Project-oriented organizations must balance structure and autonomy to handle complex and uncertain situations effectively (Nachbagauer & Schirl-Boeck, 2018). In the context of project portfolios, managers should frame uncertainties as opportunities or threats and use a combination of rational, structural, and cultural mechanisms to manage them dynamically (Martin-

suo et al., 2014). Additionally, integrating advanced methodologies such as fuzzy linguistic models and scenario network-based approaches can enhance adaptability and decision-making in cybersecurity projects (Tynchenko et al., 2024). Overall, effective uncertainty management requires a combination of structured frameworks, proactive strategies, and adaptive mechanisms to navigate the complexities and risks inherent in various project environments.

The second primary imperative driving the adoption of data-driven methods is the demand for greater efficiency. This shift is propelled by the need to optimize workflows, reduce inefficiencies, and enhance overall productivity. This paradigm shift necessitates a reevaluation of traditional decision theory and models to effectively integrate emerging technologies such as big data analytics, machine learning, and automation (Siddiqui et al., 2024). By harnessing empirical evidence and sophisticated data analysis techniques, organizations can make informed decisions that steer projects towards optimal outcomes (Pantović et al., 2024). Such data-driven approaches enable project managers to analyze large datasets and extract actionable insights, facilitating proactive risk mitigation and outcome optimization (Ajirotutu et al., 2024). The integration of AI and data analytics, particularly predictive analytics, fundamentally transforms decision-making by enabling project managers to foresee potential issues and develop tailored mitigation strategies, thereby minimizing delays and cost overruns (Adeniran et al., 2024). This analytical capability allows for real-time adjustments and resource re-allocation, leading to more efficient project execution and higher success rates across various project lifecycle stages (Vergara et al., 2025).

The ongoing digital transformation, driven by phenomena such as Industry 4.0 and emerging Industry 5.0, has fundamentally reshaped the operational landscape for projects. Industry 4.0, characterized by the integration of cyber-physical systems, the Internet of Things, big data, and AI, has ushered in an era of hyper-connectivity and automation (Cabeças & Marques da Silva, 2021). Project environments are increasingly data-rich, generating vast amounts of information from connected devices, sensors, and digital platforms (Iqbal et al., 2020). This proliferation of data, coupled with advanced computational capabilities, offers unprecedented opportunities for enhanced project insights (El Khatib et al., 2023). To sum up, this evolution has culminated in a landscape where project management is increasingly reliant on data-driven approaches and AI to navigate complexity, mitigate uncertainty, and optimize efficiency (Daraojimba et al., 2024).

A review of the scientific literature shows that project management has undergone a significant transformation over the past two decades, influenced by digitalization and increasing uncertainty. An analysis of the publications shows that the key drivers of this transformation are AI, machine learning, big data analysis, and predictive analytics, which form the basis of data-driven approaches in project management. Nevertheless, the issues of the dynamics of the development of the DDPM scientific field, its key thematic clusters, dominant research vectors, and intellectual turning points remain insufficiently studied. This work will allow us not only to fill in the identified gaps.

MATERIALS AND METHODS

This study employs a bibliometric analysis to systematically map the scholarly literature on DDPM, identifying publication trends, key contributors, and the field's intellectual structure. Bibliometric analysis, a quantitative methodology, has increasingly become a cornerstone in academic research for assessing publication patterns, trends, and scholarly impact (Hoang, 2025). This analytical approach systematically evaluates scientific literature by applying statistical and quantitative techniques to academic publications to identify influential authors, map collaboration networks, and uncover emerging research trends (Kumar, 2025). The growing popularity of this analytical approach is mainly due to several factors, including the advancement and increased accessibility of bibliometric tools such as VOSviewer, CiteSpace, and Bibliometrix, as well as the widespread availability of scientific databases like Google Scholar, Scopus, and Web of Science.

The choice of bibliometric analysis over a meta-analysis is based on the study's exploratory and structural objectives. While a meta-analysis is ideal for synthesizing specific quantitative effect sizes (e.g., measuring the financial impact of a particular AI tool), it is unsuitable for achieving our primary goals: charting the intellectual evolution and mapping complex network relationships (co-citation, co-occurrence) that define the field's academic structure.

The novelty of this study lies in its focused analytical scope, which extends beyond a general bibliometric overview to specifically investigate how DDPM literature addresses the critical project success drivers of uncertainty reduction and efficiency. By aligning the analysis and interpretation of key bibliometric networks (co-citation and keyword co-occurrence) with these two performance dimensions, this research offers a targeted and actionable intellectual roadmap for future research and practice.

The research process was divided into main stages: data collection, preprocessing, analysis, and interpretation, which is illustrated in Figure 1.

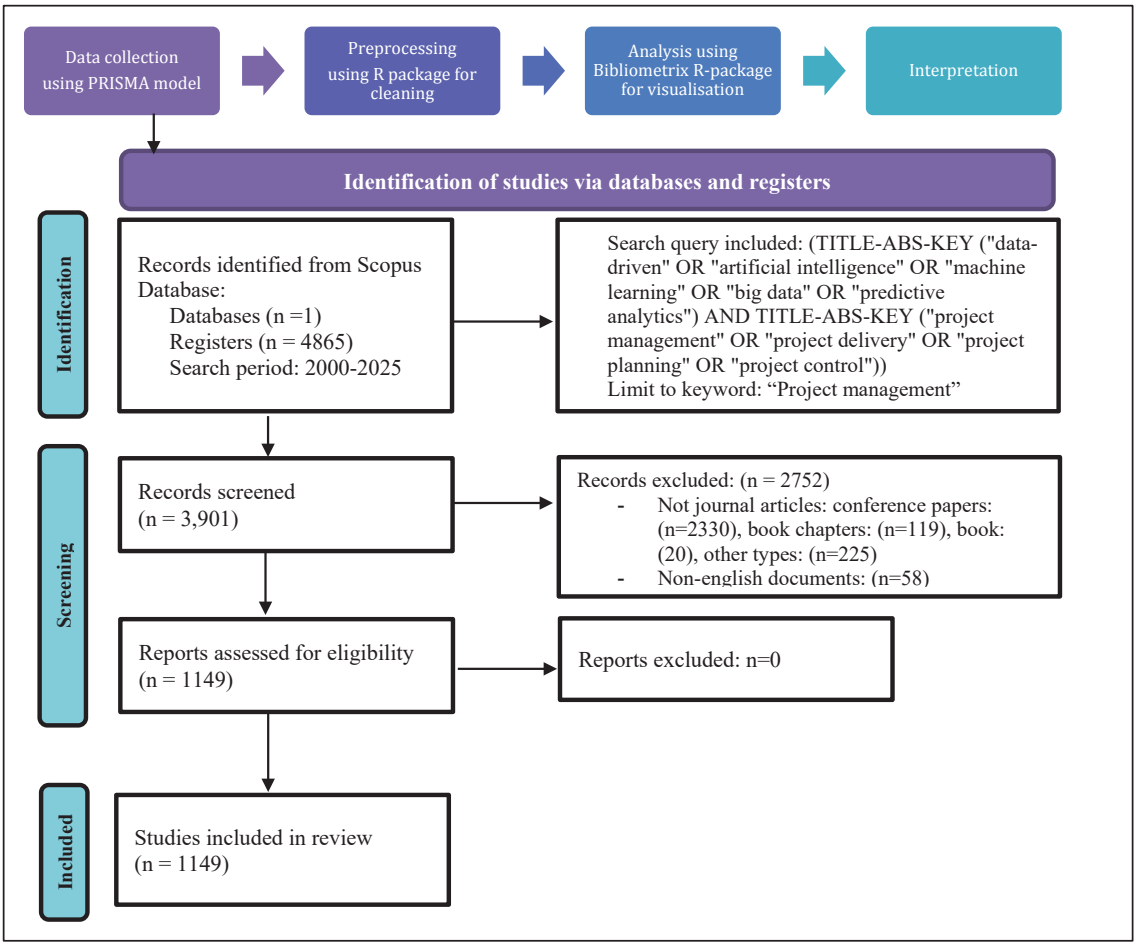

Figure 1. Research design flow

Data was exclusively sourced from the Scopus database on the 25th of August 2025. The search query used the TITLE-ABS-KEY operator to maximize the retrieval of relevant documents, as it captures information across the title, abstract, and author keywords, ensuring the identified studies are centrally focused on DDPM. The final limit on the keyword "Project management" was applied to ensure the focus remained strictly on project management literature, effectively filtering out studies that used AI/data-driven concepts in general manufacturing or supply chain processes. The period of 2000-2025 was chosen, because it captures the entire modern evolutionary arc of project management, beginning with the rise of the Agile Manifesto and the mainstream adoption of digital tools in the early 2000s, and extending through the full emergence of data-driven and predictive analytics as central paradigms, especially in the most recent years leading up to and projecting toward 2025 trends (Hohl et al., 2018; Krasteva & Ilieva, 2020). Scopus database was chosen for its comprehensive, interdisciplinary coverage and its superior handling of citation networks compared to other platforms,

ensuring the reliability of co-citation analysis. The document selection process rigorously followed the PRISMA guidelines to ensure transparency and reproducibility, with the flow from initial identification to final inclusion meticulously detailed in a PRISMA Flow Diagram (Page et al., 2021). After the initial retrieval from Scopus, the preprocessing phase used the R package software to remove duplicates and standardize data, aligning with PRISMA's systematic approach to evidence synthesis.

The rigorous exclusion of conference papers (n=2330) and book chapters was a deliberate methodological choice aimed at mapping the field's established, peer-reviewed intellectual structure, which is most reliably captured by full-length journal articles. The excluded category “other types” (n=225) primarily consisted of editorials, letters to the editor, and short survey responses that do not represent primary research output.

The bibliometric analysis was performed using the Biblioshiny tool, a web-based graphical user interface for the Bibliometrix R-package, which enabled both quantitative analysis and network visualizations (Aria & Cuccurullo, 2017). It was selected over alternative tools for its comprehensive capability to conduct both performance analysis and diverse science mapping within a single, statistically robust framework. For quantitative analysis, key metrics, including annual publication trends, the most prolific authors and journals, and the most influential countries and institutions, were calculated. For network mapping, three types of visualizations were created: co-authorship networks to map collaborative relationships, keyword co-occurrence networks to identify key research themes, and co-citation analysis to pinpoint the most influential publications and the field's intellectual foundations. This combined approach of quantitative and network-based analyses provides a comprehensive and structured overview of the research landscape.

RESULTS AND DISCUSSION

The dataset comprises 1149 documents published between 2000 and 2025, inclusive, reflecting 26 years of scholarly output. The annual growth rate of publications within this field is notably high at 18.83%, suggesting a rapidly expanding area of research. The document's average age of 5.62 years indicates that the collection primarily consists of relatively recent publications. The dataset includes 1012 articles and 137 reviews. This systematic literature review employed a bibliometric approach to analyze a dataset extracted from the Scopus database (see Table 1).

Table 1. Main information about the data

No.	Description	Result
1	Timespan	2000 - 2025
2	Sources (Journals, Books, etc)	466
3	Documents	1149
4	Annual Growth Rate %	18.83
5	Document Average Age	5.62
6	Average citations per doc	25.13
7	References	59367
9	Keywords Plus (ID)	7598
10	Author's Keywords (DE)	3310
11	Authors of single-authored docs	146
12	Single-authored docs	155
13	Co-Authors per Doc	3.55
14	International co-authorships %	27.24
15	Article	1012
16	Review	137

Note: visualization retrieved by authors from the Biblioshiny software tool

The collection encompasses contributions from 3311 distinct authors, with 146 authors contributing solely to single-authored documents. The calculation of documents per author yields a ratio of approximately 0.35, reflecting the collaborative nature of research in this field. The co-authors per

document stands at 3.55, substantiating this collaborative trend and indicating that, on average, each publication involves multiple researchers. Furthermore, 155 papers were single-authored. An analysis of international collaboration reveals that 27.24% of publications involve international co-authorships. This figure suggests a substantial degree of global engagement and knowledge sharing within the research area, highlighting the interconnectedness of researchers across different countries. Finally, the average citations per document is 25.13.

Scientific production, as shown in Figure 2, remained relatively stable until 2017, after which it increased exponentially, culminating in a substantial peak in 2024.

