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The role of blockchain technology in improving the financial performance of sports investment projects

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Abstract

The research examines the financial project performance results of blockchain technology using an evaluation of 420 participants. This research investigates how each blockchain adoption parameter (Training & Development, Participation, Tracking, Programmability, Digital Services Provided, and Processes & Systems) affects financial performance indicated through Rate of Development, Applicable Financial Transactions & Systems, Investment Opportunities, Added Financial Value, and Operational Activities. An analysis demonstrates that blockchain technology generates a substantial positive connection with financial performance, which accounts for 98.7% of its total variance ($R^2 = 0.987$, $F = 8216.345$, $p = 0.000$). The key drivers influencing financial performance improvement stem from blockchain adoption factors, which include programmability ($\beta = 0.485$) and digital services provided ($\beta = 0.378$), while Tracking ($\beta = 0.314$), Participation ($\beta = 0.256$), Training & Development ($\beta = 0.182$), and Processes & Systems ($\beta = 0.219$) form the other predictive elements. Organizations that implement blockchain technology experience improvements in transparency, as well as process efficiency and financial profitability. The research findings demonstrate a critical requirement for professional training, which should target stakeholder education about blockchain technology and knowledge acquisition. The monitoring capabilities of blockchain, together with transaction cost reductions and assurance of data transparency, allow sports institutions to develop better financial stability.

Keywords: Blockchain, financial performance, investment projects, smart contracts, technology.

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1. Introduction

The Ministry of Sports implements financial relief through improved resource distribution, together with private sector contributions, in ways that match worldwide sports management developments. Research shows that public-private partnerships (PPPs) stand out as a practical approach for Indian sports infrastructure development and talent programs, since these initiatives are vital for competitive success worldwide [1]. Sports represent a meaningful economic capacity, as investments generate new jobs, along with event-derived and tourism income, thereby fostering general economic progression [2]. Financial management and strategic planning together create the essential balance needed to support sports facilities funded by public and private sources throughout their useful life [3]. The Chinese government, alongside other international nations, understands that private capital plays an essential role in managing public sports facilities, thereby demonstrating worldwide acceptance of joint investment partnerships [4]. The current sports economy trends offer opportunities to link funding structures that enable infrastructure development between public and private entities [5].

Successful sports investments hinge on understanding key economic growth factors, particularly the transformative impact of digital technology on the sports industry. Organizations leverage rapid information technology developments to achieve speedy, accurate data processing that supports their competitive market position [6]. Digital transformation unites these technologies in every business segment to innovate services while improving user experiences, which promotes sports sector development. The sports industry profits from national policies alongside market demands that increasingly depend on sustainable digital solutions for promoting high-quality development [6, 7]. Technological advancement presents organizations in sports with unparalleled capabilities to interact with fans while achieving performance excellence, thus supporting overall economic progress through augmented consumer interests and conceptual development [8, 9].

Industry 4.0 adopts blockchain technology to revolutionize organizational functions through distributed data sharing, which builds better organizational communication and partnerships. Blockchain features such as data integrity, immutability, and security work together to boost supply chain operations while allowing smart contract deployment, which decreases business expenditures and builds stakeholder trust [10]. The peer-to-peer network architecture of this technology uses decentralized sharing of data in a model that diverges from traditional cloud-centric approaches among all participants in industrial operations. The impact of blockchain technology becomes stronger through its integration with artificial intelligence (AI) and the Internet of Things (IoT) to establish smart decision systems that create decentralized trading platforms between autonomous systems [11]. The evolution of industries into Industry 5.0 depends heavily on blockchain technology to perform secure real-time transactions that will develop self-regulating intelligent ecosystems [10].

Blockchain technology, initially developed as a decentralized peer-to-peer ledger for recording transactions, has significantly evolved, enabling secure, transparent, and efficient asset ownership transfers without intermediaries [12, 13]. Its architecture consists of a chain of blocks, each containing verified and tamper-proof data, which enhances trust among participants and facilitates instant settlement [14, 15]. The technology's applications span various sectors, including finance, healthcare, and supply chain management, where it improves traceability, reduces costs, and ensures data integrity [12, 16]. Despite its transformative potential, challenges such as scalability and regulatory issues remain, prompting ongoing research to unlock further opportunities for blockchain's integration into diverse industries [13, 15]. Overall, blockchain's ability to maintain a comprehensive record from the genesis block to the latest transactions underscores its role in modern information technology [12, 16].

Through blockchain technology, sport-related data management can undergo a transformative shift that uses decentralization with immutability to deliver secure shared access to data that boosts data quality and convenience. Through applications like PARFSET, blockchain coordinates various sports data sources, resulting in real-time access with protection against unauthorized changes [17, 18]. Smart contracts in this setup automate patient care procedures and improve operational effectiveness by making healthcare processes more efficient when dealing with administrators and players [12, 19]. The adoption of blockchain technology faces obstacles involving interoperability issues alongside regulatory rules and requirements, as well as the need for real-world verification protocols, because these elements prevent its broader implementation [18, 20]. The sports industry must solve these barriers if it wants to achieve maximum blockchain potential to improve athlete abilities and establish trust relationships with stakeholders [19].

