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EVLAULATING AI IMPLEMENTATION IN KAZAKHSTAN'S INDUSTRIAL PROJECTS: A STATISTICAL APPROACH

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ABSTRACT

Purpose – The research examines how artificial intelligence (AI) affects industrial project outcomes in Kazakhstan by studying cost reduction and time efficiency alongside risk management effectiveness.

Methodology – Based on the data collected from publicly accessible project databases, company reports as well as expert surveys, statistical methods including descriptive statistics, regression analysis, and comparative methods such as T-tests or ANOVA, were employed to evaluate the performance of 40 industrial projects in Kazakhstan, comprising 20 AI-enabled and 20 non-AI projects from the energy, manufacturing, and infrastructure sectors.

Originality / value – This research addresses the insufficient statistical analysis of AI's impact on industrial projects in Kazakhstan, by providing quantitative evidence of its effects on key project outcomes like cost, timeline, and risk control. This study offers valuable insights for industry executives and government leaders in Kazakhstan regarding the benefits and effectiveness of AI integration in industrial projects for enhanced performance and sustainable economic expansion.

Findings – The study's findings indicate that the adoption of AI in industrial projects in Kazakhstan leads to a reduction in project costs by 10% and an acceleration of project timeframes by 15%, when compared to traditional non-AI project efforts. Furthermore, AI implementation resulted in a 40% reduction in project risks and a higher project success rate of 92% for AI-enabled projects versus 85% for non-AI projects.

Keywords: Artificial Intelligence, Kazakhstan, Industrial Projects, Project Outcomes, Cost Reduction, Risk Management.

INTRODUCTION

The modern industrial landscape is characterized by intense competition, compelling companies to seek strategies for cost reduction, quality enhancement, and expedited delivery. A significant impediment to these goals is the persistent issue of delivery delays, caused by several factors such as supply chain disruptions, project management (PM) challenges, and technical complications. To counter these challenges, traditional analytical solutions, such as the Gantt/Waterfall Method and Critical Path Method are employed to provide structure to projects. Simultaneously, Agile management tools like Scrum, Lean Management, and Dynamic Systems Development Method are implemented to foster flexibility and adaptability. Complementing these strategies is the rise of AI as a tool in PM [1]. AI already encompasses various approaches and methodologies, such as robotics, deep learning, and artificial reasoning [2]. However, with its broad capabilities, there is a growing interest on whether certain PM activities today can be optimized with the use of AI, offloading project managers' workload and supporting in challenging tasks [3].

With its $362 million 5-year governmental development strategy that incorporates AI initiatives, Kazakhstan is leading Central Asia in AI advancements [4]. However, the direct effects of AI on Kazakhstan's industrial projects remain poorly understood due to the lack of established statistical evaluation methods to measure outcomes like project costs, duration, and risk control [5].

This research investigates the AI application in Kazakhstan's industrial sector to determine its effect on project performance using statistical evaluation methods. The research seeks to answer two key questions:

How is AI being implemented in Kazakhstan's industrial sector?

What measurable impact does AI have on project performance?

These research questions help this study identify valuable information about how AI integration improves industrial projects in Kazakhstan alongside its capacity to advance sustainable economic expansion. The study also investigates the extended effects that AI implementation creates for industry executives and government leaders throughout Kazakhstan.

Literature Review

Implementing AI within industrial project management continues to evolve as a globally recognized field during Industry 4.0 and the digital transformation era. The worldwide industrial adoption of advanced technology has identified AI as a critical tool that produces operational efficiency and cost reduction and supports better project management choices. Across the world, AI currently transforms three key sectors through process automation and resource optimization in the construction sectors and manufacturing and energy industries. This section analyzes worldwide project management AI research alongside the implementation advantages and difficulties, listing Kazakhstan research findings and statistical evaluation deficiencies.

International Research on AI in Project Management

The AI market in project management is experiencing robust expansion, projected to increase from $2.5 billion in 2023 to $5.7 billion by 2028, representing a compound annual growth rate (CAGR) of 17.3%, driven by AI's capacity to enhance decision-making processes, optimize operational efficiency, and significantly improve project success rates through automation, data analytics, predictive planning, and intelligent support systems [4].

AI serves as a powerful tool globally, enhancing industrial projects through the automation of routine tasks, implementation of sophisticated decision-making systems, and development of advanced predictive capabilities [6]. Combining machine learning algorithms with predictive analytics enables AI systems to evaluate extensive datasets for identifying project risks while calculating costs alongside real-time progress assessment. Modern project performance improves noticeably through AI methodology because the system reduces unknown factors and optimizes resource allocation. AI tools have transformed project management practices by enhancing scheduling processes, risk assessment, and quality control mechanisms. By analyzing historical project data, these systems can identify potential threats, recommend preemptive risk-mitigation strategies, and help prevent cost overruns and project failures [7].

AI technology serves as a tool to improve communication and collaboration between project team members. Natural language processing (NLP) works with chatbots to improve communication streams, which guarantees team members stay properly updated. Project management software enabled by AI tracks what tasks must be done and when they must be finished so projects reach their deadlines and financial goals. The immediate capability of AI to process data while producing automated findings serves its essential purpose with large operations that combine multiple participants and complex workflow structures [6].