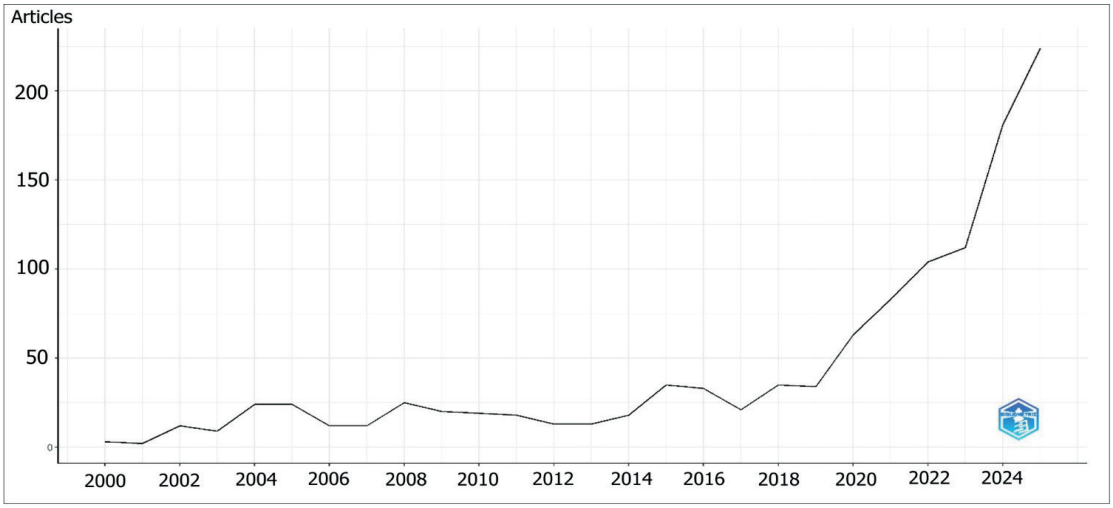

Figure 2. Annual scientific production over last 26 years

This dramatic acceleration is primarily attributed to the mainstreaming of Big Data, Machine Learning, and AI tools post-2017. These technologies provided the necessary capabilities to move DDPM from conceptual discussion to practical application, driving intense academic interest and output. The mean number of citations per year across the dataset is approximately 3.62, but this average is skewed by a period of low citations in the early 2000s and a very high-impact period more recently, as shown in Figure 3.

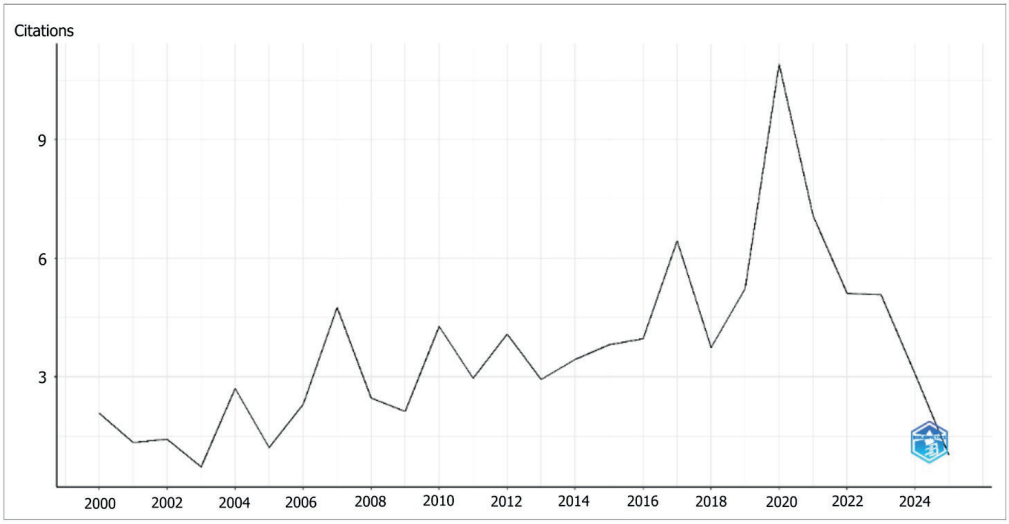

Figure 3. Average citations per year for all articles published

The standard deviation of 2.22 highlights the high volatility and lack of a consistent citation pattern across the years, which is a common characteristic of research in a developing field. Significant citation peaks (e.g., around 2020) likely correspond to the publication of highly influential or "breakthrough" articles that introduced new frameworks or successful empirical applications. The sharp rise near 2020, in particular, reflects the growing impact of research during the period of accelerated digital transformation, where data-driven decision-making became crucial for managing project uncertainty. A three-field plot was generated in Figure 4 to visualize the interconnectedness between keywords ('DE'), corresponding countries of authors ('AU_CO'), and cited sources ('CR_SO') within the Scopus dataset.

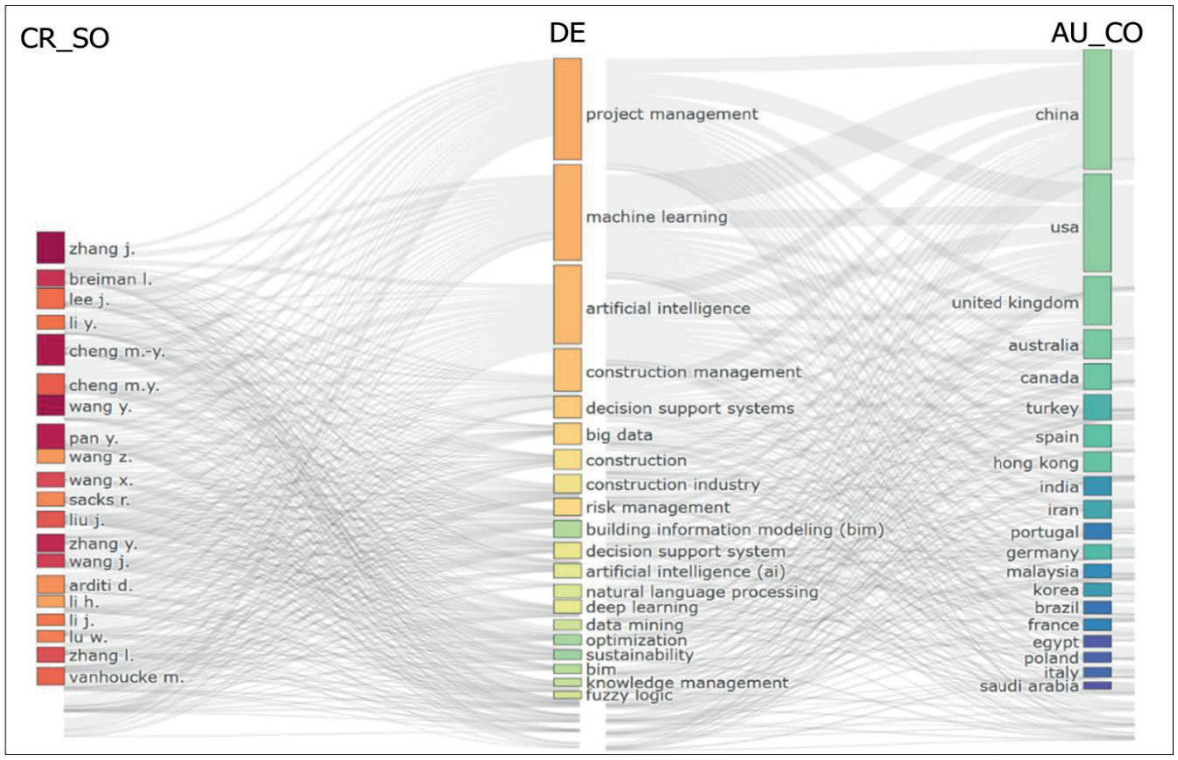

Figure 4. Three-field plot

The analysis revealed strong associations between specific research areas and geographical locations. Notably, 'project management', 'machine learning', and 'artificial intelligence' emerged as prominent keywords, with significant contributions originating from China, the USA, and the United Kingdom. These keywords also demonstrate a connection with the most frequently cited sources, such as Zhang J., Breiman L., and Lee J. The visualization further illustrates the global distribution of research efforts across diverse domains such as 'construction management', 'big data', and 'building information modeling', indicating varying levels of research activity across countries. The links stemming from the cited sources highlight the foundational works underpinning these research themes and their relevance across geographical contexts. This provides an overview of the intellectual landscape and geographical concentrations in the identified research areas.

The top three sources, as shown in Figure 5 – Journal of Construction Engineering and Management (68 articles), Automation in Construction (66 articles), and Buildings (57 articles), are the most prolific and influential platforms for this research, collectively accounting for a significant portion of the total publications.

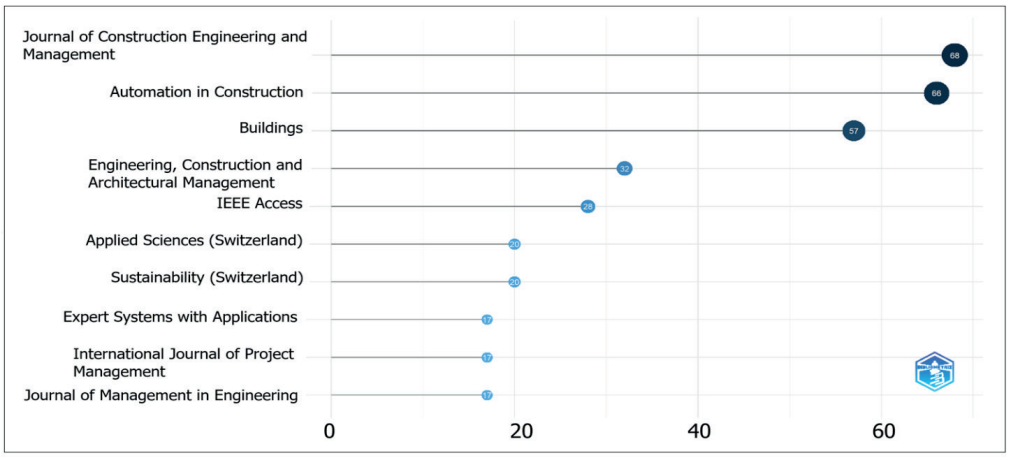

Figure 5. Most relevant sources

A steep drop-off in article count is observed after these top-tier journals, with the fourth-ranked source, engineering, construction and architectural management, publishing less than half the number of articles of the top journal (32 articles). This pattern suggests that while the research is concentrated in a few core journals, it also appears in a broader range of interdisciplinary and technology-focused publications, such as IEEE Access and Expert Systems with Applications. This distribution underscores the fusion of traditional project management with advanced technological and data-driven approaches, indicating the field's interdisciplinary nature.

The keyword frequency in Figure 6 provides a quantitative snapshot of the most prevalent topics within the analyzed literature on DDPM.

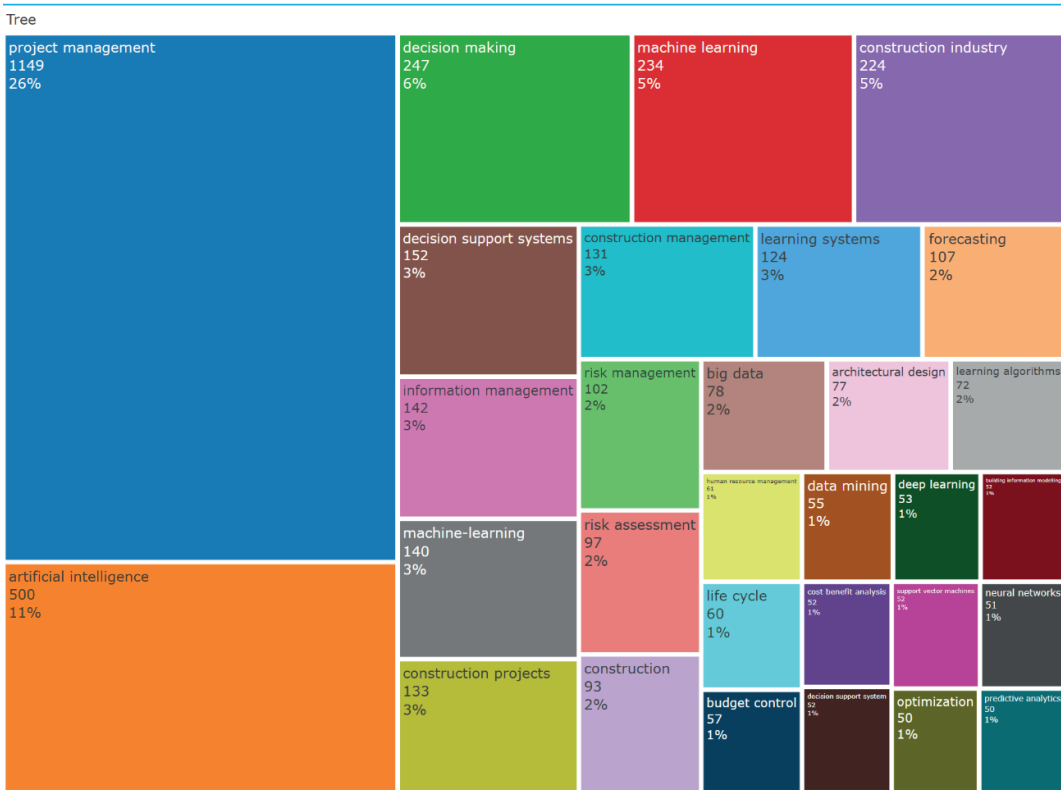

Figure 6. Keyword frequency tree

The term ‘project management’ has the highest frequency (1149), which is expected, as it defines the study's core subject area. The second most frequent term is ‘artificial intelligence’ (500), followed by ‘decision making’ (247) and ‘machine learning’ (234). This immediately highlights a central theme: the application of AI and machine learning techniques is the primary technological driver within this field. The high frequency of ‘decision making’ indicates that a key purpose of these technological applications is to provide enhanced support for project-related decisions.