Blockchain technology represents a class of technologies that establishes a transparent, autonomous, and decentralized data management system, ensuring users that archived information remains untampered with Beck et al. [21]. As a communication technology, blockchains enable peer-to-peer public service delivery Lember et al. [22], constituting a new generation of democratic processes [23]. Blockchain technology is utilized in smart contracts for digital authentication processing, eliminating the need for regulatory agencies or third-party moderators. Proprietary information can be stored on a distributed network of multiple users [24]. Smart contracts are self-executing, stored on a blockchain, with terms written directly as lines of code, minimizing human intervention [25]. The application of blockchains in smart contracts has garnered significant attention, being hailed as the "next big thing" Oganda et al. [26] with reliable results [27]. Blockchain technology's fault tolerance, supported by distributed nodes, makes it an attractive solution [24]. The financial performance of organizations is measured by specific criteria, including sales growth rate, cash flows, return on investment, and economic value. Financial performance is influenced by an organization's financial policies and growth rate, which impact financial returns, resource utilization, and goal achievement at minimal cost [28].

1.1. Problem Statement

Nationwide economic growth becomes significantly influenced by sports evolution, which results from scientific and technological progress through expanding investments into sports facilities and services. Research on sports event economics has drawn attention because initial predictions based on pre-event studies prove conducted studies sometimes yield different

results due to problematic methodologies and limited data availability [29]. National economic development receives essential inputs from the sports economy, which supports employment growth along with income expansion by enabling international competitions and attracting tourism activities [2, 30]. Research evidence demonstrates that sports development exemplifies a strong connection with social indicators because increased sports infrastructure leads to better public health alongside cultural participation [31]. The strategic sports investments generate economic development while creating positive effects on social well-being [29].

Various research shows sports activities establish a growing essential connection between the economy and sports, which displays economic implications in sports. Kudinova et al. [32] mention how sports sector development enhances economic activity through employment creation and lifestyle improvements, which demonstrate sports market effects. Through their examination, Gupta and Singh [33] demonstrate sports economics functions through revenue production and infrastructure advancement as well as social and economic development of disadvantaged societies while generating economic governance around the world. A quantitative analysis presented by Kawashima and Shoji demonstrates that sports generate 12,336 billion yen output in Japan [34].

The current operations at the Ministry of Sports encounter obstacles to maximizing modern technological approaches because they base their project planning on economic feasibility and necessity constraints. The widespread technological implementation within different sectors has confirmed the need for data-based strategies and blockchain technologies in modern operations. Worldwide organizations spend money on machine learning and blockchain technologies to boost customer service standards while simultaneously improving operations and generating higher revenues. Blockchain integration within the sports industry demonstrates essential value because it enables smoother financial operations and enhances transparency with associated lower expense levels. The Ministry of Sports has not incorporated modern technological solutions, which include blockchain technology, into its operations despite the rising organizational reliance on technology to boost efficiency and financial performance. The ministry encounters difficulties in optimizing financial operations and ensuring transparency, together with maximizing sports investment project returns, because of its limited integration capacity. The sports sector needs an assessment framework for blockchain technology effectiveness to advance its financial performance; yet, such a framework does not currently exist. The Ministry of Sports requires exploration of blockchain technology since the organization directs sports management through strategic plans and project implementation. The sports industry requires immediate evaluation of blockchain technology applications to drive sports investment project financial performance, resource management, and sustainable growth. The research examines blockchain technology applications to boost the financial results of the sports investment projects implemented by the Ministry of Sports.

1.2. The Significance of the Research

The investigation focuses on blockchain technology applications in sports worldwide by examining its financial performance effects. Blockchain serves as a disruptive technology originally developed for financial institutions and cryptocurrencies but now proves useful to improve transaction transparency and traceability and reduce fraud with better stakeholder trust in transactions including sponsorship agreements and ticketing purchases. The main objective consists of making sports administrators understand blockchain capabilities while overcoming their reservations about its technical intricacy. The study concentrates on blockchain implementation for immediate benefits that enable sponsorship contractors to safeguard data while facilitating efficient growth through crowdfunding initiatives for sports organizations. The research advances academic knowledge about technological sports management by identifying gaps in financial sustainability, specifically through technological innovations. The applied findings create better financial operations together with simplified payment systems and secure procedures in sports organizations at the same time they promote long-term blockchain investments to handle upcoming challenges. Modern technology should become an essential part of contemporary sports management systems.

1.3. Objectives

The primary objective is to investigate the impact of blockchain technology on the financial performance of investment projects undertaken by the Ministry of Sports. To achieve this, the study aims to:

1. Examine the extent to which blockchain technology is utilized in investment projects.
2. Determine the statistical correlation between blockchain technology adoption and the financial performance of the Ministry of Sports' investment projects.
3. Assess the likelihood of blockchain technology being employed to evaluate the financial performance of these investment projects.

1.4. Research Questions

To address the study's objectives, the following research questions are formulated:

Q1: The Ministry of Sports currently stands where it pertains to blockchain technology implementation for its investment projects.

Q2: What is the financial performance level of the investment projects developed by the Ministry of Sports?

Q3: Is there a statistically significant relationship between the use of blockchain technology and the financial performance of the Ministry of Sports' investment projects?

Q4: Does blockchain technology serve as a predictive element for determining the financial results of investment projects supported by the Ministry of Sports?