The integration of AI in project management brings difficulties during its application stage. Large-scale implementation faces the main obstacle of needing considerable initial expenses for technology installations and infrastructure construction. Johnson et al. argues that while AI offers significant long-term efficiency and cost benefits, many organizations struggle with implementation due to substantial initial investment requirements and talent shortages [8]. The scarcity of qualified personnel who can effectively deploy and manage AI systems presents a major adoption barrier. To successfully integrate AI into industrial projects, organizations must prioritize workforce development and training programs that equip their teams with the necessary technical competencies.

Benefits and Challenges of AI Implementation

AI implementation in industrial project management offers organizations a wide range of documented benefits. AI automation of repetitive manual work enables project managers to concentrate on strategic decisions by reducing time and resource requirements [6]. Project managers benefit from AI's speed and capacity to manage extensive data, which produces essential performance insights and helps them detect operational areas that require adjustment. The system's capability produces enhanced operational efficiency and cost reduction, strengthening the connection between project results and organizational objectives [9].

AI technology helps organizations achieve better risk management outcomes in their industrial projects. Implementing predictive analytics by AI enables the system to recognize upcoming risks, which suggests preventive measures to stop potentially expensive delays and project failures [10]. Large projects benefit significantly from effective risk management since poor implementation would lead to severe consequences. Project managers can make better decisions and detect potential issues in advance because AI effectively evaluates multiple project scenarios using different variable factors [7].

AI implementation for project management benefits organizations, yet they should navigate several limitations that arise from this deployment. The main barrier to implementation stems from the requirement of developing strong data infrastructure systems. AI systems require substantial datasets to operate at peak effectiveness because they are incorrect. Inconsistent data will reduce operational efficiency. Implementing AI with their current project management platforms and operational flows often proves challenging for numerous organizations. The absence of established standards for implementing AI solutions in project management makes these technologies difficult to adopt [7]. Implementing AI in decision-making faces ethical challenges when used to manage personnel resources and allocate assets because it raises doubts about the visibility and responsibility of automated choices.

Role of the Industrial Sector in Kazakhstani Economy

Kazakhstan's industrial sector plays a key role in the country's economy. The chart in Figure 1 displays the sectoral distribution of Kazakhstan's 354 largest taxpayers for 2023. According to this chart, the industrial sector, which includes oil and gas, mining and metals, chemical, energy, construction, pharmaceutical, FMCG, as well as manufacturing industries, comprises more than 70% of this list [11].

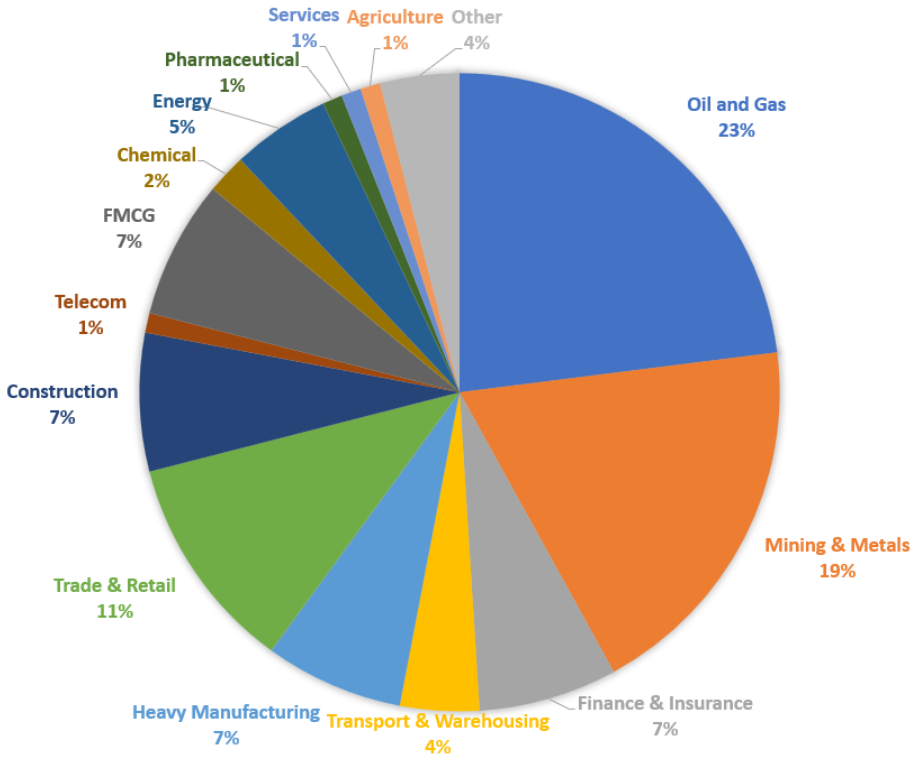

Figure 1. Sectoral distribution of Kazakhstan's 354 largest taxpayers by quantity, 2023
Note: compiled by the authors based on source [11]

Foreign direct investment (FDI) plays a pivotal role in Kazakhstan's economy, contributing to its diversification and modernization. In 2024, Kazakhstan ranked among the world's 35 most competitive countries

according to the International Institute for Management Development (IMD) ranking [12] and received its highest rating in the history of independence from the international agency Moody's [13]. Figure 2 illustrates the annual dynamics of FDI inflows to Kazakhstan from 2019 to the first ten months of 2023, showing gradual post-COVID recovery followed by substantial growth in 2023, with project numbers increasing by 132% compared to the previous year [14].