Figure 6 also reveals a significant focus on a specific industry, with terms like ‘construction industry’ (224), ‘construction projects’ (133), and ‘construction management’ (131) appearing prominently. This suggests that the construction sector is a leading area for the practical application and research of DDPM methods. Other related technological and conceptual terms, such as ‘information management’ (142), ‘big data’ (78), and ‘data mining’ (55), further support the overarching theme of leveraging large datasets and advanced analytics to improve project outcomes. The presence of ‘risk management’ (102) and ‘risk assessment’ (97) demonstrates that traditional project management concerns remain central, but they are now approached with data-driven methods.

While the co-occurrence networks and frequency data establish the primary technological (AI/ML) and industrial (Construction) focus of the field, the subsequent analysis moves beyond description to address the core substantive objectives of this study: defining the role of data-driven approaches in Uncertainty Reduction and assessing their contribution to project efficiency and performance. The combination of the ‘machine learning’ cluster (prediction/optimization) and the high frequency of "risk management’ and ‘risk assessment’ explicitly addresses the role of data-driven methods in uncertainty reduction. The shift toward AI and machine learning is not simply about automation but about transforming reactive risk management into a proactive, data-driven discipline. The literature, as evidenced by these keywords, focuses on providing early warning signals and improving the accuracy of forecasts for schedule and cost variables. The inclusion of ‘decision making’ as a high-frequency term confirms that the ultimate goal of reducing uncertainty is to enable project managers to make better-informed choices under dynamic conditions.

The bibliometric evidence equally confirms the field's focus on improving Project Efficiency and Performance. The emphasis on terms like ‘optimization’ (within the ML cluster) and the prominence of specialized applications such as ‘digital twin’ and ‘building information modeling’ (focused on enhanced control and monitoring) are the key bibliometric indicators of this drive. The research implicitly leverages data-driven methods to achieve efficiency by enabling dynamic resource allocation, identifying and eliminating process bottlenecks, and automating routine monitoring tasks. Furthermore, the strong sectoral focus on the construction industry highlights the attempt to apply these efficiency gains in a domain traditionally characterized by high complexity and low productivity.

The author collaboration network represented in Figure 7, derived from the Scopus database, reveals a fragmented structure with several distinct communities, identified using the Walktrap algorithm.

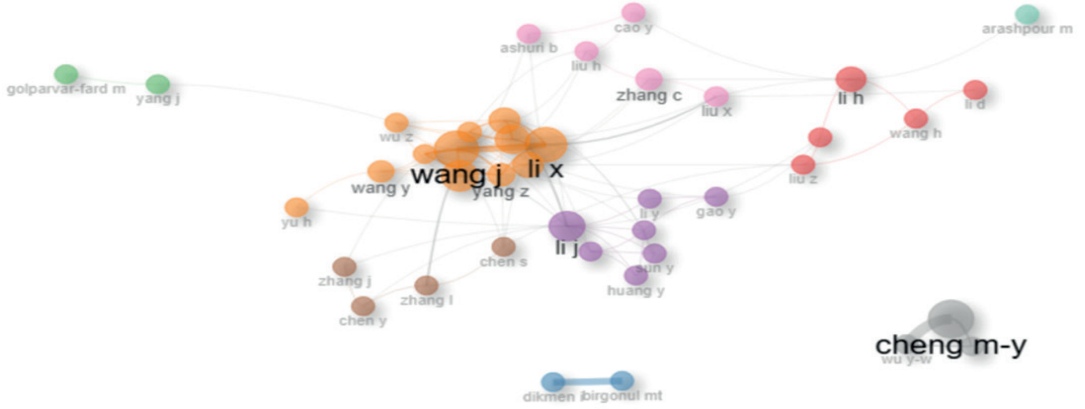

Figure 7. The author collaboration network

The network is characterized by a core group of highly connected authors, notably Wang J., Li X., and Yang Z., suggesting these individuals are central figures within this research area and likely drive collaborative efforts. Several smaller clusters are also apparent, indicating potentially isolated research groups or distinct sub-fields within the broader topic, with the names of other authors also mentioned. Some nodes appear isolated, which suggests either single-authored papers or collaborations with authors outside the scope of this dataset. The visualization highlights the importance of core individuals in fostering cooperation and reveals potential opportunities to bridge existing communities.

A global collaboration network map, illustrated in Figure 8, derived from the SCOPUS database, highlights key trends in international scientific cooperation.

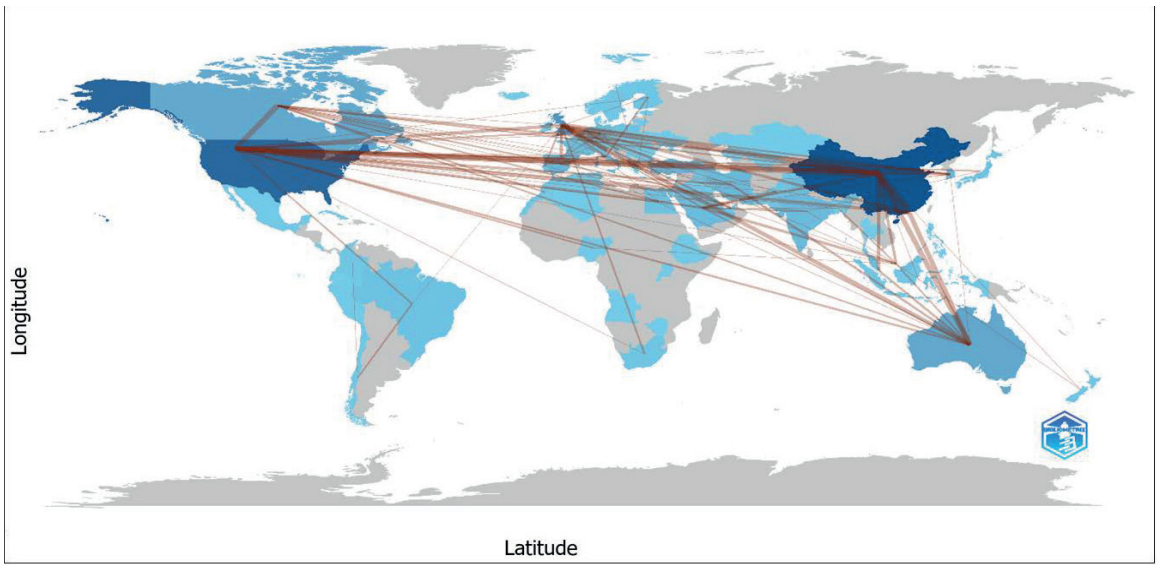

Figure 8. Country collaboration map

The intensity of the country's shading corresponds to its total research output, with the United States and China emerging as central hubs of scientific production, exMachine Learning hibiting the darkest shades. The lines connecting countries represent collaborative links established through co-authorship, independent of the author's order. Notably, strong collaborative ties are observed among the United States, European countries (especially the United Kingdom), China, and Australia, forming a global network anchored in these regions. Other countries showing significant research presence (lighter shades) include Canada, Brazil, South Africa, and some Asian countries. This visual representation offers insight into the interconnectedness of the global research landscape in the studied field, illustrating patterns of knowledge exchange and collaborative research.

The list of highly influential papers presented in Table 2, ranked by Local Citations, strongly confirms that the intellectual core of DDPM lies in applying AI and machine learning techniques to improve project outcomes.

Table 2. Highly cited articles in the field of DDPM

Author	Journal	Title	Year	Local Citations	Global Citations
Wauters & Vanhoucke (2016)	Expert Systems with Applications	A comparative study of Artificial Intelligence methods for project duration forecasting	2016	18	72
Pospieszny et al. (2018)	Journal of Systems and Software	A practical approach for software project effort and duration estimation with machine learning algorithms	2018	18	197

Wauters & Vanhoucke (2014)	Automation in Construction	Support Vector Machine Regression for project control forecasting	2014	16	116
Akhavian & Behzadan (2016)	Automation in Construction	Smartphone-based construction workers' activity recognition and classification	2016	13	238
Wang et al. (2012)	International Journal of Project Management	Predicting construction cost and schedule success using an artificial neural network ensemble and support vector machine classification models	2012	12	165
Zhang & El-Gohary (2017)	Automation in Construction	Integrating semantic NLP and logic reasoning into a unified system for fully automated code checking	2017	11	214
Wauters & Vanhoucke (2017)	European Journal of Operational Research	A Nearest Neighbour extension to project duration forecasting with AI	2017	10	53
Costantino et al. (2015)	International Journal of Project Management	Project selection in project portfolio management: An artificial neural network model based on critical success factors	2015	10	168
Faghihi et al. (2015)	The International Journal of Advanced Manufacturing Technology	Automation in construction scheduling: a review of the literature	2015	10	88
David & Thaveeporn (2005)	Journal of Computing in Civil Engineering	Predicting the Outcome of Construction Litigation Using Boosted Decision Trees	2005	10	87

Note: compiled by the authors

The recurring prominence of research focusing on project duration forecasting and estimation (e.g., Wauters & Vanhoucke, 2014, 2016, 2017); Pospieszny et al., 2018) through algorithms like Support Vector Machines and Neural Networks highlights predictive accuracy as the field's dominant concern. This focus directly supports the goal of Uncertainty Reduction by replacing traditional subjective estimates with data-driven probabilistic forecasts. Furthermore, the significant presence of articles in Automation in Construction (e.g., Akhavian & Behzadan, 2016; Wang et al., 2012) immediately validates the construction sector as the primary real-world testbed and source of innovation for DDPM, demonstrating practical applications from automated code checking to worker activity recognition. This sectoral focus underscores the drive for Efficiency by applying automation and predictive control in a highly complex, resource-intensive environment. While the high Global Citations for these papers attest to their fundamental academic impact, the intense specialization in predictive modeling and construction also suggests a potential thematic imbalance or research gap in exploring data-driven solutions for other crucial project lifecycle stages (such as initiation or benefits realization) or non-engineering, organizational industries.

The analysis of these highly cited papers establishes the foundational intellectual structure of DDPM: it is fundamentally a technology-driven field aimed at proactive control. Specifically, the dominance of forecasting research demonstrates that the primary mechanism for achieving Uncertainty Reduction is through superior temporal and cost prediction. Simultaneously, the focus on automation, activity recognition, and schedule optimization directly signifies the field's commitment to enhancing Project Efficiency. Consequently, the intellectual foundation of DDPM, as defined by these influential works, is built on leveraging AI/ML to increase predictive power, enable better resource allocation, and ultimately deliver more predictable and efficient project outcomes.

This robust intellectual foundation did not emerge instantaneously but rather through a clear, phased, substantive, and philosophical evolution over two decades, as illustrated in Figure 9.

2000-2004	2005-2009	2010-2014	2015-2019	2020-2025 (YTD)
Conceptualization of Need	**Early Applicability**	**Shift to Predictive Analytics**	**Exponential AI Adoption**	**Advanced System Integration**
Discussion of limitations of traditional (Waterfall) methods. Early demand for flexibility (Agile).	First attempts to use computational models (e.g., simple decision trees) for risk and outcome analysis.	Implementation of Machine Learning (ML): ANN, SVM. Focus on forecasting project cost and duration.	Sharp growth in publications (post-2017). Use of AI for automation of routine tasks and in-depth analysis of Big Data.	Focus on 'Digital Twin', 'building information modeling' (Building Information Modeling), and sustainability.
Key Substantive Development				
→	→	→	→	→
Evolutionary Outcome				
Formation of a demand for adaptive, non-linear approaches.	Shift from theoretical discussion to pioneering modeling efforts.	Transformation of reactive risk management into proactive and precise uncertainty management.	DDPM becomes the dominant paradigm. Construction emerges as the leading industrial testbed.	Shift to comprehensive, end-to-end control of the project lifecycle in real-time (Industry 5.0).

