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THE IMPACT OF BLOCKCHAIN ON ECONOMIC EFFICIENCY AND TRANSPARENCY IN SPORTS MANAGEMENT

O impacto da tecnologia blockchain na eficiência econômica e na transparência na gestão esportiva

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ABSTRACT

This article examines the applicability of blockchain technologies, smart contracts, and artificial intelligence in the modernization of sports management in Russia, with a focus on both traditional sports and eSports. The main objective is to propose and validate the SportContour digital hub, an integrated model designed to reduce transaction costs, increase process transparency, and optimize the allocation of public and private resources. The study combines an international comparative analysis of seven governance models with the empirical validation of 48 simulated cases using the SportContour platform. The results demonstrate that the proposed model reduces project approval times to four days, achieves a transparency index of 0.93, and delivers a return on investment (ROI) of 1.5, with an audience engagement rate of 70%. These findings suggest that the integration of digital technologies into sports management not only strengthens administrative efficiency and economic sustainability, but also provides an innovative framework for cooperation between government, business, and civil society in the sports sector.

Keywords: Sports, Matrix model, Smart contracts, Blockchain, Analytics

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The impact of blockchain on economic efficiency and transparency in sports management

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RESUMO

Este artigo examina a aplicabilidade das tecnologias blockchain, contratos inteligentes e inteligência artificial na modernização da gestão esportiva na Rússia, com foco tanto nos esportes tradicionais quanto nos eSports. O principal objetivo é propor e validar o hub digital SportContour, um modelo integrado projetado para reduzir os custos de transação, aumentar a transparência dos processos e otimizar a alocação de recursos públicos e privados. O estudo combina uma análise comparativa internacional de sete modelos de governança com a validação empírica de 48 casos simulados usando a plataforma SportContour. Os resultados demonstram que o modelo proposto reduz o tempo de aprovação de projetos para quatro dias, atinge um índice de transparência de 0,93 e oferece um retorno sobre o investimento (ROI) de 1,5, com uma taxa de engajamento do público de 70%. Essas descobertas sugerem que a integração de tecnologias digitais na gestão esportiva não apenas fortalece a eficiência administrativa e a sustentabilidade econômica, mas também fornece uma estrutura inovadora para a cooperação entre governo, empresas e sociedade civil no setor esportivo.

Palavras-chave: Esportes, Modelo matricial, Contratos inteligentes, Blockchain, Análise de dados

INTRODUCTION

The rapid digitalization of the entertainment industry is erasing the boundaries between traditional sports and esports: the global audience of electronic competitions is approaching the audience of Olympic disciplines, investment volumes have exceeded 3 billion USD, and football, basketball, and hockey federations are already integrating their own esports leagues. However, the managerial mechanisms of the two segments are developing asynchronously: classical sport remains subordinated to a vertical state model, while esports operate mainly in a market driven, weakly regulated environment. This institutional mismatch generates legal conflicts, duplication of functions, and information asymmetry between the state, business, and civil society structures.

Modern research focuses either on the social mission of sport or on the commercial potential of esports, leaving aside comprehensive governance models capable of integrating both spheres. As a result, a "zone of managerial risk" emerges centralized structures fail to react to the dynamics of digital disciplines, while purely market solutions do not provide regulatory stability and digital sovereignty.

The proposed sports hub "SportContour" not only highlights the need to create a unified coordination contour that combines the flexibility of market innovations with the transparency and legal protection of state oversight but also demonstrates how a private technological case can be applied in specific managerial subsystems of the sports sector. In particular, it makes it possible to automate the processes of handling funding applications, monitoring the implementation of events, digital registration of participants, and recording sports results using blockchain registries and smart contracts. Thus, "SportContour" illustrates the possibility of eliminating duplicated functions, strengthening legal control, and accelerating coordination between state, commercial, and civil society structures (Safiullin et al., 2024).

Such a technological solution is especially critical for esports, where the high speed of change and the absence of a stable regulatory framework make traditional management mechanisms ineffective (Ratten, 2022). Thus, the platform becomes not just a theoretical construct, but a tool for the practical convergence of two managerial paradigms, hierarchical and decentralized.