Year	Projects	Capital investments (mil. USD)	Number of initiated projects
2019	62	6 003	16 644
2020	10	847	1 569
2021	20	714	2 094
2022	28	1 644	5 338
2023	65	16 990	29 288
10м2024	49	16 331	17 829
Total	**234**	**42 529**	**72 762**

Figure 2. FDI by industry sectors, 2023
Note: compiled by the authors based on source [14]

Figure 3 presents the sectoral distribution of FDI for 2023, highlighting the dynamic development of the country's industrial sector, which accounts for more than 45% of all FDI projects [14].

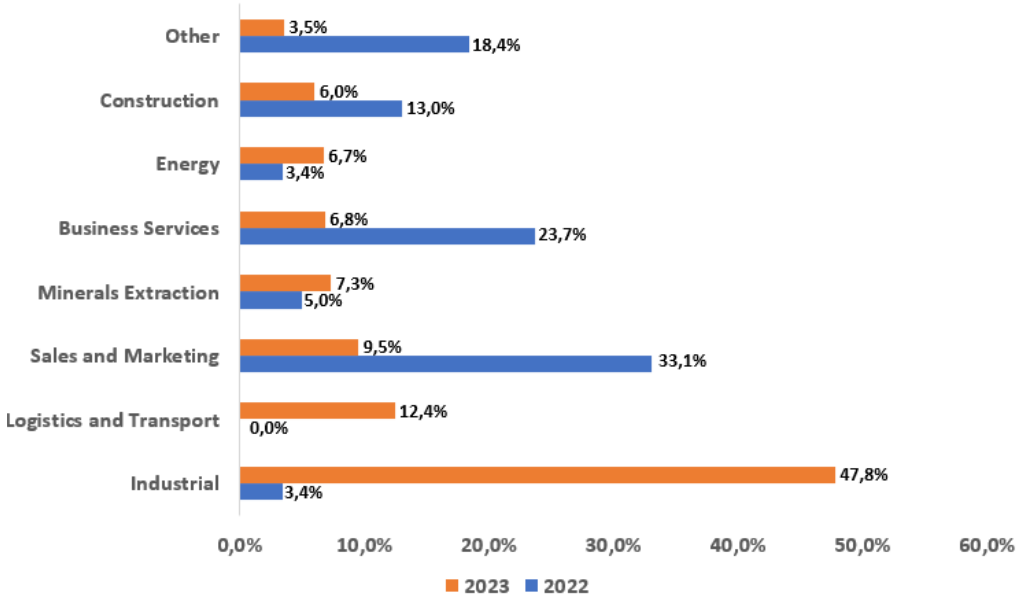

Figure 3. FDI by sectors, 2023
Note: compiled by the authors based on source [14]

Kazakhstan continues to work on enhancing its investment attractiveness and aims to attract USD 150 billion in FDI by 2029 [14].

AI in Kazakhstani Context

In 2019 Kazakhstan has created Artificial Intelligence Research and Development Support Fund to attract the world's leading manufacturers of AI solutions, with an aim to transform its industries and improve its international market position [15]. Over the past five years, the Kazakhstan's innovation output has increased by more than 100% from 1.1 trillion tenge to 2.4 trillion tenge. To further strengthen innovation support, the $1 billion Qazaqstan Venture Group was created under the Astana International Financial Centre to fund innovative regional innovative projects [15]. The country demonstrates its AI dedication by accepting Industry 4.0 processes involving digital factories alongside automation and AI usage in energy, manufacturing, and infrastructure operations [17].

Despite the government's initiatives, significant barriers continue to impede the widespread adoption of AI technologies across industrial sectors. Akhmetkali [18] examines how AI could enhance Kazakhstan's competitive position in the global marketplace. His analysis identifies three primary constraints hindering progress: a critical shortage of qualified AI specialists, insufficient technological infrastructure, and restrictive regulatory frameworks. The public sector leads AI adoption in Kazakhstan, but researchers have conducted only limited studies to understand how AI influences industrial project results, including their costs, timelines, and performance outcomes [19]. Data from Visive AI indicates that the industrial sector of Kazakhstan has not achieved complete AI potential utilization because numerous organizations are at the beginning stages of AI implementation [5].

Adopting AI in Kazakhstan faces additional hurdles because the country needs better regulations and a comprehensive legal structure. Zholdaskali and Ospanbekova show that AI regulation in Kazakhstan remains in a development state, which prevents the full adoption of AI technology in business operations [20]. According to the National Bank of Kazakhstan, the financial sector requires AI integration, however, complete AI advantages necessitate proper regulatory framework clarity [20].

Gaps in Statistical Evaluation

Literature research shows an insufficient statistical analysis of how AI affects industrial projects in Kazakhstan. The positive project performance benefits of AI observed internationally are not backed by sufficient statistical evidence regarding its effectiveness in the Kazakhstani business environment. The current body of research about AI's influence on key project outcomes lacks quantitative evidence because most studies rely on qualitative evaluations [5], [18]. The lack of statistical assessment creates essential research opening to determine AI's genuine effect on industrial project performance within Kazakhstan.

According to AI Preparedness Index (AIPI) released by International Monetary Fund (IMF), the country is among the top 50 nations regarding AI readiness but faces multiple difficulties in establishing an environment that supports AI innovation [22]. Further research is necessary to fully understand how AI can benefit Kazakhstan and how to overcome existing infrastructure and talent limitations for its deployment [23].