Figure 9. Intellectual evolution and substantive development stages of DDPM

The DDPM field's development began with a conceptual phase (2000-2009) that established the need for adaptive, non-linear approaches to project uncertainty. The decisive intellectual inflection point was reached in the 2010-2014 period, marked by the systematic implementation of Machine Learning techniques (ANN, SVM). This shift transformed the discipline by replacing traditional methods with a highly proactive predictive mechanism, thus solidifying the concept of data-driven uncertainty management. This core innovation fueled the subsequent exponential AI adoption (2015-2019), rapidly maturing the field, driving specialization, especially in the Construction industry, and establishing DDPM as the dominant research paradigm. Consequently, the field's current trajectory (2020-2025) is focused on Advanced System Integration, leveraging technologies such as digital twin and building information modeling to move beyond mere prediction toward comprehensive, end-to-end control of the project lifecycle in real-time, thereby aligning the future of project management with the demands of the Industry 5.0 era.

CONCLUSION

The bibliometric analysis successfully achieved its aim of exploring the intellectual evolution of DDPM, it confirmed the thesis that data-driven approaches are fundamentally reshaping project management practice by effectively addressing contemporary challenges. The study fully met all set objectives: it mapped the field's rapid expansion (18.83% annual growth) and identified the most influential sources and authors (Objective 1); it defined the intellectual structure through network analysis, revealing the central role of the machine learning cluster and the emerging digital twin/building information modeling cluster (Objective 2). Crucially, the findings confirmed that the primary mechanism for Uncertainty Reduction (Objective 3) is the predictive power of AI/ML, as evidenced by the dominance of forecasting research in highly cited works. In contrast, Project Efficiency (Objective 4) is enhanced through automation, optimization, and specialization within the highly complex Con-

struction industry—all of which collectively define the field's intellectual core.

This article provides a significant scientific contribution on two fronts. In the domain of bibliometric analysis, the study introduces and visualizes a novel five-stage intellectual evolution model (Figure 9), providing a critical chronological framework that links the field's technological adoption directly to its substantive development. This approach moves beyond simple mapping. In the DDPM subject area, the study precisely identifies the 2010-2014 period as the intellectual inflection point, where the systematic implementation of machine learning established the field's foundation in proactive, predictive control. This analysis also projects the field's future trajectory towards the comprehensive Advanced System Integration enabled by digital twin and building information modeling. However, the study is subject to limitations, primarily the exclusive reliance on the Scopus database, which may introduce selection bias, and the systematic exclusion of conference papers during data screening, potentially underrepresenting the most recent technological innovations that often debut at conferences.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: LS and ZM; research design: LS and ZM; data collection: ZM; analysis and interpretation: LS and ZM; writing draft preparation: LS and ZM; supervision: LS; correction of article: LS and ZM; proofread and final approval of article: LS and ZM. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Adebayo, Y., Udoh, P., Kamudyariwa, X. B., & Osobajo, O. A. (2025). Artificial Intelligence in Construction Project Management: A Structured Literature Review of Its Evolution in Application and Future Trends. *Digital, 5*(3), 26. https://doi.org/10.3390/digital5030026

Adeniran, I., Agu, E., Efunniyi, C., Osundare, O., & Iriogbe, H. (2024). The future of project management in the digital age: Trends, challenges, and opportunities. *Engineering Science & Technology Journal, 5*(8), 2632–2648. https://doi.org/10.51594/estj.v5i8.1516

Ajirotutu, R., Garba, B., & Johnson, S. (2024). AI-driven risk mitigation: Transforming project management in construction and infrastructure development. *World Journal of Advanced Engineering Technology and Sciences, 13*, 611–623. https://doi.org/10.30574/wjaets.2024.13.2.0628

Akhavian, R., & Behzadan, A. H. (2016). Smartphone-based construction workers' activity recognition and classification. *Automation in Construction, 71,* 198–209. https://doi.org/https://doi.org/10.1016/j.autcon.2016.08.015

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics, 11*(4), 959–975. https://doi.org/https://doi.org/10.1016/j.joi.2017.08.007

Bühler, M. M., Nübel, K., Jelinek, T., Köhler, L., & Hollenbach, P. (2025). Bridging the Construction Productivity Gap-A Hierarchical Framework for the Age of Automation, Robotics, and AI. *Buildings, 15*(16), 2899. https://doi.org/10.3390/buildings15162899

Cabeças, A., & Marques da Silva, M. (2021). Project Management in the Fourth Industrial Revolution. *TECHNO REVIEW. International Technology, Science and Society Review, 9,* 79-96. https://doi.org/10.37467/gka-revtechno.v9.2804

Chou, S. (2008). Uncertainty management in a process environment. *Journal of the Chinese Institute of Engineers, 31*(4), 625–638. https://doi.org/10.1080/02533839.2008.9671416

Costantino, F., Di Gravio, G., & Nonino, F. (2015). Project selection in project portfolio management: An artificial neural network model based on critical success factors. *International Journal of Project Management, 33*(8), 1744–1754. https://doi.org/https://doi.org/10.1016/j.ijproman.2015.07.003

Cucos, S., & Turcan, R. (2025). Role of the construction industry in economic growth and sustainable development. *Journal of Social Sciences, 8*(1), 25–38. https://doi.org/10.52326/jss.utm.2025.8(1).02

David, A., & Thaveeporn, P. (2005). Predicting the Outcome of Construction Litigation Using Boosted Decision Trees. *Journal of Computing in Civil Engineering, 19*(4), 387–393. https://doi.org/10.1061/(ASCE)0887-3801(2005)19:4(387)

De Meyer, A., Loch, C., & Pich, M. (2002). Managing Project Uncertainty: From Variation to Chaos. *Engineering Management Review, IEEE, 30*(3), 91. https://doi.org/10.1109/EMR.2002.1032403

Dhamija, P., & Bag, S. (2020). Role of artificial intelligence in operations environment: a review and bibliometric analysis. *The TQM Journal, 32*(4), 869-896. https://doi.org/10.1108/TQM-10-2019-0243

El Khatib, M., & Falasi, A. (2021). Effects of Artificial Intelligence on Decision Making in Project Management. *American Journal of Industrial and Business Management, 11*(3), 251–260. https://doi.org/10.4236/ajibm.2021.113016

El Khatib, M., Zitar, R., Alnaqbi, K., Alnaqbi, W., Alharmoodi, S., & Baydoun, A. (2023). Effect of Big Data and Analytics on Managing Projects. *International Journal of Computers and Their Applications, 30*(2), 173–182.

Daraojimba, E., Nwasike, C., Adegbite, A., Ezeigweneme, C., & Gidiagba. J. (2024). Comprehensive review of agile methodologies in project management. *Computer Science & IT Research Journal, 5*(1), 190–218. https://doi.org/10.51594/csitrj.v5i1.717

Faghihi, V., Nejat, A., Reinschmidt, K. F., & Kang, J. H. (2015). Automation in construction scheduling: a review of the literature. *The International Journal of Advanced Manufacturing Technology, 81*(9), 1845–1856. https://doi.org/10.1007/s00170-015-7339-0

Hanafy, N. O., & Hanafy, N. O. (2025). An Extensive Examination of Uses of Machine Learning and Artificial Intelligence in The Construction Industry's Project Life Cycle. *Energy and Buildings, 345*, 116094 https://doi.org/10.1016/j.enbuild.2025.116094

Hashfi, M. I., & Raharjo, T. (2023). Exploring the Challenges and Impacts of Artificial Intelligence Implementation in Project Management: A Systematic Literature Review. *International Journal of Advanced Computer Science and Applications, 14*(9). https://doi.org/10.14569/IJACSA.2023.0140940

Hoang, A. (2025). Evaluating Bibliometrics Reviews: A Practical Guide for Peer Review and Critical Reading. *Evaluation Review, 49*(6), 1074–1102. https://doi.org/10.1177/0193841X251336839

Hohl, P., Klünder, J., van Bennekum, A., Lockard, R., Gifford, J., Münch, J., Stupperich, M., & Schneider, K. (2018). Back to the future: origins and directions of the "Agile Manifesto" – views of the originators. *Journal of Software Engineering Research and Development, 6*(1), 15. https://doi.org/10.1186/s40411-018-0059-z

Iqbal, R., Doctor, F., More, B., Mahmud, S., & Yousuf, U. (2020). Big Data analytics and Computational Intelligence for Cyber-Physical Systems: Recent trends and state of the art applications. *Future Generation Computer Systems, 105*, 766–778. https://doi.org/https://doi.org/10.1016/j.future.2017.10.021

Jørgensen, T., & Wallace, S. W. (2000). Improving project cost estimation by taking into account managerial flexibility. *European Journal of Operational Research, 127*(2), 239–251. https://doi.org/https://doi.org/10.1016/S0377-2217(99)00484-1

Koi-Akrofi, J., Henry Matey, A., & Koi-Akrofi, G. (2019). Understanding the Characteristics, Benefits and Challenges of Agile IT Project Management: A Literature Based Perspective. *International Journal of Software Engineering & Applications, 10*(5), 25–44. https://doi.org/10.5121/ijsea.2019.10502

Krasteva, I., & Ilieva, S. (2020). Adopting Agile Software Development Methodologies in Big Data Projects – a Systematic Literature Review of Experience Reports. 2020 IEEE International Conference on Big Data (Big Data), 2028–2033. https://doi.org/10.1109/BigData50022.2020.9378118

Kumar, R. (2025). Bibliometric Analysis: Comprehensive Insights into Tools, Techniques, Applications, and Solutions for Research Excellence. *Spectrum of Engineering and Management Sciences, 3*(1), 45–62. https://doi.org/10.31181/sems31202535k

Lenfle, S., & Loch, C.H. (2010). Lost Roots: How Project Management Came to Emphasize Control over Flexibility and Novelty. *California Management Review, 53*(1), 32–55. https://doi.org/10.1525/cmr.2010.53.1.32

Leong, J., Yee, K., Baitsegi, O., Palanisamy, L., & Ramasamy, R. K. (2023). Hybrid Project Management between Traditional Software Development Lifecycle and Agile Based Product Development for Future Sustainability. *Sustainability, 15*(2), 1121. https://doi.org/10.3390/su15021121

Marinho, M., Sampaio, S., & Moura, H. (2018). Managing uncertainty in software projects. *Innovations in Systems and Software Engineering, 14*(3), 157–181. https://doi.org/10.1007/s11334-017-0297-y

Marnewick, C., & Marnewick, A. L. (2022). Digitalization of project management: Opportunities in research and practice. *Project Leadership and Society, 3,* 100061. https://doi.org/https://doi.org/10.1016/j.plas.2022.100061

Martinsuo, M., Korhonen, T., & Laine, T. (2014). Identifying, framing and managing uncertainties in project portfolios. *International Journal of Project Management, 32*(5), 732–746. https://doi.org/10.1016/j.ijproman.2014.01.014

Moniruzzaman, A. B. M. (2013). *Comparative Study on Agile software development methodologies*. Cornell University. https://doi.org/10.48550/arXiv.1307.3356

Nachbagauer, A. G. M., & Schirl-Boeck, I. B. (2018). *Organizational maturity beyond risk management: Successfully managing the unexpected*. In Developing Organizational Maturity for Effective Project Management (pp. 78–103). IGI Global. https://doi.org/10.4018/978-1-5225-3197-5.ch005

Osemeike, G., Eyieyien, Eyieyien, O., Paul, P., & Ijomah, T. (2024). Strategic approaches for successful digital transformation in project management across industries. *International Journal of Frontiers in Engineering and Technology Research, 7*, 7. https://doi.org/10.53294/ijfetr.2024.7.1.0037

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J.M., Grimshaw, J.M., Hrõbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., McGuinness, L.A., Stewart, L.A., Thomas, J., Tricco, A.C., Welch, V.A., Whiting, P.F., & Moher, D. (2020). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Systematic Reviews, 10*. https://doi.org/10.1186/s13643-021-01626-4

Pantović, V., Vidojević, D., Vujičić, S., Sofijanić, S., & Jovanović-Milenković, M. (2024). Data-Driven

Decision Making for Sustainable IT Project Management Excellence. *Sustainability, 16*(7), 3014. https://doi.org/10.3390/su16073014

PMI. (2021). *A Guide to the Project Management Body of Knowledge – Seventh Edition and The Standard for Project Management*. Project Management Institute.