2. Literature Review

The research executed by Wouda and Opdenakker [35] demonstrates how blockchain technology can boost transaction efficiency by building trust and increased transparency. Blockchain technology establishes itself as an essential system for forthcoming secure data management alongside transaction protection, specifically in fields that mainly rely on security elements. The research by Puthal et al. [36] demonstrates how blockchain functions effectively to permit secure peer-to-peer information sharing which is efficient and transparent throughout the process. Blockchain allows direct communication between parties while blocking intermediaries, which creates tamperproof data accessibility for authorized users therefore improving system reliability. Morkunas et al [37] analyze how blockchain technologies revolutionize business models through research on active blockchain solution development by companies. The demonstrated business examples evidence how blockchain technology allows organizations to improve operational efficiency as well as minimize expenses and develop better business processes. The adoption process for private and public blockchain technologies in the construction industry receives extensive examination through Yang et al. [38]. The research presents both blockchain advantages such as better security, alongside tracking capabilities while identifying implementation barriers. The information helps researchers and practitioners who aim to implement blockchain systems in their operations. Sander F. et al. conducted research Sander et al. [39], which shows how stakeholders view blockchain-based text-to-speech systems from varying points of view. The implementation of these systems receives both positive and negative reactions from stakeholders because some see benefits for accessibility and transparency, yet others doubt their usefulness. The disagreement between different stakeholders emphasizes the necessity for more research into blockchain methods that fulfill sector requirements and handle worries properly.

The study by Velte [40] examines the related nature of financial accounting with corporate social responsibility (CSR) as well as integrated reporting practices. The essential elements of CSR and integrated reporting rely on blockchain technology for delivering transparency as well as traceability. The research reveals that control mechanisms provide a connection between corporate governance quality and integrated reporting standards. An integration of blockchain enables organizations to improve monitoring activities and output reporting precision which boosts stakeholder trust levels. Multiple research studies explore blockchain technology to demonstrate its effects while revealing modern technology's important role and business-oriented implications. The implementation of blockchain technology modifications the work duties of accountants according to Cangemi and Brennan [41]. The findings from Ghode et al. [42] study as reported by Van Hoek [43], highlighted that companies should adopt blockchain technology to achieve lower product prices along with improved market penetration. Through its implementation, blockchain technology provides organizations with methods to optimize existing operational resources while creating new efficiency points. The research by Abreu et al. [44] studied the blockchain technology concept to determine how it could assist professional auditors in decreasing audit tasks and fighting fraud risks.

The research by Almustafa et al. [45] demonstrates that poor-performing businesses need to focus first on operational efficiency enhancement through well-developed governance systems which help stabilize business environments. The research conducted by Lan [46] demonstrates that corporate governance elements, especially board independence and company size influence financial reporting quality. The study by Nguyen [47] shows that financial technology (FinTech) development in emerging markets creates instability, which yields vital guidance for regulatory bodies. The research by Qing et al. [48] looks into how green technology innovation affects corporate financial performance. Research by Nguyen [47] examines the essential part of risk governance for effective risk management in banking institutions that protect financial stability Nguyen [49]. Cao et al. [50] investigated blockchain technology usage within financial reporting and auditing functions. The study analyzed blockchain effects on auditor competition and audit quality and organizational policies as well as materiality errors. The analyzed data confirmed that blockchain systems function to lower sample costs and cut both reporting errors and auditing mistakes. The paper authored by Bonsón and Bednárová [51] provided an extensive discussion of an accounting and auditing system that integrates blockchain technology. The study identified valuable opportunities by utilizing this contemporary technology to merge it with accounting information systems which would allow businesses to harness its useful capabilities.

3. Materials and Methods

3.1. Research Sample

The research subjects consisted of Ministry of Sports leaders and sports economics experts, along with sports department senior officials from the Olympic Committee and all sports federations and clubs based in the Kingdom of Saudi Arabia. The study employed purposive deliberate sampling as its method for gathering representatives from the field of financial performance direction and sports investment expertise. The researchers chose members of the population categories through non-probability purposive sampling to obtain a study sample that included people with backgrounds in sports and financial performance. A minimum of ten years of experience is applied as the selection criterion. The study foundation comes from its selection of 420 participants. Table 1 shows a description of the study sample, while the researchers adopted a descriptive approach for their investigation.

Table 1.
Provides an overview of the demographic characteristics of the study participants.

Profile	Basic sample	Sample Survey
Leaders	85	6
Sports investment specialists	34	5
Senior sports administrators	60	7
Olympic Committee board members	10	3
Sports federation board members	45	4
Sports club board members	95	8
Youth center board members	91	6
TOTAL	420	39

3.2. Research Instruments

The necessary data collection process used two structured questionnaires. The first survey examined blockchain technology diffusion among the Ministry of Sports departments regarding their investment project uses. The instrument featured 29 questions rated on a three-point Likert scale distribution across six domains: training and development, Participation (P), Traceability (Tr), Programmability (Pr), Digital Services Provided (DiSP), Processes and Systems (PrS) (Details available in Appendix A). The second instrument evaluated financial project performance at the Ministry. The second instrument consisted of 27 evaluation items using three-point Likert scoring which split into five essential sections: Development Rates (DeR), Applied Financial Transactions and Systems (AFTSs), Investment Opportunities (InO), Added Financial Value (AFV), and Operational Activities (OAs). The questionnaires received a Cronbach's alpha evaluation to verify their consistency as well as their accuracy. The reliability test for the initial survey about blockchain technology adoption returned a value of 0.80, but the second assessment of financial performance results produced 0.87 as the reliability measure. The research demonstrates strong reliability due to the high values obtained and these levels are appropriate for academic studies of this nature. The tools underwent extensive evaluation to match study goals, which enabled them to efficiently record participant insights regarding blockchain implementation in addition to financial effects.