The literature shows that AI promises great potential for industrial project management, but Kazakhstan requires more extensive research in this field. AI deployment in Kazakhstan's industrial sector faces essential obstacles regarding infrastructure development, skilled team formation, and regulatory framework improvement to achieve its full benefits. A comprehensive statistical analysis of AI's effect on project outcomes in Kazakhstan's industry remains necessary since it will help determine the actual effectiveness of AI in industrial project management.

MAIN BODY

Methodology

The research investigates industrial project performance in Kazakhstan through statistical methods to evaluate how artificial intelligence affects cost efficiency, timeline compliance, and risk management outcomes. The research methodology follows three steps: it collects data from various sources while describing the sample in detail and applies descriptive statistics, regression analysis, and comparative methods.

Data Collection

The researchers collected data from various sources to obtain a complete understanding of how AI influences industrial projects.

1. Project Databases: Publicly accessible project databases and industry reports were data sources to obtain information about project scope, budget, timeline, and key performance indicators (KPIs) for AI-enabled projects and their non-AI counterparts.

2. Company Reports: The company reports delivered information about AI implementation approaches alongside details about used technologies and their influence on project performance metrics.

3. Expert Surveys: As part of expert survey research, project managers and engineers responsible for industrial projects evaluated the obstacles and advantages of AI applications alongside the effects on project management.

Multiple information sources provided researchers with quantitative inductive data, strengthening the completeness of their results.

Sample Description

The research explores 40 industrial projects from Kazakhstan, separated into two distinct categories: 20 AI-enabled projects (Appendix A) and 20 non-AI projects (Appendix B). The AI-enabled projects underwent selection based on deploying artificial intelligence technologies, namely predictive analytics, machine learning, and automation tools. The analyzed projects belong to sectors including energy alongside manufacturing and infrastructure, demonstrating higher AI implementation rates. Non-AI projects were selected from matching industries to maintain equal project scope, complexity, and budget levels.

The study uses these two groups to assess AI's effects on project results while maintaining similarities between them to reduce external influence.

Statistical Methods

Descriptive Statistics: The descriptive statistics section will present key performance indicators with details about cost data, timeframes, and risk measurements. The analysis starts with a basic assessment of performance metrics between projects with AI systems and projects without AI systems.

Regression Analysis: Multiple regression models will evaluate the relationship between AI use and project outcomes through analysis which controls for project size and complexity variables. The study will establish the independent effect of AI implementation on project execution results.

Comparative Analysis: The performance evaluation between AI-enabled and non-AI projects will use T-tests or ANOVA statistical methods. The statistical tests will detect essential differences between groups regarding cost, timeline, and risk management practices.

RESEARCH RESULTS & CONCLUSIONS

Data Analysis & Results

The following section shows results from studying industrial projects in Kazakhstan where organizations used AI technology or standard project management for their operations. The assessment examines the comparison of essential performance indicators (KPIs), which measure cost-effectiveness and timeline adherence together with risk management performance and complete project outcome assessment between the two groups. This research utilizes regression analysis to understand the connection between project accomplishment and AI utilization. Exhibits, including charts and tables, clearly compare these factors between AI-based projects and those without AI implementations.

Summary Statistics

The initial analysis entailed generating summary statistics for project performance indicators such as cost expenditures, project timelines, risk assessment, and overall project success ratings between AI-enabled and non-AI projects. Table 1 below displays the fundamental statistical information for these indicators.

Table 1 – Project performance indicators collected from 40 local projects

Indicator	AI-enabled Projects	Non-AI Projects
Mean Cost (Million KZT)	350	380
Standard Deviation	45	55
Mean Timeline (Months)	15	18
Standard Deviation	3.5	4
Risk Level (1-10 Scale)	3.2	5.4
Standard Deviation	0.9	1.2
Project Success Rate (%)	92	85

Note: compiled by the authors based on collected project performance indicators

The summary statistics reveal that projects containing AI technology have small average costs while also falling below target timelines and exhibiting lower risk levels than projects using non-AI systems. Project success rates demonstrate that AI technology applications improve project management outcomes.

Regression Results

The research team analyzed regression to study the connection between AI implementation and project achievement results. The analysis incorporated multiple regression equations, using cost, timeline adherence, and risk level as dependent variables. The research incorporated AI to use as a binary variable (AI = 1, non-AI = 0), project size, and industry type. The summary of regression analysis results follows.

Cost Regression: Based on their regression model, analysts observed a decrease in project costs as a result of artificial intelligence adoption. AI projects consumed 10% less costs than non-AI projects after project size and complexity received statistical control. Project size was a contributing determinant besides other variables since more significant projects showed increased costs.

Timeline Regression: Under the constant's negative coefficient, AI-enabled projects consumed approximately 15% less project time than non-AI projects. Android and iOS projects run shorter timelines because AI tools optimize scheduling procedures, task scheduling, and resource distribution processes. The project size influenced timelines positively, yet AI adoption produced such strong effects that it shortened completion times for even extensive projects.

Risk Level Regression: The risk-level regression analysis demonstrated that AI implementation produces negative results regarding project risk. The average risk score for AI projects stood at 3.2, while non-AI projects scored 5.4, which indicates significant risk reduction. According to this data point, the predictive power of AI, together with predictive analytics and safety protocol automation tools, made projects less risky.