Pospieszny, P., Czarnacka-Chrobot, B., & Kobylinski, A. (2018). An effective approach for software project effort and duration estimation with machine learning algorithms. *Journal of Systems and Software, 137,* 184–196. https://doi.org/https://doi.org/10.1016/j.jss.2017.11.066

Ranasinghe, U., Jefferies, M., Davis, P., & Pillay, M. (2021). Conceptualising project uncertainty in the context of building refurbishment safety: A systematic review. *Buildings, 11*(3), 1–15. https://doi.org/10.3390/buildings11030089

Salimimoghadam, S., Ghanbaripour, A. N., Tumpa, R. J., Kamel Rahimi, A., Golmoradi, M., Rashidian, S., & Skitmore, M. (2025). The Rise of Artificial Intelligence in Project Management: A Systematic Literature Review of Current Opportunities, Enablers, and Barriers. *Buildings, 15*(7), 1130. https://doi.org/10.3390/buildings15071130

Saunders, F. C., Gale, A. W., & Sherry, A. H. (2015). Conceptualising uncertainty in safety-critical projects: A practitioner perspective. *International Journal of Project Management, 33*(2), 467–478. https://doi.org/10.1016/j.ijproman.2014.09.002

Siddiqui, A., Chowdhary, H., Krishna, R., Muniyandy, E., & Maguluri, L. (2024). Harnessing Big Data: Strategic Insights for IT Management. *International Journal of Advanced Computer Science and Applications, 15*(7), 912. https://doi.org/10.14569/IJACSA.2024.0150790

Steegh, R., Van De Voorde, K., & Paauwe, J. (2025). Understanding how agile teams reach effectiveness: A systematic literature review to take stock and look forward. *Human Resource Management Review, 35*(1), 101056. https://doi.org/https://doi.org/10.1016/j.hrmr.2024.101056

Tynchenko, V., Lomazov, A., Lomazov, V., Evsyukov, D., Nelyub, V., Borodulin, A., Gantimurov, A., & Malashin, I. (2024). Adaptive Management of Multi-Scenario Projects in Cybersecurity: Models and Algorithms for Decision-Making. *Big Data and Cognitive Computing, 8*(11), 150. https://doi.org/10.3390/bdcc8110150

Vergara, D., del Bosque, A., Lampropoulos, G., & Fernández-Arias, P. (2025). Trends and Applications of Artificial Intelligence in Project Management. Electronics, 14(4), 800. https://doi.org/10.3390/electronics14040800

Wang, Y.-R., Yu, C.-Y., & Chan, H.-H. (2012). Predicting construction cost and schedule success using artificial neural networks ensemble and support vector machines classification models. *International Journal of Project Management, 30*(4), 470–478. https://doi.org/10.1016/j.ijproman.2011.09.002

Wauters, M., & Vanhoucke, M. (2014). Support Vector Machine Regression for project control forecasting. Automation in Construction, 47, 92–106. https://doi.org/10.1016/j.autcon.2014.07.014

Wauters, M., & Vanhoucke, M. (2016). A comparative study of Artificial Intelligence methods for project duration forecasting. *Expert Systems with Applications, 46*, 249–261. https://doi.org/10.1016/j.eswa.2015.10.008

Wauters, M., & Vanhoucke, M. (2017). A Nearest Neighbour extension to project duration forecasting with Artificial Intelligence. European *Journal of Operational Research, 259*(3), 1097–1111. https://doi.org/https://doi.org/10.1016/j.ejor.2016.11.018

Zhang, J., & El-Gohary, N. M. (2017). Integrating semantic NLP and logic reasoning into a unified system for fully-automated code checking. *Automation in Construction, 73*, 45–57. https://doi.org/10.1016/j.autcon.2016.08.027

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Digital Transformation of Courier Logistics in Kazakhstan: Drivers and Barriers

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ABSTRACT

In the context of accelerated digitalization of the economy, the growth of e-commerce and increasing requirements for sustainable development, courier logistics is becoming one of the key elements of the modernization of urban transport and logistics systems. The purpose of this article is to study the drivers and barriers of the digital transformation of courier logistics in Kazakhstan, as well as to develop conceptual directions for its sustainable development in the context of a smart city. The research methodology consists of an analysis of strategic and regulatory documents, a review of international scientific publications, and correlation and factor analyses. The empirical basis of the study is official statistical data from the Bureau of National Statistics and the World Bank, as well as primary sociological and expert materials. The results of the study showed that in 2023-2024, the volume of e-commerce in Kazakhstan increased from 1.60 to 2.44 trillion tenge, and the share of online marketplaces was about 85%. Correlation analysis revealed a strong positive relationship between the development of courier services and GDP per capita ($r = 0.946$; $p < 0.01$), as well as with foreign trade turnover ($r = 0.897$; $p < 0.01$). Based on the results, a matrix for digital transformation of courier logistics in Kazakhstan is proposed, and a set of strategic recommendations to improve the efficiency and sustainability of the last mile of delivery is formulated. The findings can be used to develop government policy, smart city urban programs, and digital development strategies for logistics companies.

KEYWORDS: Digital Economy, Digitalization, E-commerce, Courier Logistics, Smart Logistics, Logistics Strategy, Smart City, Urban Development

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Цифровая трансформация курьерской логистики в Казахстане: драйверы и барьеры

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АННОТАЦИЯ

В условиях ускоренной цифровизации экономики, роста электронной коммерции и усиления требований к устойчивому развитию курьерская логистика становится одним из ключевых элементов модернизации городских транспортно-логистических систем. Целью данной статьи является исследование драйверов и барьеров цифровой трансформации курьерской логистики в Казахстане, а также разработка концептуальных направлений её устойчивого развития в контексте смарт города. Методологию исследования составляют анализ стратегических и нормативных документов, обзор международных научных публикаций, а также корреляционный и факторный анализ. Эмпирическую основу исследования составляют официальные статистические данные Бюро национальной статистики РК и Всемирного банка, а также результаты первичных социологических и экспертных материалов. Результаты исследования показали, что за 2023–2024 гг. объем электронной коммерции в Казахстане вырос с 1,60 до 2,44 трлн тенге, а доля онлайн-маркетплейсов составила около 85%. Корреляционный анализ выявил сильную положительную связь между развитием курьерских услуг и ВВП на душу населения ($r = 0,946$; $p < 0,01$), а также с внешнеторговым оборотом ($r = 0,897$; $p < 0,01$). На основе полученных результатов предложена матрица цифровой трансформации курьерской логистики Казахстана и сформулирован комплекс стратегических рекомендаций, направленных на повышение эффективности и устойчивости последней мили доставки. Полученные выводы могут быть использованы при разработке государственной политики, программ развития смарт города и стратегий цифрового развития логистических компаний.

КЛЮЧЕВЫЕ СЛОВА: цифровая экономика, цифровизация, электронная коммерция, курьерская логистика, умная логистика, логистическая стратегия, умный город, городское развитие

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INTRODUCTION

Urban logistics is undergoing a profound transformation worldwide due to the convergence of digitalization, sustainability goals, and rapid growth in e-commerce. In Kazakhstan, these dynamics intersect with national development priorities outlined in the Digital Kazakhstan program, which aims to modernize infrastructure and enhance economic competitiveness through advanced technologies (Government of Kazakhstan, 2024). The expansion of online retailing has been particularly significant: the total volume of e-commerce services increased from 1.60 trillion KZT in 2023 to 2.44 trillion KZT in 2024, with online marketplaces accounting for nearly 85% of the sector (Bureau of National Statistics, 2024, 2025). This surge has placed unprecedented pressure on courier companies to improve the speed, reliability, and environmental performance of last-mile deliveries.

At the same time, Kazakhstan's major urban centers, particularly Almaty and Astana, face several structural challenges, including traffic congestion, rising carbon emissions, and inefficient use of curbside space. According to the World Bank's Logistics Performance Index (LPI) 2023, Kazakhstan scored 2.7, indicating weaknesses in logistics competence, tracking and tracing, and delivery timeliness compared to global leaders (World Bank, 2023). These shortcomings directly affect courier operations, which are highly sensitive to the quality of infrastructure and the level of digital service readiness.

International research emphasizes that "smart" courier logistics, integrating technologies such as Artificial Intelligence (hereinafter – AI), Internet of Things, blockchain, and Big Data analytics, can simultaneously enhance efficiency and reduce environmental impacts (Pan et al., 2021; Idrissi et al., 2024). Case studies have demonstrated that combining AI-driven routing with electric vehicle (hereinafter – EV) fleets and parcel lockers can reduce delivery time by 15-20%, energy consumption by 10-25%, and emissions by up to 40% (Ferreira & Esperança, 2025; Gnoni et al., 2025). However, scaling such solutions requires addressing persistent barriers, such as fragmented IT systems, insufficient digital skills among Small and Medium-sized Enterprises (hereinafter – SMEs), high upfront costs of electrification, and the absence of shared standards for data and curbside management (OECD, 2023; Syzdykbayeva et al., 2025).

In Kazakhstan, the context of smart courier transformation is shaped by opportunities and constraints. On the one hand, government-backed smart city initiatives in Almaty and Astana introduced smart city platforms; their limited integration with courier operations constrains potential efficiency gains (UNECE, 2023). However, the uneven pace of digital adoption across regions and firms threatens to widen disparities and limit national competitiveness (OECD, 2024).

Against this backdrop, this study examines the key drivers and barriers to digital transformation in Kazakhstan's courier logistics sector and proposes a conceptual framework to enhance its sustainability. The contribution of the paper is threefold. First, it synthesizes international best practices in smart courier logistics and adapts them to the Kazakhstani context. Second, it develops a conceptual model, the Smart Courier Transformation Matrix, that identifies opportunities, risks, and policy levers for major urban centers. Third, it formulates a set of strategic recommendations for policymakers, businesses, and city authorities aligned with Kazakhstan's national digitalization and sustainable development agendas. By providing both theoretical insights and practical implications, the study contributes to ongoing efforts to modernize Kazakhstan's courier logistics system while supporting sustainable urban growth.

LITERATURE REVIEW

The last-mile delivery segment is considered the most expensive and environmentally challenging part of supply chains, accounting for nearly 40-50% of the overall logistics costs in e-commerce (Bosona, 2020). Global studies emphasize that "smart" courier logistics, enabled by AI, IoT, blockchain, and advanced data analytics, can transform urban freight into a more sustainable system (Pan et al., 2021). Simulation-based models demonstrate that optimizing routing with AI and integrating parcel lockers can reduce failed deliveries and vehicle kilometers by up to 30% (Gnoni et al., 2025). Moreover, empirical evidence suggests that the adoption of EVs, together with AI-assisted scheduling, can reduce CO_2 emissions by up to 40% and delivery times by 15-20% (Ferreira & Esperança, 2025).

A systematic review by Idrissi et al. (2024) highlighted the synergetic role of IoT, blockchain, and AI in logistics, noting that while technical potential is high, governance challenges such as interoperability, cybersecurity, and investment risks limit adoption. These findings indicate that successful digital transformation requires not only technological readiness but also institutional and organizational frameworks.

International research has identified several recurring drivers: growing e-commerce demand, consumer preferences for real-time tracking, supportive government policies, and technological advances in electrification and automation. Conversely, barriers include high capital expenditure for fleet electrification, insufficient charging infrastructure, limited digital skills among SMEs, and fragmented IT systems (OECD, 2024). The World Bank LPI 2023 further underlined that logistics performance depends not only on infrastructure, but also on competence, regulation, and reliability – areas where emerging economies often lag (World Bank, 2023).

Smart city initiatives worldwide provide lessons relevant to Kazakhstan. UNECE (2023) profiles Almaty as a pilot city where smart infrastructure, intelligent transport systems, and urban data lakes are being introduced, although not yet fully leveraged for courier logistics. Similarly, Syzdykbayeva et al. (2025) applied graph theory to optimize Astana's logistics infrastructure, demonstrating a local methodological basis for data-driven planning. These studies confirm that Kazakhstan's urban contexts can benefit from global best practices, while requiring adaptation to national realities.