3.3. Statistical Analysis

The main data collection activities lasted from September 23 through November 4 in 2024. The research recruited 420 participants from the Ministry of Sports, which represents Saudi Arabia. To analyze the data comprehensively, various statistical methods were employed, including Pearson's correlation coefficient to measure relationships between variables, Cronbach's alpha to assess the internal consistency of measurement tools, percentages and descriptive statistics (mean and standard deviation) to summarize responses, response rate to evaluate participation levels, chi-square tests to examine categorical differences, and multiple regression analysis to determine predictive relationships among variables. The Statistical Package for the Social Sciences (SPSS) version 26 served to conduct all analyses. The study analyzed statistical coefficients through which associations could be quantified while maintaining a p value lower than 0.05 to achieve robust results. The organized analytic structure permitted valid and dependable findings, which served as fundamental support for extracting significant insights about blockchain technology's impact on sports investment financial outcomes.

4. Results

The graphical representation of Figure 1 displays the extensive breakdown of participants and their questionnaire response levels concerning blockchain technology usage in investment projects within the Ministry of Sports. The illustration demonstrates how participants fared in the survey through their numerical breakdown as well as their response distribution percentage. The response rate figure indicates both the rate of participant involvement and how well the survey sample reflects the complete set of respondents.

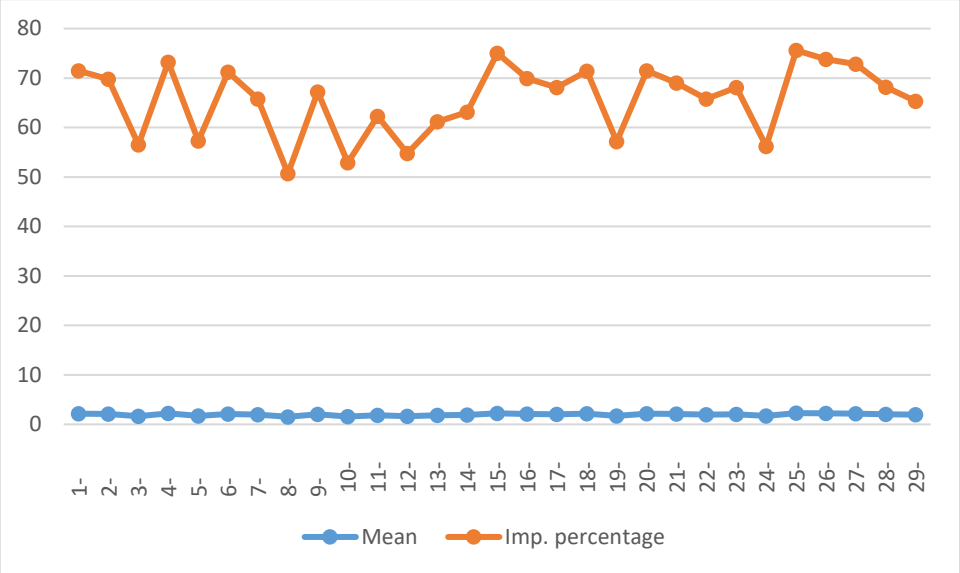

Figure 1.
Response to the Digital Blockchain Technology.

Table 2.
Descriptive Statistics for the Survey on Blockchain Technology Adoption in Investment Projects at the Ministry of Sports (N = 420).

No.	Mean	SD	Average response	X^2	Imp. percentage	KMO
Axis 1: TRD						
1-	2.15	0.78	0.72	6.98	71.505	
2-	2.08	0.80	0.70	8.42	69.80%	
3-	1.67	0.69	0.56	12.14	56.50%	
4-	2.21	0.79	0.74	7.18	73.20%	
5-	1.70	0.72	0.57	11.82	57.30%	
Average for Axis			0.67			0.82
Axis 2: P						
6-	2.12	0.81	0.71	7.86	71.20%	
7-	1.98	0.78	0.66	8.22	65.80%	
8-	1.53	0.70	0.51	14.82	50.70%	
9-	2.01	0.83	0.76	6.94	67.20%	
10-	1.59	0.73	0.53	13.42	52.90%	
Average for Axis			0.62			0.81
Axis 3: Tr						
11-	1.87	0.80	0.62	7.48	62.30%	
12-	1.64	0.75	0.55	12.36	54.80%	
13-	1.83	0.79	0.61	8.14	61.20%	
14-	1.90	0.81	0.63	7.98	63.10%	
Average for Axis			0.60			0.83
Axis 4: Pr						
15-	2.25	0.83	0.75	6.82	75%	
16-	2.10	0.82	0.70	8.54	69.90%	
17-	2.03	0.81	0.68	7.26	68.10%	
18-	2.14	0.80	0.71	7.68	71.40%	
Average for Axis			0.71			0.84

Continue.