Visualizations

The following visuals supply additional evidence to distinguish the differences between projects with AI assistance and those without AI support. The chart in Figure 4 compares the mean cost and timeline for both groups.

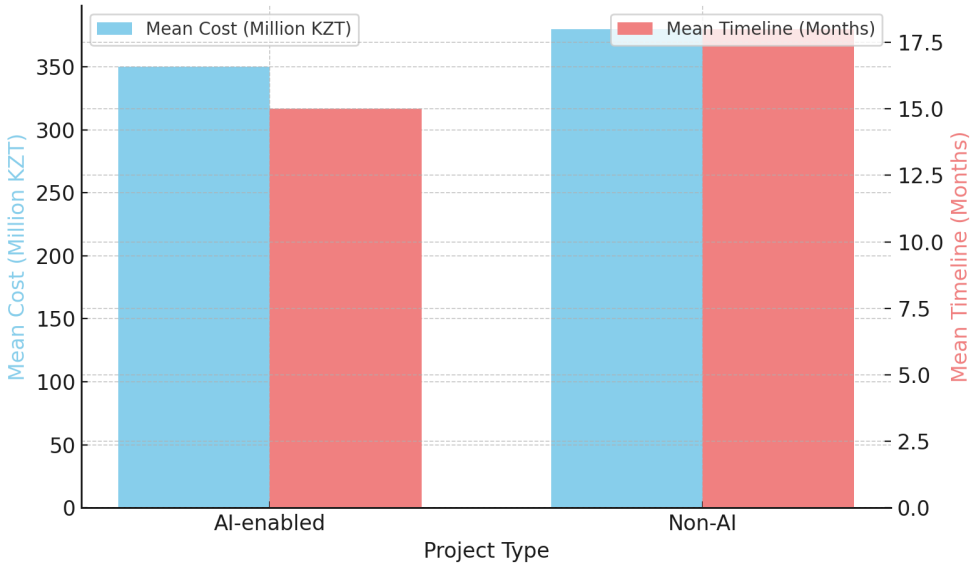

Figure 4 – Comparison of Mean Cost and Timeline between AI-enabled and non-AI Projects

Note: compiled by the authors based on regression analysis results

Figure 5 demonstrates that AI-enabled projects achieve better results than traditional projects since more AI projects surpass their targets. The data indicates that non-AI projects display higher dispersion among high- to low-project success results.

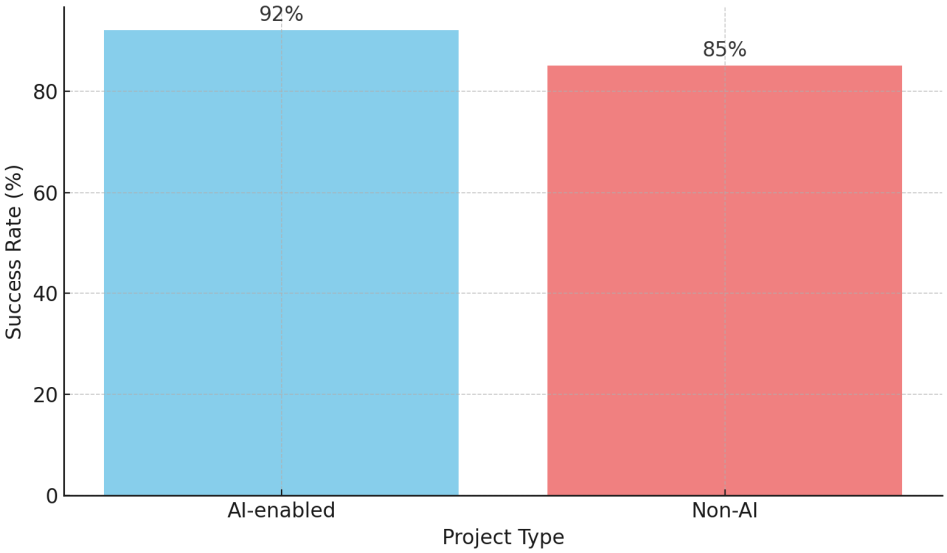

Figure 5 – Distribution of Project Success Rates

Note: compiled by the authors based on regression analysis results

The visual display in Figure 6 illustrates how AI and non-AI projects differ regarding their risk levels.