Kazakhstan's logistics sector has recently been the subject of several studies. Saktaganova et al. (2025) emphasized the opportunities and challenges of digital transformation in the national transport and logistics system, particularly regarding global integration and sustainability. Mamrayeva et al. (2022) highlight the importance of IoT, blockchain, and Big Data for Kazakhstani logistics companies but caution that limited digital skills and infrastructure remain critical bottlenecks. Kredina et al. (2022) found a strong correlation between the development of Information and Communication Technology (hereinafter – ICT) services and logistics performance in Kazakhstan, noting that postal and courier services are closely tied to Gross Domestic Product (GDP) per capita (r = 0.946*) and foreign trade turnover (r = 0.897*). These findings confirm that courier logistics are both drivers and reflections of broader economic modernization.

Despite notable progress, several critical gaps remain in the existing literature, including the limited availability of empirical case studies on Kazakhstani courier companies implementing digital technologies such as electric vehicle fleets, parcel locker networks, and AI-based routing systems; the insufficient integration of sustainability metrics, particularly emissions, energy efficiency, and curb-space utilization, into national logistics research; the absence of robust frameworks that ensure effective alignment between public policy and business strategies, especially within the context of smart city programs and courier operations; and the lack of localized methodological approaches that systematically combine international best practices with Kazakhstan's specific economic, climatic, and urban conditions.

Addressing these gaps, the present study contributes by synthesizing global evidence with local data to develop a Smart Courier Transformation Matrix and mapping key drivers, barriers, and actionable policy levers for sustainable urban logistics in Kazakhstan. Smart courier logistics refers to an integrated, technology-driven model of last-mile delivery that leverages advanced digital solutions to optimize routing, enhance operational visibility, reduce environmental impacts, and improve customer experience. Contemporary research emphasizes that such systems are fundamentally built on data-driven decision-making, enabled by real-time information from IoT infrastructure, vehicle telematics, and parcel-level tracking, which enables dynamic route optimization, accurate demand forecasting, and predictive maintenance in urban delivery systems (Chen et al., 2021; Pan et al., 2021). These capabilities are reinforced through automation and algorithmic optimization, where AI and machine learning reduce routing inefficiencies, minimize fuel consumption, and automate sorting, dispatching, and load-balancing processes (Giuffrida et al., 2022).

At the organizational level, platform-based coordination via digital logistics platforms ensures transparent interaction among couriers, marketplaces, warehouses, and customers, supporting interoperability and service flexibility across delivery networks (Dinu, 2024). From a sustainabil-

ity perspective, electrification and green technologies, including electric vehicles, cargo bikes, and low-emission urban microhubs, play a central role in decarbonization and sustainable urban mobility (Llorca & Moeckel, 2021). In parallel, out-of-home and autonomous delivery solutions, such as parcel lockers, pick-up and drop-off points, drones, and autonomous delivery robots, help reduce failed deliveries and alleviate urban congestion (Zhang & Demir, 2025).

A review of international and national studies shows that the digital transformation of courier logistics is considered a key factor in increasing the efficiency of the last mile, reducing environmental stress, and supporting sustainable urban development. Foreign studies confirm the high potential of using AI, IoT, big data analytics, electric transport, and off-site delivery to optimize logistics processes, reduce costs and emissions, as well as improve the quality of service. An analysis of the works devoted to Kazakhstan indicates that there are objective prerequisites for the development of "smart" courier logistics, including the growth of e-commerce, the development of digital infrastructure, and the implementation of smart city initiatives in major cities. Thus, existing scientific research provides an important theoretical basis, but it underscores the need for further research focused on developing conceptual models and analysis tools adapted to national conditions.

Smart courier logistics operates at the intersection of urban logistics, digital transformation, and sustainability, aligning with global smart city frameworks. In emerging economies such as Kazakhstan, the integration of these elements is evolving but demonstrates significant potential for optimization and green transition. Thus, the purpose of this article is to study the drivers and barriers of the digital transformation of courier logistics in Kazakhstan, as well as to develop conceptual directions for its sustainable development in the context of a smart city.

MATERIALS AND METHODS

This study adopts a mixed-methods research design that integrates three complementary methodological components. First, a document analysis of Kazakhstan's national policy and strategic frameworks, including Digital Kazakhstan, OECD analytical reports, and World Bank policy diagnostics, is conducted to establish the institutional and regulatory context. Second, an empirical qualitative stage is implemented through expert interviews with courier companies and semi-structured surveys involving representatives of state-owned enterprises engaged in logistics activities. Third, the quantitative component employs correlation and factor analysis based on secondary datasets (Kredina et al., 2022; Bureau of National Statistics; World Bank LPI 2023). This triangulation provides a comprehensive perspective on global best practices and Kazakhstan's unique institutional and economic conditions.

Document analysis was employed to identify policy-level drivers and barriers shaping the digital transformation of courier logistics in Kazakhstan. The analysis covered national digitalization strategies, international policy diagnostics, and urban sustainability assessments, focusing on priorities for ICT adoption, digital services, infrastructure modernization, SME digital readiness, and the role of smart urban infrastructure in supporting courier logistics. In addition, international benchmarking evidence was used to assess systemic weaknesses in logistics performance, particularly in tracking and delivery timeliness (Government of Kazakhstan, 2024; OECD, 2023; UNECE, 2023; World Bank, 2023).

To complement secondary data, five semi-structured expert interviews were conducted with managers of leading Kazakhstani courier companies. The analysis focuses on the thematic coding of regulatory enablers and structural gaps affecting courier services. Additionally, an online survey of 32 respondents (including logistics specialists) was conducted in early 2025. The online survey and expert interviews were conducted in accordance with standard ethical principles. Participation was voluntary, informed consent was obtained from all respondents, and no personally identifiable information was collected.

The interview protocol focused on three core thematic areas, including the adoption of AI, the Internet of Things, blockchain technologies, and parcel locker systems; the technological, financial, and infrastructural barriers to fleet electrification; and the key regulatory and infrastructure bottlenecks constraining the digital transformation of courier operations. Surveys applied a 5-point Likert scale

to evaluate the perceived importance of drivers (e.g., e-commerce growth and policy support) and barriers (e.g., cost, skills, and IT fragmentation). Responses were coded thematically and cross-referenced with findings from document analysis.

Although the interview sample (n = 5) and survey sample (n = 32) were modest in size, this is consistent with the methodological practices in exploratory logistics research conducted in emerging markets. Access to courier company management is restricted because of operational confidentiality and competition concerns. Therefore, purposive sampling was used to obtain insights from key decision makers directly involved in digital transformation processes. The results are not intended for statistical generalization but provide valuable qualitative evidence to complement the correlation and policy findings.

To examine the relationships between ICT adoption, courier logistics performance, and economic development, this study applied correlation and factor analytical techniques. The core empirical basis draws on the findings of Kredina et al. (2022), who report strong positive correlations between postal and courier services and GDP per capita as well as foreign trade turnover. These findings are complemented by national e-commerce statistics for 2023–2024 obtained from the Bureau of National Statistics (2024) and by the World Bank LPI 2023 scores. All statistical procedures, including Pearson correlation analysis and principal component analysis (hereinafter – PCA), were conducted using SPSS 28. The objective was to identify structural linkages among digital logistics indicators, economic performance, and sustainability-related factors. The analytical workflow is presented in Figure 1.

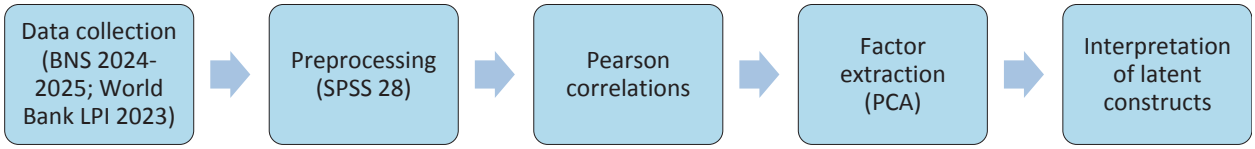

Figure 1. Analytical workflow for correlation and factor analysis

All empirical findings were synthesized into a Smart Courier Transformation Matrix, and identified drivers and barriers were systematically classified into four interrelated dimensions encompassing policy and regulation, infrastructure, technology and data, and skills and organizational capacity. This integrative framework subsequently served as the analytical basis for formulating a 12-point action plan and a strategic roadmap toward 2030, which are presented in the results section.

RESULTS

A review of Kazakhstan's strategic development documents and international assessment frameworks reveals both enabling conditions and persistent systemic constraints affecting the transition toward smart and sustainable courier logistics. The national Digital Kazakhstan Program prioritizes the expansion of ICT infrastructure, e-government services, and digital platforms, and positions logistics as one of the key sectors for modernization (Government of Kazakhstan, 2024). However, the strategy lacks operational mechanisms specifically targeting courier operations, such as incentives for EVs, the deployment of parcel locker networks, or standardized digital protocols for last-mile services. According to the OECD diagnostic report (2023), low SME digital readiness and uneven adoption of advanced ICT solutions across industries directly hinder courier companies' ability to implement technologies such as IoT tracking, AI-driven routing, and blockchain-enabled data exchange.

In the urban context, the UNECE Smart Sustainable Cities Profile (2023) for Almaty identifies several existing smart-city components – including urban data lakes, intelligent transport systems, and AFC – that could support courier telemetry, curbside allocation, and demand-responsive routing, yet integration with private logistics operators remains limited and largely uncoordinated. Additional constraints are reflected in Kazakhstan's performance on the World Bank LPI, where the country recorded an overall score of 2.7, significantly below the

OECD average of 3.5, with remarkably low scores in logistics competence (2.5), tracking and tracing (2.4), and delivery timeliness (2.6). These gaps indicate structural operational risks and highlight the vulnerability of courier service reliability under current conditions (World Bank, 2023).

Overall, the document analysis suggests that while Kazakhstan has a generally supportive policy environment for digitalization and smart-city development, implementation mechanisms specifically targeting last-mile courier logistics remain insufficiently developed. The key findings of the document analysis are summarized in Table 1.

Table 1. Document analysis results

Document	Enabler	Gap
Digital Kazakhstan	ICT infrastructure, e-services	No explicit courier standards
OECD (2023)	Policy alignment, SME support	Low SME digital readiness
UNECE (2023) Almaty	Data lakes, ITS, AFC	Weak integration with couriers
World Bank LPI (2023)	Benchmarking of logistics	Low tracking & competence scores

Note: compiled by authors based on OECD (2023), UNECE (2023), World Bank LPI (2023)

A synthesis of insights derived from international empirical studies, industry reports, and expert assessments reveals a consistent set of perceived drivers and barriers shaping the digital transformation of courier logistics in Kazakhstan. The rapid growth of e-commerce – identified in global logistics research as one of the most influential accelerators of last-mile innovation – is considered the primary driver, reinforcing demand for faster delivery, real-time parcel tracking, and an enhanced customer experience. Government-led digitalization initiatives, particularly those embedded in the Digital Kazakhstan program, further enable sectoral modernization by expanding ICT infrastructure and promoting the integration of digital platforms (OECD, 2023). International literature similarly highlights rising consumer expectations for transparency, visibility, and delivery responsiveness as a significant force behind courier service automation and data-driven optimization. At the same time, significant barriers persist. Studies on sustainable urban logistics consistently point to the high capital costs associated with transitioning to EV fleets, coupled with insufficient availability of charging infrastructure, as key constraints on low-carbon last-mile operations. Additional challenges include fragmented digital architectures across logistics operators, limited interoperability of IT systems, and the absence of standardized data-sharing protocols – factors that hinder the implementation of IoT, AI, and smart routing tools in emerging economies. Shortages of skills in both IT and logistics, documented in regional assessments and OECD diagnostics, further slow the diffusion of advanced technologies. These consolidated trends, summarized conceptually in Table 2, reflect broader global patterns shaping the adoption of smart courier logistics and highlight the structural constraints faced by Kazakhstan's logistics ecosystem.