No.	Mean	SD	Average response	X^2	Imp. percentage	KMO
Axis 5: DiSP						
19-	1.72	0.74	0.57	11.24	57.20%	
20-	2.15	0.82	0.72	7.86	71.50%	
21-	2.07	0.81	0.69	8.42	69%	
22-	1.98	0.78	0.66	8.22	65.80%	

23-	2.03	0.80	0.68	7.68	68.10%	
Average or Axis			0.65			0.85
Axis 6: PrS						
24-	1.69	0.72	0.56	13.42	56.20%	
25-	2.27	0.83	0.76	6.78	75.60%	
26-	2.21	0.82	0.74	7.18	73.80%	
27-	2.18	0.81	0.73	7.54	72.80%	
28-	2.05	0.79	0.68	8.14	68.20%	
29-	1.96	0.77	0.65	8.42	65.30%	
Average for Axis			0.69			0.86
Average to the survey			0.64			0.88

A review of data in Table 2 demonstrates how 420 participants from the research sample expressed their views on blockchain technology usage in sports investment projects at the Ministry of Sports. Research participants maintained a decent understanding of Training & Development (T&D), Participation (P), Tracking (Tr) and Programmability (Pr), Digital Services Provided (DSP), and Processes & Systems (PS). Recognizing infrastructure and strategic planning received the most substantial mean scores from participants at 0.71 for Programmability and at 0.69 for Processes & Systems as calculated by KMO indicators of 0.84 and 0.86. Results from the Training & Development and Tracking sections (with respective means of 0.67 and 0.60) indicate training deficiencies and the need for improved blockchain benefit demonstrations. The study participants displayed an average level of acceptance (0.64) while having a satisfactory value of Kaiser-Meyer-Olkin (KMO = 0.88) that confirms the demand for improved understanding among people about blockchain applications. The research indicates that specialized training programs should demonstrate blockchain advantages for economics and technology while enhancing organizational systems to meet blockchain standards and expanding educational efforts, specifically among youth participants. The research shows that blockchain should be deployed in ministry strategies to enhance operational proficiency alongside increased transparency.

The mean responses, together with response percentages for statements within the financial performance level questionnaire of the Ministry of Sports investment projects, appear in Figure 2. The statistical data highlights the various financial performance aspects as viewed by 420 participants who took part in the study. The average responses (means) for each statement stand behind corresponding bars in the chart, together with the total participant percentages matching each statement. The graphic illustrates how people understand financial performance by showing both major patterns and differing perception degrees between various performance elements.

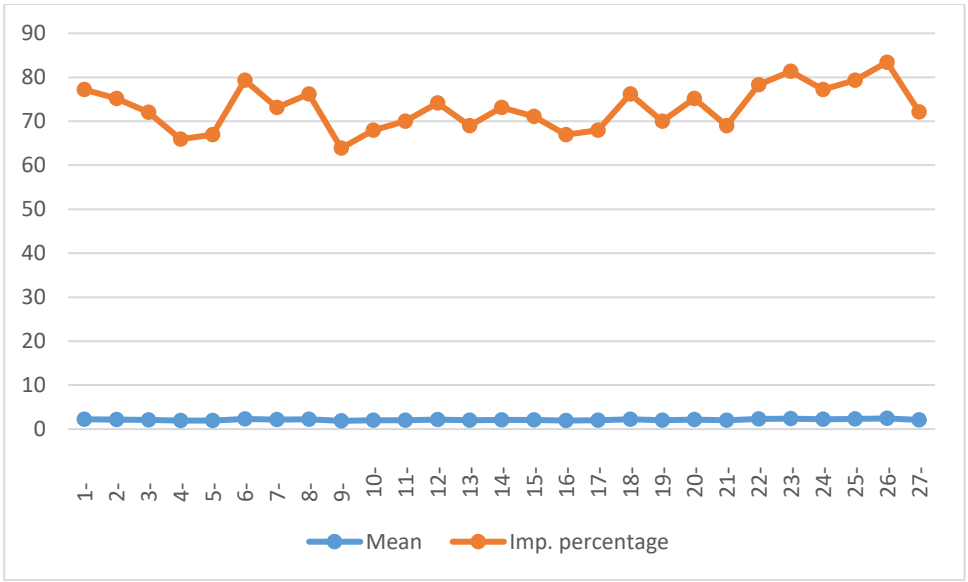

Figure 2.
Response Distribution of Questionnaire.

Table 3.
Descriptive Statistics for the Survey of Questionnaire on Financial Performance.