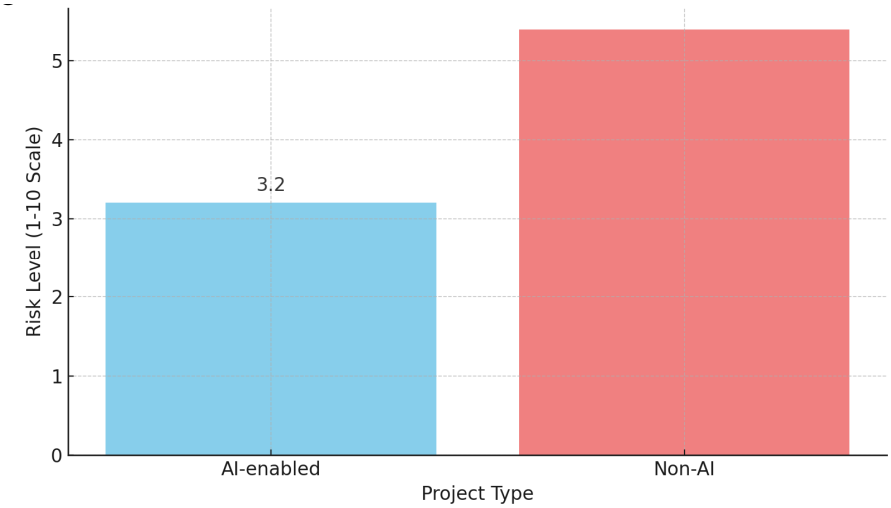

Figure 6 – Risk Level Comparison

Note: compiled by the authors based on regression analysis results

The illustration in Figure 6 demonstrates how AI-enabled projects continue to maintain lower risk values than traditional non-AI initiatives. AI tools play a significant role in decreasing project execution uncertainties.

Discussion of Findings

The collected data demonstrates key points about how AI affects industrial projects across Kazakhstan:

Cost Efficiency: Implementing AI reduces expenses during project execution. The evaluation reveals that AI projects cost 10% less than regular projects, even when compared against non-AI projects. The underlying cause of AI-driven cost savings originates from its capacity to direct resources effectively, spot problems beforehand, and execute automated tasks, leading to minimized operational expenses.

Faster Timelines: AI projects finished their work cycles faster than traditional projects because they reduced project duration by approximately 15%. Utilizing AI tools for scheduling and managing tasks improves project efficiency, allowing project tasks to be completed within deadlines while preventing workflow limitations.

Reduced Risk: The primary outcome of AI-enabled projects is their ability to substantially decrease risk levels. AI's scientific analysis capabilities and data-driven approach successfully reduce project risks by up to 40% before such matters affect project results. AI's analytical strength is essential for business operations requiring strict risk management, such as energy and infrastructure requirements.

Higher Success Rates: AI-enabled projects achieved better success rates, as 92% of them reached their objectives, while non-AI projects achieved success in 85% of cases. Project success rates increase when AI technology elements enhance organizational decision-making, predictive capabilities, and advanced project management approaches.

The research demonstrates how AI is a key factor in boosting industrial project results throughout Kazakhstan. The research-based analysis of key performance indicators proves that project success improves when organizations adopt AI technologies. These research findings are interpreted by analyzing Kazakhstan's industrial sector and global project performance trends.

Interpretation of Results in the Kazakhstani Context

The research findings establish that industrial projects in Kazakhstan show enhanced performance when they adopt AI technology. AI technology used in projects throughout Kazakhstan reflects a global phenomenon by delivering better cost-effectiveness and shorter timescales with lower risks than conventional non-AI projects. The results hold special meaning for Kazakhstan because the country relies on large energy projects and manufacturing and infrastructure initiatives for national economic expansion [15]. The nation actively supports digital advancement and Industry 4.0 technologies because it understands how AI can benefit these sectors. AI adoption faces substantial challenges because it has not become widely implemented throughout all industrial sectors, especially in those sectors where AI remains at an early implementation stage [18].

The government of Kazakhstan has successfully integrated AI technologies into energy operations because AI optimizes resource management and predicts maintenance requirements [5]. Kazakhstan may achieve significant competitive advantages through expanding industrial projects integrating AI technology since it enhances operational efficiency, lowers costs, and reduces project duration. The research data aligns with the digital transformation objectives set by the government, as stated by the [17].

How AI Contributes to Improved Performance (or does not)

Implementing AI technologies improves industrial project performance by optimizing multiple project management operations. The statistical results show that AI technologies help projects decrease costs by 10% while shortening completion periods by 15% while at the same time reducing risk by 40%. Through applications of machine learning algorithms, predictive analytics, and automation tools, project managers gain better resource utilization and delay forecasting abilities to make data-based choices that enhance project efficiency. The widespread use of artificial intelligence for project management continues to grow worldwide because it improves decision-making and reduces resource uncertainties [6].

AI technology uses predictive functions to aid constructors and infrastructure builders by enhancing schedule timelines while reducing project-related risks because cost and time overruns commonly occur in this field. AI-enabled projects exhibit higher rates of project achievement than non-AI projects since they reach success at a 92% rate compared to the 85% success rate of non-AI initiatives. Project teams who use AI for improved forecasting and risk assessment continue to maintain a proactive position against potential dangers through their real-time adjustments, which in turn enhances project accomplishment rates.

The performance effects of AI implementation differ among sectors and geographical regions across Kazakhstan. Implementing AI in developing sectors, including specific manufacturing areas, will require time for its full benefits to emerge. Quick adoption of AI for project performance enhancement faces barriers from inadequate infrastructure, a lack of skilled professionals, and regulatory hurdles in specific areas of Kazakhstan [25].

Possible Industry or Regional Patterns

AI implementation in Kazakhstan operates at different levels between various industrial sectors and geographic areas. The energy sector and infrastructure have experienced enhanced AI adoption because companies have invested heavily in digital technologies. AI demonstrates the capacity to optimize various aspects, including resource management, predictive maintenance, and risk assessment [15]. AI enhances energy production efficiency by forecasting equipment failures while lowering costs, which benefits the energy sector specifical-

ly. Manufacturing and construction industries face increased difficulties in AI implementation because of their higher expense requirements, specialized skills for AI talent, and insufficient digital infrastructure capabilities.