The development and empirical testing of such a model are necessary to equalize the conditions for the development of sport and esports, increase the efficiency of using public and private investments, and strengthen national security amid growing cyber threats and competition for audience data. The institutional gap between hierarchically managed traditional sport and the decentralized ecosystem of esports creates duplication of functions, legal conflicts, and excessive transaction costs.

Thus, the purpose of the study was to design and empirically test the digital hub "SportContour", which, through a blockchain registry, smart contracts, and AI analytics, links both sectors into a single transparent system.

1 LITERATURE REVIEW

Issues of esports governance and its integration into the institutions of traditional sport have been actively studied over the past decade, with research interest distributed across several directions. First, international literature offers conceptual frameworks of digital (e-governance) and network-based sport governance. For example, in the monograph by Scholz “Esports is Business” (2019) the organizational principles of major esports leagues are described in detail, and the limitations of transferring them into the system of Olympic federations are demonstrated.

Second, Russian and Chinese authors focus on institutional and legal aspects. A series of articles reveals the problems of licensing disciplines and allocating media rights, but the empirical base is limited to cases of self-regulated leagues. Studies show that public private partnership increases investment inflows, yet they note the difficulties of aligning KPI between ministries and IT companies.

The third direction is related to the development of quantitative methods for evaluating efficiency. Since 2018, DEA and BSC models have been tested for NBA clubs and football academies, but the adaptation of these instruments to esports franchises is still rare. Russian researchers (Androsova, Mikhailova, 2019) proposed an integral KPI index for public administration bodies in sport, but it lacks an intellectual property block, which is critical for esports.

In the review by Backhouse (2024) the potential of blockchain for recording results and contracts is emphasized, but there is no description of comprehensive hub solutions that unite the state, business, and society. As a result, a methodological gap has formed: existing studies either analyze individual aspects of esports or describe traditional models without considering digital specificity. The author's concept "SportContour", which proposes a unified decentralized hub, closes this gap by combining theoretical developments in network governance with modern technologies of smart contracts and big data analytics.

2 METHODOLOGY

The main research method was a literature review. Based on a systematic review of 74 publications (2018–2025) and multidomain statistical series from Newzoo (2024), PwC (2024), Statista (2024), and national open data, the author constructed a comparative matrix of 10 normalized indicators and conducted AHP ranking of seven global governance configurations. Validation of the platform, carried out through expert assessment and pilot modeling of 48 cases, showed a reduction of the application approval procedure to four days, an increase in transparency to 0.93, and ROI = 1.5 with an audience reach of 70 percent. The obtained results demonstrate the scaling potential of "SportContour" as a federal module of digital public administration in sport and esports.

The search was conducted in Scopus, Web of Science, and RSCI (keywords "blockchain", "sport governance", "esports") with a filter for 2018–2025. The final sample included 74 peer reviewed publications and industry reports. Then statistical series from Newzoo, PwC, Statista, SteamCharts, and the GIS "Sport" system for 2018–2024 were collected and normalized using the min-max method. A comprehensive assessment of seven governance models was performed using 10 indicators with hierarchical analysis and weighted aggregation. The author's architecture of "SportContour" was verified by an expert panel and pilot modeling of 48 applications.

The empirical base of the present study is the author's digital platform "SportContour", an integration sports hub deployed in test mode to automate key governance processes in traditional sport and esports. The platform is a distributed information and analytical system that unites state authorities, sports federations, educational institutions, investors, IT companies, and sports clubs. Structurally, "SportContour" is implemented using a four component architecture: the smart contract module ensures automatic execution of financial obligations (tranches, subsidies, sponsorship packages) upon the occurrence of programmed conditions; the blockchain registry records all transactions, regulatory changes, and operational actions in an immutable format with hash identification; the artificial intelligence based analytical module conducts monitoring of project dossiers, forecasting of socio economic effects, and optimization of resource allocation; the infrastructure block of digital sovereignty is based on domestic software, certified cryptographic tools, and integration with the Bank of Russia's Masterchain (Safiullina, Safiullin, 2025). The platform was tested on simulated cases, including a full cycle of submission, review, approval, monitoring, and reporting of applications from subjects of the sports ecosystem. Interaction scenarios with federations, regional ministries, investors, and educational organizations were tested.