No.	Mean	SD	Average response	X^2	Imp. percentage	KMO
Axis 1: RD						
1-	2.25	0.76	0.75	8.92	75.00%	
2-	2.18	0.78	0.73	9.24	73.33%	
3-	2.07	0.75	0.70	7.86	70.00%	
4-	1.92	0.72	0.64	26.84	64.00%	
5-	1.94	0.73	0.65	23.46	65.00%	
Average Response Score for Axis			0.69			0.83
Axis 2: AFTSs						
6-	2.31	0.79	0.77	0.78	77	
7-	2.14	0.81	0.71	0.62	71	
8-	2.23	0.80	0.74	0.65	74	
9-	1.87	0.76	0.62	0.54	62	
10-	1.98	0.77	0.66	0.59	66	
Average for Axis			0.68			0.82
Axis 3: InO						
11-	2.03	0.78	0.68	0.58	68	
12-	2.15	0.80	0.72	0.63	72	
13-	2.01	0.77	0.67	0.57	67	
14-	2.12	0.79	0.71	0.62	71	
15-	2.07	0.76	0.69	0.58	69	
16-	1.95	0.75	0.65	0.55	65	
Average for Axis			0.67			0.84
Axis 4: AFV						
17-	1.98	0.77	0.66	0.56	66	
18-	2.21	0.79	0.74	0.63	74	
19-	2.03	0.78	0.68	0.55	68	
20-	2.18	0.81	0.73	0.61	73	
21-	2.01	0.76	0.67	0.55	67	
Average Response Score for Axis			0.69			0.85
Axis 5: OAs						
22-	2.29	0.80	0.67	0.59	76	
23-	2.37	0.81	0.79	0.62	79	
24-	2.25	0.79	0.75	0.61	75	
25-	2.31	0.80	0.77	0.61	77	
26-	2.43	0.82	0.81	0.63	81	
27-	2.10	0.78	0.70	0.57	70	
Average for Axis			0.75			0.86
Average of the survey			0.70			0.87

Table 3 shows results based on participant perception of financial performance through five parameters involving 420 respondents, according to descriptive statistics. The average agreement indicated by study participants amounts to 0.70 on the questionnaire scale. The respondents scored the Rate of Development at 0.69 while demonstrating a basic level of understanding that routine performance assessments and strategic planning should lead to better initiative termination practices. The data shows that the Applicable Financial Transactions & Systems (AFTSs) averages 0.68, which indicates a moderate level of budget compliance and financial standards adherence. The mean value of 0.67 shows that respondents understand flexible regulations during the Investment Opportunities assessment, yet struggle to take full advantage of diverse investment choices. The mean scores of 0.69 and 0.75 for Added Financial Value and Operational Activities indicate efficient expense management with transparent rules and automated systems under strong operational practices. The KMO metrics between 0.82 to 0.86 indicate the study data will work properly for factor analysis.

Table 4 presents the correlation coefficients, illustrating the relationship between the utilization of blockchain technology and the enhancement of the financial performance of investment projects undertaken by the Ministry of Sports.

Table 4.
Correlation Coefficients Between Blockchain Technology and Financial Performance.

Blockchain Technology		Financial Performance				
		RD	AFTSs	InO	AFV	OAs
1	TRD	0.62**	0.73**	0.70**	0.61**	0.75**
2	P	0.75**	0.71**	0.72**	0.65**	0.66**
3	Tr	0.78**	0.62**	0.74**	0.67**	0.69**
4	Pr	0.69**	0.74**	0.60**	0.71**	0.67**
5	DiSP	0.76**	0.60**	0.77**	0.73**	0.74**
6	PrS	0.82**	0.66**	0.65**	0.76**	0.72**
	Overall Score	0.77**	0.68**	0.72**	0.70**	0.71**

Table 4 shows positive correlations indicating that blockchain technology adoption creates favorable financial aspects affecting various organizational performance metrics. Research shows a substantial statistical relationship between blockchain implementation for Training & Development, Participation, Tracking, Programmability, Digital Services Provided, Processes & Systems, and financial results through Rate of Development, Applicable Financial Transactions & Systems, Investment Opportunities, Added Financial Value, Operational Activities with a combined correlation coefficient value of 0.77. The statistical relationship between the Processes & Systems dimension (PrS) and all financial measures is most significant, especially with Rate of Development (RD) reaching 0.82, which demonstrates its clear importance in performance enhancement. A strong association between Tracking (Tr) at 0.78 and Investment Opportunities (InO) demonstrates that blockchain-based monitoring helps organizations secure financial development. Financial outcomes improve substantially when sports investment projects adopt blockchain technology since it creates transparent systems and efficient operations alongside strategic planning practices. The unified positive relationship between all tested dimensions demonstrates blockchain technology's substantial capability to revolutionize financial operations.

Table 5.
Regression Results

R Square	0.987
F value	8216.345
Significance	0.000
Beta of TRD	0.182
Beta of P	0.256
Beta of Tr	0.314
Beta of Pr	0.485
Beta of DiSP	0.378
Beta of PrS	0.219

Data from Table 5 shows that dimensions of blockchain technology adoption create substantial predictions for financial performance while accounting for 98.7% of its variance. The statistical significance of the model at $p \leq 0.01$ appears valid through the F Value measurement, which registers at 8216.345. The predictive power of programmable systems stands out from other variables with an impact strength of Beta=0.485 due to their vital role in financial strategy planning and transaction processing efficiency. investments and operational tracking function of blockchain is supported by DiSP and Tr since both variables demonstrate Beta coefficients of 0.378 and 0.314. Training & Development (TRD) (Beta = 0.182), along with Processes & Systems (PrS) (Beta = 0.219), present significant contributions yet lower than the other variables, which underscore the value of continuous learning and systematic implementation. Participation (P) demonstrates a strong influence on financial performance enhancement because it promotes blockchain initiative involvement. The regression model for financial performance prediction has been established as follows:

$$Y = 0 + 0.182(TRD) + 0.256(P) + 0.314(Tr) + 0.485(Pr) + 0.378(DiSP) + 0.219(PrS)$$

The equation provides organizations with a means to forecast financial results through tracking blockchain implementation levels across distinct assessment areas. Organizations should integrate blockchain into their operations by placing special emphasis on programmability and digital services, since this approach generates significant financial benefits along with increased transparency and improved efficiency in sports investment activities.