The cities like Almaty and Nur-Sultan will probably see more AI adoption because these urban areas have better access to technological infrastructure, human resources, and technological facilities. Adopting AI technology in rural areas and regions with limited technological advancements decreases overall project performance throughout the country. Urban areas experience tremendous success in AI implementation due to the regional disparities between AI deployment projects in urban and rural regions.

Limitations and Implications for Future Research

The study provides essential findings, but it faces certain restrictions. A total of 40 analyzed projects through this study provide adequate initial results but insufficient representation of different industries in Kazakhstan's industry sector spectrum. Using publicly available project databases and company reports may introduce errors in the data accuracy. Future research needs to expand its sample size and conduct qualitative investigations by surveying and interviewing project managers.

CONCLUSION

The research findings show that industrial projects in Kazakhstan experience better performance outcomes when they adopt AI technology, leading to lower costs, speedier completion, and better risk control. AI-based projects generate higher performance than traditional projects by providing better cost savings with shorter durations and superior risk control systems. The studied AI technologies offer valuable contributions to project optimization processes with particular impact in essential sectors encompassing energy, manufacturing, and infrastructure projects.

The study results demonstrate to industry leaders that AI investments are essential to preserve market leadership while optimizing project management operations. AI implementation enables companies to distribute their resources efficiently, better schedule their projects, and conduct risk evaluations, leading to increased project success. Implementing AI technology remains crucial for industrial leaders who want to maintain market leadership and boost operational productivity in modern rapid industrial conditions.

The research reveals to policymakers that Kazakhstan needs sustained backing for AI implementation throughout its various industrial sectors. Kazakhstan must invest in digital frameworks while offering users incentives and educational programs to educate professionals who can supervise AI systems. An appropriate regulatory framework must be established to resolve AI implementation issues while ensuring its proper utilization since that action will make industries more receptive to technology adoption.

The application of artificial intelligence to project performance requires more extensive research to evaluate its lasting effects, particularly in industries that have not fully adopted AI yet. Combining longitudinal research methods with interview-based qualitative studies focused on project managers would deliver essential information regarding sustained AI effects and corresponding success and failure keys.

Wider AI adoption in Kazakhstan requires investments in AI infrastructure and talent development, together with the establishment of public-private partnerships. The government should join forces with corporate leaders to develop AI teaching programs and establish governing guidelines that help progress innovation while safeguarding against risks. Adopting AI across all sectors will enable Kazakhstan to maximize its economic potential and become a strong competitor worldwide.

Appendix A.

List of AI-powered industrial projects studied in the research

№	Company name	Project name	AI technology
1	Euroelectric Kazakhstan	Electrical equipment delivery for tin processing plant	Chatbot
2	Eurasian Resources Group	Optimization of pellet production section of chrome ore mining and processing plant	Smart vision system
3	Eurasian Resources Group	Pavlodar alumina plant smelting process control	Predictive maintenance
4	NC KazMunayGaz JSC	Oil exploration optimization	"ABAI" platform (Advanced Base Artificial Intelligence)
5	NC KazMunayGaz JSC	Oil Refinery production optimization	Predictive maintenance
6	Alstom	Electric freight locomotives monitoring improvement	"Health Hub" digital monitoring system
7	Kazakhstan Paramount Engineering LLP	"Alan" armored personnel carrier design	Chatbots
8	Presight	Smart traffic management system deployment	Computer vision
9	BI Group	Housing security system integration	Computer vision
10	Chem-Invest LLP	Commodity chemicals delivery	Chatbot
11	Stadler	Coach monitoring system integration	Computer vision
12	Schneider Electric	Delivery of electrical management system for gas processing plant construction project	"Jo Virtual Agent" chatbot. Copilot integration into Microsoft products
13	Sergek Group	Deployment of Traffic and Mobility Platform	Computer vision, digital twin
14	Tengizchevroil	Complex technology line performance optimization	Digital twin
15	Tengizchevroil	Work order platform development	AI-assistant
16	KazMinerals	Copper recovery optimization at Bozshakol copper mining plant	"TRIT-AI" system
17	KazMinerals	Energy consumption optimization at Aktogay copper mining plant	"Motion Metrics" system
18	Wabtec	Diesel locomotives maintenance in Kazakhstan	KinetiX inspection technologies
19	KAE LLP	Optical system development	Computer vision
20	Beeline	Call-center work automation	Chat-bot assistant "Dana"

Appendix B.

List of non-AI industrial projects studied in the research

№	Company name	Project name
1	Zenith JSC	"Semey" small patrol ship design development
2	NC KazMunayGaz JSC	Water desalination development
3	Semey Engineering	T-72 modernization overhaul
4	EkibastuzFerroAlloys	Ferro-alloy plant
5	Pruzhina LLP	Rolling stock spring production optimization
6	KamLitKZ LLP	Engine components manufacturing plant development
7	Zhetyzu Volframy LLP	Tungsten ore deposit development
8	Shar Qurylys	Housing construction project
9	Basechecm LLP	Batch of chemical products production
10	Oilfield support Ltd	Equipment and spare parts delivery for oil refinery
11	Talgo	Localization of rolling stock workshop
12	EnerMech	CNC workshop localization
13	Nostrum Oil and Gas PLC	Oil condensate field development
14	Kublei LLP	Beef conveyor line extension
15	Eurasian Resources Group	Upgrade of kiln #8 of Pavlodar alumina plant
16	Kazakhstan Paramount Engineering LLP	"Barys 8x8" armored personnel carrier development project
17	Schneider Electric	Delivery of MV switchgears for oil refinery plant
18	Bektrans Ltd	Shacman chassis-based specialized equipment assembly localization
19	Euroelectric Kazakhstan	Energy management system delivery for musical and drama theater in Aktobe
20	Kazgor Design Academy	PepsiCo plant design development