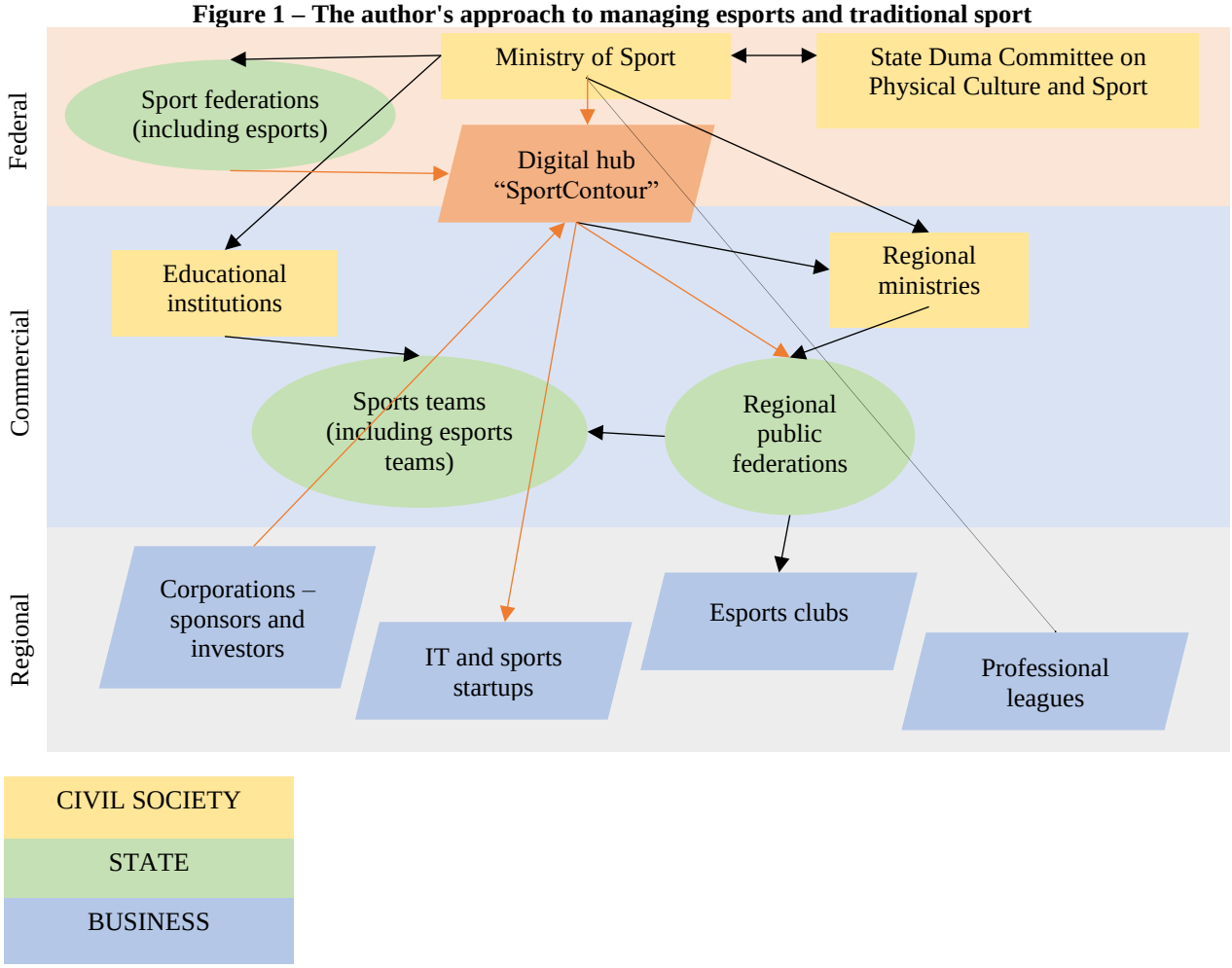
In addition, the empirical base was supplemented with aggregated data from open sources: the registries of the Ministry of Sport of the Russian Federation, the SteamCharts platform, Statista, PwC, and the GIS "Sport" system, API of esports disciplines, as well as digital journals of sports education institutions. All data were normalized using the min-max method, and hierarchical analysis (AHP) and weighted aggregation were applied to evaluate the effectiveness of governance models. This made it possible to compare seven alternative configurations of sport governance in international practice and to substantiate the advantages of the author's model in specific managerial areas. Thus, "SportContour" is not an abstract concept but a full-scale empirical system tested in an environment close to practical functioning.