4.1. Limitations in Adopting Blockchain Technology

The research about blockchain technology adoption at the Ministry of Sports' sports investment projects reveals several essential restrictions that need improvement for enhanced understanding. The current blockchain infrastructure faces scalability problems because public networks require peer-to-peer transaction verification for every trade, thus affecting efficiency in handling high transaction volumes. The transaction verification process through this method results in delays, together with efficiency issues that traditional systems achieve better second-per-second transaction handling capability.

The integration of blockchain faces challenges with existing financial systems due to an observed lack of accounting capacity. The implementation of blockchain technology encounters difficulties with standard accounting practices because the development of integrating these systems remains insufficient, which leads to reduced operational effectiveness when

transitioning between systems. Limited financial resources and high implementation expenses for blockchain network deployment act as barriers to widespread adoption, primarily because they impact organizations with budget restrictions. The cost of developing the necessary technological systems remains too high for several entities that are unable to allocate sufficient funds.

Thirdly, technological awareness and training proved to be major obstacles in the process. The adoption of blockchain faces obstacles because most of its potential stakeholders do not possess a clear understanding of its benefits alongside its practical value for applications. User training stands as essential despite creating more challenges that impede adoption in the process. Organizations struggle to support blockchain technology deployments because there are currently no known successful sports sector applications, thus diminishing its perceived value.

The analysis identified public blockchain network governance challenges as the final main issue to address. Standards for transaction protocols remain unclear because there is no central authority, which creates risks, particularly when dealing with financial transactions. The need for controlled governance and management of data has motivated organizations to select private blockchain networks despite their reduced openness and accessibility features. Sports investment projects need to handle these blockchain limitations so they can effectively implement the technology while considering its practical limitations.

5. Discussion

Table 2 shows practical blockchain deployment in Ministry of Sports investment projects since participant responses measure at an average of 0.64, indicating insufficient blockchain use. The practical application of blockchain technology remains limited because government officials lack knowledge about its value-add and significance, while their current work does not prioritize technology integration and does not view blockchain as a revenue driver. The organization's progress suffers from the lack of an information systems technology center, which is needed to create and implement blockchain solutions successfully. Digital network development faces a challenge because existing systems fail to effectively verify blockchain peer-to-peer methods, which leads to performance difficulties and operational delays. The organization faces difficulties in adopting blockchain in full capacity because it lacks sufficient modern technology and weak communication systems, which affect both internal operational functions and business transactions outside the organization. Not enough practical use has been adopted for blockchain technology in ministry sports investment projects because government officials still need education about its value [52]. Operational inefficiencies occur because the required peer-to-peer verification processes presented by blockchain cannot function effectively due to insufficient modern technology development and limitations in digital networks [18, 52]. The sports industry fails to capitalize on blockchain technology because of its unwillingness to integrate new technologies which negatively impacts both financial success and operational effectiveness of investment initiatives [20, 53].

Multiple essential elements outlined in Table 3 contributed significantly to the financial setbacks of sports investment projects within the Ministry of Sports domain. A structural weakness exists within the organization because of sport service and activity capacity limitations which leads to negative effects on financial results. The insufficient knowledge and expertise of stakeholders responsible for improving financial performance multiplies the existing limitations. The sports sector struggles with economic transformation due to stakeholders' inability to employ blockchain technology and modern tools, caused by their deficient specialized skills. Different interconnected issues create substantial financial challenges in sports investment projects within the Ministry of Sports, and these obstacles become worse because stakeholders lack the proper expertise needed to boost financial performance. Economic transformation initiatives in sports continue while the sector faces substantial challenges because of inadequate specialized skills, especially those related to blockchain technology utilization [52]. Current performance metrics in sports organizations primarily include financial elements but social and environmental measurements have been historically absent, leading to a limited comprehension of organizational performance specifically important since sports organizations aim for broader goals than financial gains [54].

Sports institutions encounter major obstacles in their economic development through poor investment methods because they fail to deploy resources properly and develop insufficient financial strategies. According to Dimitropoulos [55], the proper management of finances stands vital for both sports organizational investment decisions and operational refinement. Insufficient financial returns from facilities create unworkable wage and maintenance costs, which proves the need for enhanced financial procedures [56]. Financial challenges intensify when sports results receive more priority than liquidity management and cost control, according to Lalić and Lučić [56]. Knowledge of complete financial dynamics strengthens the ability to maintain sustainable and viable sports institutions.