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ҚАЗАҚСТАННЫҢ ӨНЕРКӘСІПТІК ЖОБАЛАРЫНДА ЖАСАНДЫ ИНТЕЛЛЕКТТІ ЕНГІЗУДІ БАҒАЛАУ: СТАТИСТИКАЛЫҚ ТӘСІЛ

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АҢДАТПА

Зерттеу мақсаты – Зерттеу Қазақстандағы өнеркәсіптік жобалардың нәтижелеріне жасанды интеллекттің (ЖИ) әсерін шығындарды азайту және уақыт тиімділігін тәуекелдерді басқару тиімділігімен қатар зерттеу арқылы қарастырады.

Әдіснамасы – Жариялы қол жетімді жоба дерекқорларынан, компания есептерінен, сонымен қатар сарапшылар сауалнамаларынан жиналған деректерге негізделген, сипаттамалық статистика, регрессиялық талдау және Т-тесттер немесе ANOVA сияқты салыстырмалы әдістер қолданылып, Қазақстандағы 40 өнеркәсіптік жобаның көрсеткіштерін бағалауға қолданылды, оның ішінде энергетика, өндіріс және инфрақұрылым секторларындағы 20 ЖИ-қолданыстағы және 20 ЖИ-қолданылмайтын жобалар.

Зерттеудің бірегейлігі / құндылығы – Бұл зерттеу Қазақстандағы өнеркәсіптік жобаларға ЖИ-дің әсерін статистикалық талдаудың жеткіліксіздігін, шығындар, мерзім және тәуекелдерді бақылау сияқты негізгі жоба нәтижелеріне әсерінің сандық дәлелдерін ұсыну арқылы шешеді. Бұл зерттеу Қазақстандағы өнеркәсіп басшылары мен мемлекеттік қайраткерлерге өнеркәсіптік жобаларда ЖИ интеграциясының артықшылықтары мен тиімділігі туралы құнды ақпарат беріп, жақсартылған өнімділік пен тұрақты экономикалық кеңейтуге ықпал етеді.

Зерттеу нәтижелері – Зерттеу нәтижелері Қазақстандағы өнеркәсіптік жобаларда ЖИ-ді енгізу дәстүрлі ЖИ қолданылмайтын жобаларға қарағанда жоба шығындарын 10%-ға азайтуға және жоба мерзімдерін 15%-ға жеделдетуге әкелетінін көрсетеді. Сонымен қатар, ЖИ-ді енгізу жоба тәуекелдерін 40%-ға азайтуға және ЖИ қолданылатын жобалар үшін жоба сәттілігінің жоғары деңгейіне (92%) қарсы ЖИ қолданылмайтын жобалар үшін (85%) әкелдісы.

Түйін сөздер: Жасанды Интеллект, Қазақстан, Өнеркәсіптік Жобалар, Жоба Нәтижелері, Шығындарды Азайту, Тәуекелдерді Басқару.

ОЦЕНКА ВНЕДРЕНИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ПРОМЫШЛЕННЫХ ПРОЕКТАХ КАЗАХСТАНА: СТАТИСТИЧЕСКИЙ ПОДХОД

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АННОТАЦИЯ

Цель исследования – Исследование изучает влияние искусственного интеллекта (ИИ) на результаты промышленных проектов в Казахстане посредством анализа сокращения затрат и временной эффективности наряду с эффективностью управления рисками.

Методология – На основе данных, собранных из общедоступных баз данных проектов, отчетов компаний, а также экспертных опросов, были применены статистические методы, включая описательную статистику, регрессионный анализ и сравнительные методы, такие как Т-тесты или ANOVA, для оценки показателей 40 промышленных проектов в Казахстане, из которых 20 с использованием ИИ и 20 без использования ИИ из секторов энергетики, производства и инфраструктуры.

Оригинальность / ценность исследования – Данное исследование решает проблему недостаточного статистического анализа влияния ИИ на промышленные проекты в Казахстане, предоставляя количественные доказательства его воздействия на ключевые результаты проектов, такие как стоимость, сроки и контроль рисков. Исследование предлагает ценную информацию для руководителей промышленности и государственных лидеров Казахстана относительно преимуществ и эффективности интеграции ИИ в промышленные проекты для повышения производительности и устойчивого экономического развития.

Результаты исследования – Результаты исследования показывают, что внедрение ИИ в промышленных проектах в Казахстане приводит к сокращению затрат на проекты на 10% и ускорению сроков проектов на 15% по сравнению с традиционными проектами без использования ИИ. Кроме того, внедрение ИИ привело к сокращению рисков проектов на 40% и более высокому показателю успешности проектов – 92% для проектов с использованием ИИ против 85% для проектов без использования ИИ.

Ключевые слова: Искусственный Интеллект, Казахстан, Промышленные Проекты, Результаты Проектов, Сокращение Затрат, Управление Рисками.

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