Table 2. Drivers and barriers identified through the survey

Factor	Mean score (1-5)	Category
E-commerce growth	4.8	Driver
Government (Gov't) digitalization support	4.2	Driver
Consumer demand for faster delivery	4.0	Driver
High cost of EV transition	4.6	Barrier
Lack of charging infrastructure	4.4	Barrier
IT fragmentation	4.2	Barrier
Shortage of skilled personnel	4.0	Barrier

Note: compiled by the authors

A consolidated analysis of international literature, policy reports, and expert insights reveals a coherent set of drivers and barriers shaping Kazakhstan's transition toward smart courier logistics. Global studies emphasize that rapid e-commerce expansion continues to reshape last-mile logistics by accelerating demand for real-time visibility, faster delivery, and automated routing solutions. This tendency aligns with Kazakhstan's Digital Kazakhstan agenda, which strengthens ICT capacity yet does not provide targeted mechanisms for EV deployment, parcel locker networks, or interoperability standards for courier ecosystems (OECD, 2023). International research further shows that consumers increasingly expect transparent and time-sensitive delivery services, pushing companies toward data-driven optimization and IoT-enabled tracking. At the same time, multiple structural constraints persist. Transitioning to EV fleets remains financially burdensome and technologically challenging for SMEs, as studies on emerging markets confirm. These barriers were also reflected in expert interviews: a courier company manager from Almaty noted that "we are interested in EVs, but without public charging stations and financial incentives, this is not realistic for SMEs". At the same time, another respondent highlighted that the integration of courier operations with municipal smart-city data platforms "remains unclear and poorly coordinated". Such practitioner perspectives correspond with OECD findings on SME capability gaps and limited digital readiness, underscoring the need to harmonize private-sector innovation with public infrastructure investments. Additional challenges, including fragmented IT systems, a lack of standardized data-sharing protocols, and persistent shortages of ICT-skilled logistics personnel, are widely documented in global supply chain digitalization research.

Using combined datasets from Kredina et al. (2022), the Bureau of National Statistics (2024), and the World Bank Logistics Performance Index (2023), an exploratory correlation and factor analysis was conducted to examine structural linkages between digital infrastructure, logistics performance, and macroeconomic indicators. The results indicate a strong and statistically significant association between the development of ICT services and the expansion of postal-courier activities, both of which closely align with national economic performance, as reflected by a high positive correlation with GDP per capita ($r = 0.946$, $p < 0.01$). A similarly strong correlation was identified between courier service activity levels and foreign trade turnover ($r = 0.897$, $p < 0.01$), suggesting that courier logistics play an increasingly important role in supporting Kazakhstan's trade-driven economic model – consistent with global findings on the interplay between trade intensity and last-mile distribution capacity. Moreover, the LPI tracking and tracing dimension demonstrated a significant positive correlation with national courier delivery performance ($r = 0.812$, $p < 0.05$), reinforcing the notion that improvements in digital tracking capability are closely linked to greater reliability and transparency in last-mile operations. These empirical relationships, derived from internationally recognized logistics indices and official national statistics, underscore the systemic nature of digital transformation in Kazakhstan's courier sector and provide quantitative evidence that ICT development, logistics digitalization, and economic performance evolve in an interdependent manner.

The correlation analysis confirmed strong relationships between ICT adoption, courier services, and GDP per capita. The detailed results are presented in Table 3.

Table 3. Correlation Matrix

Variable	Courier service	GDP per capita	Foreign trade	LPI Tracking
Courier services	1.000	0.946**	0.897**	0.812*
GDP per capita	0.946**	1.000	0.914**	0.765*
Foreign trade	0.897**	0.914**	1.000	0.732*
LPI Tracking	0.812*	0.765*	0.732*	1.000

Note: compiled by the authors

The obtained correlation coefficients indicate a strong positive relationship between the volume of courier services and GDP per capita, as well as between courier services and foreign trade turnover. Factor analysis using PCA yielded three latent factors, with a Kaiser–Meyer–Olkin (KMO) measure

of sampling adequacy of 0.72, jointly explaining 68% of the total variance. The extracted factors were interpreted as follows: digital infrastructure readiness, encompassing ICT development, broadband penetration, and AI/IoT adoption; operational efficiency, reflected by LPI indicators related to tracking and tracing, delivery timeliness, and delivery success rates; economic impact, represented by GDP per capita, foreign trade turnover, and e-commerce activity.

The distribution of the eigenvalues, with factor loadings visualized through a scree plot in Figure 2.

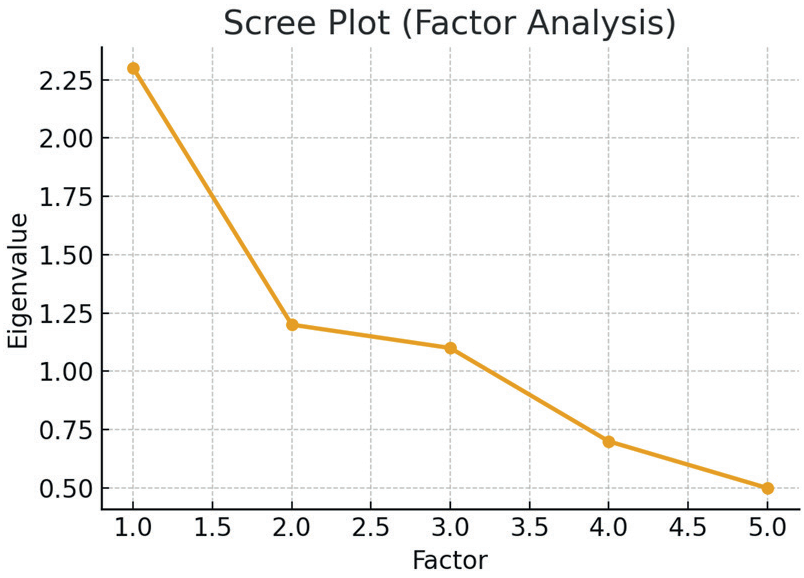

Figure 2. Scree Plot of factor analysis

The results of the factor analysis showed the contribution of each factor to the overall variance. The graph shows a clear break in the curve after the third factor, which indicates that it is advisable to identify three latent factors. The first three components have eigenvalues above unity and collectively account for 68% of the total variance. The first factor characterizes digital infrastructure readiness and includes indicators for the development of ICT, broadband access, and the implementation of AI and IoT-based solutions. The second factor reflects the operational efficiency of courier logistics and is related to tracking, timely delivery, and successful order fulfillment. The third factor describes the economic impact and includes GDP per capita, foreign trade turnover, and e-commerce volume. Thus, Figure 2 confirms the stable three-factor data structure and justifies the use of this model to analyze the interrelationships between digitalization, courier logistics efficiency and economic development.

A holistic synthesis of the empirical results, policy analysis, and international evidence indicates that Kazakhstan's transition toward smart courier logistics is shaped by a combination of mutually reinforcing drivers and persistent structural constraints. The expansion of e-commerce continues to be a significant catalyst, increasing demand for faster, more reliable, and digitally supported last-mile delivery – an effect widely documented in the global urban logistics literature. National-level initiatives such as the Digital Kazakhstan program further strengthen enabling conditions by expanding ICT infrastructure and supporting the digital transformation of key service sectors (OECD, 2023), while ongoing smart-city investments – including urban data lakes and ITS in Almaty and Astana – create additional technological foundations for courier route optimization, telemetry, and curbside management (UNECE, 2023). International studies provide robust evidence that the adoption of AI-driven routing, IoT-based tracking, and EV fleets improves operational efficiency and reduces environmental externalities across last-mile logistics networks. However, these enabling forces are counterbalanced by systemic barriers. Kazakhstan's relatively low performance in the World Bank Logistics Performance Index (2023) – particularly in logistics competence and tracking – highlights operational vulnerabilities that

directly affect courier service reliability. SME digital readiness remains limited, with skills shortages in ICT and logistics continuing to slow technology adoption (OECD, 2023). High capital expenditure requirements for EV fleet upgrades, charging infrastructure, and parcel locker deployment also restrict the feasibility of large-scale technological modernization. Furthermore, the absence of unified regulatory standards for curbside allocation, data interoperability, and cross-platform data-sharing creates institutional fragmentation and inhibits coordinated innovation across the courier ecosystem. Collectively, these integrated findings form the analytical basis for the Smart Courier Transformation Matrix presented in

Table 4 underpins the 12-point strategic action plan proposed in the discussion section.

Table 4. Smart courier transformation matrix in Kazakhstan

Layer	Driver (opportunity)	Barrier (risk)	Actionable lever (2025-2030)
Policy & Regulation	Digital Kazakhstan: city smart-mobility agendas	Fragmented rules for lockers/curbspace; data-sharing uncertainty	National guidelines for lockers & microhubs; city curbspace APIs; standard service-level/open-data clauses in municipal procurement
Infrastructure	ITS, data lakes, AFC; emerging hubs	Limited depot/charging footprint; curb conflicts	Public-private microhubs; depot electrification; kerbside booking and enforcement tools
Technology & Data	AI routing, telematics, EVs; blockchain for chain-of-custody	Legacy Transport Management System (TMS)/ Warehouse Management System (WMS); interoperability gaps	Reference architecture (open APIs, event streams); city mobility-data trusts; pilot blockchain for high-value/temperature-controlled flows
Skills & Organization	Growing analytics talent pools	SME digital skills gaps	National upskilling vouchers; vendor-supported “digital twins” sandboxes; shared services for SMEs

Note: compiled by the authors

Content analysis of the policy documents highlights that national strategies (Digital Kazakhstan and smart city programs) provide strong foundations for digital infrastructure but lack mechanisms tailored explicitly to courier operations. The correlation results reinforce this finding: indicators of ICT development and tracking performance strongly correlate with courier sector output, suggesting that systemic digital capabilities drive operational efficiency.

Interviews and survey responses provided a micro-level validation of these structural patterns. While respondents confirmed that ICT infrastructure and smart city tools facilitate digital adoption, they also identified operational barriers, such as EV costs, fragmented IT systems, and skill shortages. This combination of macro- and micro-level insights demonstrates that Kazakhstan’s courier logistics transformation depends not only on policy frameworks but also on organizational capabilities, internal investments, and interoperability solutions.

DISCUSSION

The results confirm international evidence that digitalization of last-mile logistics improves both efficiency and sustainability. Studies in Europe and Asia have shown that combining AI-assisted routing with EVs and parcel lockers reduces emissions and delivery costs (Ferreira & Esperança, 2025; Gnoni et al., 2025). Similarly, in Kazakhstan, correlation analysis demonstrated a strong relationship between courier services and GDP per capita ($r = 0.946$), validating Kredina et al. (2022), who argued that courier services act as economic drivers.

However, our interview data highlighted context-specific barriers: high CAPEX for EV fleets, insufficient public charging, and fragmented IT systems. These challenges echo the OECD (2023) findings on Kazakhstan’s uneven digital readiness for SMEs and weak ICT adoption. Simultaneously, smart city initiatives in Almaty and Astana (UNECE, 2023) offer unique opportunities for da-

ta-driven courier integration, aligning with Pan et al. (2021), who emphasized the importance of integrating freight into smart city frameworks.

Kazakhstan stands at a crossroads: without the rapid scaling of smart courier solutions, urban congestion, emissions, and delivery failures may intensify. However, with coordinated action, courier logistics can act as a catalyst for sustainable urban development.

The integrated findings of the study point to a set of strategic implications for policymakers, logistics firms, and urban authorities, highlighting the need for coordinated institutional, technological, and regulatory action to accelerate the development of smart courier logistics in Kazakhstan. At the policy level, international evidence emphasizes that the successful diffusion of last-mile innovations requires clear national standards for parcel locker deployment, curbside allocation rules, and interoperable open-data protocols, alongside targeted financial incentives that reduce the cost burden associated with the transition to electric delivery fleets. For private sector actors, global best practices demonstrate that investment in AI-based routing solutions, cloud-enabled TMS and WMS, and out-of-home delivery channels – such as parcel lockers and pick-up/drop-off (PUDO) points – significantly enhances operational efficiency and service reliability, particularly when firms collaborate with municipalities to pilot microhubs and shared urban consolidation spaces. From the perspective of city governments, integrating courier operations into existing smart-city platforms, expanding ITS, and enabling kerbside management through standardized APIs represents an essential step toward aligning private innovation with public digital infrastructure, a challenge frequently reported in assessments of Kazakhstan's digital-readiness and SME capability gaps (OECD, 2023; UNECE, 2023). These multidimensional implications are synthesized in Table 5, which outlines the Smart Courier Transformation Matrix – a structured mapping of strategic priorities across three governance layers (state, business, and urban authorities). The table highlights how regulatory standardization, digital investment, and cross-sector integration jointly form the foundation for a coherent national strategy capable of supporting scalable, technology-enabled, and sustainable last-mile logistics solutions.