Analysis of Table 4 shows that blockchain technology adoption creates a direct link to high financial achievement in investment project development by the Ministry of Sports. Blockchain technology usage created a moderate positive relationship between financial performance outcomes. The analysis reveals a significant link which demonstrates that blockchain integration leads to better financial outcomes for institutions [41]. supports his statement about blockchain changing accounting roles without eliminating them, Ata et al. [52]. Multiple research studies demonstrate that blockchain implementation leads to improved investment efficiency, which enhances transparency along with lower managerial control, especially among organizations at the beginning of their transparency journey [48]. Various regions have confirmed the positive relationship between blockchain technology and financial market development [57]. Organizations in the sports industry must learn to utilize blockchain capabilities as they implement digital transformations because blockchain strengthens both financial outcomes and operational processes.

Table 5 findings demonstrate that blockchain technology adoption positively affects financial performance because the significance level ($p = 0.000$) is statistically significant. The identification capabilities of blockchain technology establish it

as an essential operational deviation detection tool, which makes institutions without this technology need to consider its adoption during development and improvement. Blockchain technology establishes digital financial and administrative management through operations that promote accuracy, operational efficiency, and operational integrity. The implementation of blockchain supports reliable administration and authentic accounting while regulatory bodies maintain control mechanisms operational by preventing potential breakdowns. Blockchain stands as an essential technological component to detect operational discrepancies, which leads to better organizational improvements when organizations have not adopted blockchain technology [58]. Financial and administrative document management systems using blockchain technology maintain regulatory compliance through decentralized as well as immutable systems that deliver efficient accuracy [59]. Through blockchain integration, firms can enhance corporate governance while improving their financing behaviors, overall value, and their relationship with audit firms [58]. The extensive implementation of blockchain faces obstacles stemming from high implementation costs and regulatory barriers, as well as existing work culture resistance, which requires advanced expertise to overcome these implementation obstacles.[59, 60].

Modern research by Ghode et al. [42], Van Hoek [43], and Yeoh [61] supports the importance of blockchain technology adoption because it helps businesses cut product expenses and boost market penetration in competitive sectors. The adoption of blockchain technology presents organizations with the possibility to use current resources effectively through unified data systems. The research of Cao et al. [50] shows that blockchain implementation would lead to fewer reporting mistakes by auditors, together with reduced costs for sample collection and error reduction. The analysis conducted by Bonsón and Bednárová [51] demonstrated the necessity of integrating contemporary blockchain technology into accounting information systems to achieve its advantages. The research examined how green technology innovation affects corporate financial outcomes.

6. Conclusion and Recommendation

The research addressed how blockchain technology affects financial performance metrics in investment projects. Research findings demonstrate that blockchain technology will contribute substantially to improving financial results achieved by the Ministry of Sports' investment projects. The research shows that although existing blockchain usage remains low among 420 respondents, it positively correlates with financial outcomes as a performance prediction tool. Blockchain technology enables the financial industry to obtain exceptional operational benefits through distributed ledgers that result in reduced auditing durations while ensuring secure financial documentation storage. Blockchain technology enables precise record-keeping through transparent and reliable traceable data that eliminates intermediaries by cutting down on manual processes. IoT in sports investments results in lower costs and enhanced reputation by tracking better and producing accurate financial records. The benefits of blockchain integration into organizational frameworks highlight the need for higher transparency and stable data security, along with better organizational frameworks. Professional training programs should be created to educate employees about blockchain technology platforms alongside their financial management applications. Academic and sports institutions need motivation to execute additional research regarding blockchain's financial characteristics alongside its technical aspects. Sports business investment projects need customized blockchain implementations for their unique requirements.

6.1. Limitations and Future Studies

The research makes groundbreaking strides toward studying blockchain adoption in sports and sports institutions but faces important restrictions. The survey questionnaire creates limitations on generalization in the research findings because a survey approach fails to fully comprehend the detailed implementation challenges of blockchain. The investigation results were potentially affected by respondent bias because not every participant demonstrated proper comprehension of the pros and cons of blockchain technology. Insufficient participants with extensive practical experience in blockchain existed in the sample, and this shortage may have restricted the details obtained. Future researchers need to concentrate on specific groups with financial knowledge and practical blockchain experience to develop a better comprehension of the field. The evaluation process of blockchain technology adoption in sports institutions requires practical, implementation-based studies. Sports institutions should invest resources into upgrading infrastructure while providing training programs and workshops that develop stakeholder competency and readiness regarding blockchain adoption because of the current challenges with inadequate digital networks, high costs, limited expertise, and lack of readiness. The implemented interventions will assist organizations in overcoming obstacles by supporting an innovation-promoting culture.

The advancement of blockchain technology adoption will enable significant process transformation in financial operations within numerous sectors, including sports institutions. Research efforts should concentrate on creating blockchain solutions designed to solve particular challenges that affect sports organizations by maximizing their investments while minimizing transaction costs. The integration of blockchain with artificial intelligence and machine learning technologies represents a growing research need because it promises better decision-making processes. Marked success in implementation will depend heavily on training programs that deliver both awareness and expertise development to stakeholders. The study of blockchain adoption across different countries would generate valuable knowledge about its compatibility and success potential. For blockchain to reach widespread adoption, both a strong infrastructure platform and superior network capabilities need development, as well as a fundamental solution to scalability problems and implementation expenses. The exploration of blockchain's ability to build ethical practices alongside accountability measures within sports institutions relates to existing moral intelligence research, which leads to sustainable innovation paths. Current trends indicate that blockchain technology possesses vital capabilities to redefine sports management methods and financial operations systems.

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