Table 5. Strategic action plan for smart courier logistics in Kazakhstan for 2025-2030

Action	Stakeholder	Expected impact
1. National standards for parcel lockers	Gov't, SMEs	Reduce failed deliveries, improve accessibility
2. Microhub corridors in Almaty & Astana	Cities, couriers	Optimize curbspace, cut congestion
3. EV transition compacts	Gov't, banks, SMEs	Accelerate decarbonization
4. Charging infrastructure expansion	Utilities, cities	Enable electrification at scale
5. Open kerbside APIs	Cities, IT firms	Reduce dwell time, improve turnover
6. Interoperable tracking standards	Marketplaces, SMEs	Improve LPI "tracking" scores
7. Locker federation across operators	Couriers, marketplaces	Enhance convenience, efficiency
8. Green procurement mandates	Gov't, State-owned enterprises (SOEs)	Lead by example for EV adoption
9. Digital Maturity Vouchers for SMEs	Gov't, donors	Build IT/AI capacity
10. Regulatory sandboxes	Gov't, startups	Pilot AI/blockchain in delivery
11. Shared KPI dashboard	Cities, couriers	Transparency & benchmarking
12. University-led living labs	Academia, SMEs	Experimentation, training, innovation

Note: compiled by authors

The proposed roadmap to 2030 synthesizes empirical evidence, stakeholder needs, and global best practices into a phased strategy to advance smart courier logistics in Kazakhstan. As shown in Figure 3, the roadmap begins with a foundational stage (2025-2026) in which the emphasis is placed on piloting parcel locker networks and urban microhubs in Almaty and Astana – an approach widely recognized for reducing congestion and failed deliveries in large metropolitan areas. During this initial phase, support mechanisms such as digital maturity vouchers for SMEs and preferential EV leasing

programs through green financial institutions can help overcome the cost-related barriers that have been extensively documented in emerging markets. The roadmap then transitions into a scaling phase (2027-2028), characterized by the consolidation of parcel locker ecosystems into a federated model enabling cross-operator interoperability, the expansion of open kerbside management APIs across major cities, and the introduction of a public KPI dashboard tracking logistics sustainability metrics – an approach consistent with OECD recommendations for improving transparency and digital governance in logistics systems (OECD, 2023). The final integration phase (2029-2030) envisions nationwide convergence of interoperability standards for parcel lockers, tracking systems, and data-sharing protocols, combined with the electrification of 30-40% of the courier fleet and the full incorporation of last-mile logistics into national decarbonization and smart mobility strategies.

CONCLUSIONS

This study provides the first integrated assessment of drivers and barriers to smart courier logistics in Kazakhstan, combining literature, document analysis, expert interviews, and correlation-factor methods. The study also has several limitations that should be acknowledged. First, the limited number of expert interviews (n = 5) constrains statistical generalization; however, the use of methodological triangulation through surveys and secondary data sources enhances the overall reliability of the findings. Second, the analysis is affected by data gaps, as disaggregated microdata from individual courier operators were unavailable, necessitating reliance on national statistics and international indices. Third, the results remain time-sensitive, as ongoing policy reforms and regulatory changes may alter digitalization priorities, underscoring the need for continuous monitoring and future updates.

The overall findings of this study demonstrate that Kazakhstan's courier logistics sector is shaped by a dynamic interplay of technological, institutional, and economic factors that collectively determine the pace of transition toward a smart and sustainable last-mile ecosystem. The analysis confirms that the most significant enabling forces include the rapid growth of e-commerce, the expansion of government-supported digital programs such as Digital Kazakhstan, and the steady development of smart-city infrastructure – particularly data lakes and ITS in Almaty and Astana – which together create a favorable technological environment for the adoption of advanced logistics solutions (OECD, 2023; UNECE, 2023). At the same time, structural barriers persist, including low performance in logistics competence and tracking indicators reported in the World Bank LPI (2023), substantial digital-readiness gaps among SMEs, high capital expenditures associated with fleet electrification and parcel locker deployment, and the absence of standardized protocols for curbside management and data-sharing across operators. The exploratory correlation analysis conducted using data from Kredina et al. (2022), the Bureau of National Statistics (2024), and the World Bank (2023) further reinforces these findings by demonstrating strong linkages between courier activity, GDP per capita, and foreign trade turnover. These empirical relationships underscore the strategic importance of courier services for Kazakhstan's broader economic modernization and highlight the interdependence between logistics digitalization, macroeconomic performance, and trade intensity.

Based on these insights, the study proposes a coherent 12-point action plan and a structured 2030 roadmap designed to align policy instruments, infrastructure investment, and business-level digital adoption. By integrating sustainability and digitalization perspectives – two dimensions that have traditionally been examined separately in the Kazakhstani logistics literature – this research contributes a novel analytical framework in the form of the Smart Courier Transformation Matrix, which can serve as a methodological foundation for policymakers and practitioners seeking to design coordinated interventions across regulatory, technological, and institutional domains. Nevertheless, several important areas remain underexplored and require further research. First, large-scale, empirical case studies of Kazakhstani courier firms, including national operators such as Kazpost as well as private platforms such as Glovo Kazakhstan and regional SMEs, are necessary to capture how AI-based routing, IoT telemetry, EV fleets, and parcel locker systems are adopted and adapted in real organizational settings. Such micro-level investigations would complement the predominantly macroeconomic and policy-focused evidence presented in this study. Second, further research should employ cost-benefit mod-

eling, system dynamics simulations, and life cycle assessment tools to examine the economic and environmental trade-offs associated with smart courier technologies in Kazakhstan's urban context. Third, comparative analyses across key logistics hubs – Almaty, Astana, Shymkent, and Aktobe – would provide deeper insights into how differences in density, infrastructure, and governance influence the scalability of smart logistics solutions. Fourth, future studies must address critical issues related to data governance, privacy, interoperability, and digital sovereignty, particularly as cities and logistics firms move toward integrated open-data ecosystems and API-based kerbside management. Finally, the application of advanced statistical techniques, such as structural equation modeling (SEM), causal inference methods, and machine learning-based prediction models, could significantly strengthen causal understanding and provide robust forecasting tools for evaluating courier performance across various digital transformation scenarios.

From a theoretical standpoint, the study advances the integration of smart-city theory, last-mile delivery research, and digital transformation literature in the context of an emerging economy. By conceptualizing the relationships among policy frameworks, digital infrastructure, technological capabilities, and workforce skills, the Smart Courier Transformation Matrix provides a platform for developing future analytical models that more systematically connect these domains. The policy implications point to the importance of developing national standards for parcel locker networks, curbside allocation, and data-sharing protocols; expanding financial incentives – including subsidies, tax relief, and EVs leasing programs – to reduce adoption barriers for SMEs; and embedding courier logistics explicitly into sustainable urban mobility and national decarbonization strategies in line with international environmental commitments (OECD, 2023). For business leaders and courier companies, the results emphasize the immediate performance gains achievable through investment in cloud-based TMS/WMS platforms, AI-enabled routing tools, and digitally enabled out-of-home delivery channels. Strengthening collaboration with municipal authorities on microhub and locker pilots can reduce congestion and delivery failures. At the same time, workforce development, particularly digital skills training for drivers, dispatchers, and IT staff, remains essential for ensuring that technological upgrades translate into operational improvements.

In conclusion, Kazakhstan is well-positioned to accelerate the evolution of its courier logistics sector by strategically combining digital innovation with sustainability-oriented planning. Achieving this transformation will require the coordinated implementation of the 12-point action plan developed in this study, alongside targeted research efforts that empirically test the feasibility and impacts of smart solutions. If these measures are implemented cohesively by policymakers, businesses, and city authorities, Kazakhstan's courier sector can emerge as a regional benchmark for sustainable, data-driven, and technologically advanced urban logistics by 2030.

AUTHOR CONTRIBUTIONS

Conceptualization and theory: AS and MB; research design: AS and MB; data collection: AS and MB; analysis and interpretation: AS and MB; writing draft preparation: AS and MB; supervision: AS and MB; correction of article: AS and MB; proofread and final approval of article: AS and MB. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Bosona, T. (2020). Urban freight last mile logistics – Challenges and opportunities to improve sustainability: A literature review. *Sustainability, 12*(21), 8769. https://doi.org/10.3390/su12218769

Bureau of National Statistics. (2024). *E-commerce in the Republic of Kazakhstan.* Retrieved August 20, 2025, from https://stat.gov.kz/en

Chen, Y.-T., Sun, E. W., Chang, M.-F., & Lin, Y.-B. (2021). Pragmatic real-time logistics management with traffic IoT infrastructure: Big data predictive analytics of freight travel time for Logistics 4.0. *International Journal of Production Economics, 238*, 108157. https://doi.org/10.1016/j.ijpe.2021.108157

Dinu, O., Rosca, E., Burciu, S., Oprea, C., Ilie, A., Stere, A. S., & Rusca, F. (2024). Integrative Framework for Platform-Based Business Models to Drive Climate Neutrality in Logistics. *Sustainability, 16*(4), 1418. https://doi.org/10.3390/su16041418

Ferreira, J. C., & Esperança, M. (2025). Enhancing sustainable last-mile delivery: The impact of electric vehicles and AI optimization on urban logistics. *World Electric Vehicle Journal, 16*(5), 242. https://doi.org/10.3390/wevj16050242

Giuffrida, N., Fajardo-Calderín, J., Masegosa, A. D.,

Werner, F., Steudter, M., & Pilla, F. (2022). Optimization and machine learning applied to last-mile logistics: A review. *Sustainability, 14*(9), 5329. https://doi.org/10.3390/su14095329

Gnoni, M. G., Rubrichi, L., & Tornese, F. (2025). Assessing sustainability of smart last mile delivery: A simulation-based decision support tool. *Sustainable Futures*, 100713. https://doi.org/10.1016/j.sftr.2025.100713

Government of Kazakhstan. (2024). *Ministry of Artificial Intelligence and Digital Development of the Republic of Kazakhstan.* Retrieved August 20, 2025, from https://www.gov.kz/memleket/entities/maidd?lang=en

Idrissi, Z. K., Lachgar, M., & Hrimech, H. (2024). Blockchain, IoT and AI in logistics and transportation: A systematic review. *Transport Economics and Management,2,* 275-285. https://doi.org/10.1016/j.team.2024.09.002

Kredina, A., Akhtanova, M., Bekturganova, M., Tsoy, A., & Spankulova, L. (2022). The relationship between logistics and information and communication technologies and their impact on the economy of Kazakhstan. *Problems and Perspectives in Management, 20*(4), 344-355. https://doi.org/10.21511/ppm.20(4).2022.26

Llorca, C., & Moeckel, R. (2021). Assessment of the potential of cargo bikes and electrification for last-mile parcel delivery by means of simulation of urban freight flows. *European Transport Research Review, 13,* 33. https://doi.org/10.1186/s12544-021-00491-5

Mamrayeva, D., Babkin, A., Tashenova, L., & Kulzhambekova, B. (2022). Key aspects of digital transformation of logistics companies in Kazakhstan. *Buketov Business Review*, *107*(3), 95–102. https://doi.org/10.31489/2022ec3/95-102

OECD. (2023). *Improving framework conditions for the digital transformation of businesses in Kazakhstan*. OECD Publishing. Retrieved August 20, 2025, from https://www.oecd.org/en/publications/improving-framework-conditions-for-the-digital-transformation-of-businesses-in-kazakhstan_368d4d01-en.html

OECD. (2024). *OECD Digital Economy Outlook 2024 (Vol.1): Embracing the technology frontier*. OECD Publishing. https://doi.org/10.1787/a1689dc5-en

Pan, S., Zhou, W., Piramuthu, S., Giannikas, V., & Chen, C. (2021). Smart city for sustainable urban freight logistics. *International Journal of Production Research, 59*(7), 2079-2089. https://doi.org/10.1080/00207543.2021.1893970

Saktaganova, G., Karipova, A., Mukhiyayeva, D., Zhanseitova, G., & Saktaganova, I. (2025). Digital transformation in the transport and logistics sector of Kazakhstan: Challenges and opportunities for global integration. *Scientific Bulletin of Mukachevo State University. Series Economics*, *12*(2), 163–176. https://doi.org/10.52566/msu-econ2.2025.163

Syzdykbayeva, B., Raimbekov, Z., Baiburiev, R., & Dulatbekova, Z. (2025). Improving the transport and logistic infrastructure of a city using the graph theory method: The case of Astana, Kazakhstan. *Sustainability, 17*(6), 2486. https://doi.org/10.3390/su17062486

UNECE. (2023). *Smart Sustainable Cities Profile: Almaty*. United Nations Economic Commission for Europe. Retrieved August 20, 2025, from https://unece.org/sites/default/files/2023-09/Inf%20doc%202%20SSCP%20Almaty%20v270923.pdf

World Bank. (2023). *Connecting to Compete 2023: Logistics Performance Index*. Retrieved August 20, 2025, from https://lpi.worldbank.org/

Zhang, Q., & Demir, E. (2025). Parcel locker solutions for last mile delivery: A systematic literature review and future research directions. *Future Transportation, 6.* https://doi.org/10.3389/ffutr.2025.1654621

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