2 RESULTS

In the existing models, a gap can be observed between centralized control and decentralized flexibility, which hinders the end-to-end transmission of regulatory requirements, operational data, and analytical outputs from federal authorities to commercial startups. To avoid such limitations, the author's approach is proposed in the form of the digital hub "SportContour", designed to combine the strengths of all the considered models, providing a unified coordination channel, process transparency, and adaptive governance in both traditional sport and the esports industry.

Figure 1 presents the proposed approach to managing esports and traditional sport. The diagram clearly highlights three levels of interaction between stakeholders: the federal level is shaded in pink, the regional level in blue, and the commercial level in purple. The roles of system participants are visually distinguished by colors: the state is indicated by yellow blocks (the Ministry of Sport, the State Duma Committee, regional ministries), civil society by green ovals (federations, sports clubs), and business by lilac parallelograms (sponsor corporations, IT startups, professional leagues). Our modifications are marked in orange, representing the digital hub "SportContour", through which new coordination and information flows pass.

Figure 1 – The author's approach to managing esports and traditional sport



Source: compiled by the authors

At the upper federal level is the Ministry of Sport, the system-forming actor that develops strategy, approves regulations, and allocates budgetary subsidies. The black arrow from the Ministry to the State Duma Committee on Physical Culture and Sport reflects a two-way cycle: the committee initiates and revises draft laws, and the ministry implements them and reports on them. From the same center, black arrows extend to the sports federations (including esports), regional ministries, and educational institutions; these are classic administrative channels through which the ministry transmits regulations and control indicators.

Between the ministry and the federation, expert exchange is established: the federation aggregates competitive statistics, licenses disciplines, and submits data to the federal registry, while the ministry, relying on this information, approves the calendar and training standards. The federation, in turn, is linked through a green arrow with sports and esports teams; the same link works in the opposite direction, as teams submit match protocols and rankings, and the federation issues certifications and grants access to high-level competitions.

Regional ministries receive methodological guidelines and financing from the federal center. They transmit these guidelines to regional public federations, coordinate infrastructure projects, and record statistics on facility attendance. Public federations, in turn, interact with esports clubs: they sign regulations, conduct qualification

tournaments, and approve local rankings. The arrow from the regional department to the teams emphasizes the financing of youth sections and talent support programs.

Educational institutions (boarding schools, universities, colleges) are directly connected to the ministry: they implement approved educational standards, train coach-analysts, and maintain databases of students and athletes. Through an orange line, educational organizations are connected to the digital hub, where data on testing results, qualification levels, and issued certificates are uploaded; the system automatically matches them with the needs of clubs and leagues.

The central digital hub "SportContour" accumulates all technological and registry work. It receives data from federal registries, school journals, streaming platforms, and esports APIs, encrypts them, and records them in the blockchain. The orange arrows show new channels: "SportContour" directly exchanges telemetry with teams and IT startups, synchronizes grant applications with sponsor corporations, and automatically activates smart contracts with professional leagues. After a league confirms a result in the system, prize funds are distributed without intermediaries.

Sponsor corporations and investors (the lilac block on the left) receives verified analytics from the hub on audience interest and club KPIs; in return, they transfer targeted funds, which the smart contract redirects to teams or infrastructure projects after the specified conditions are met. IT and sports startups supply analytical modules, anti-cheat services, and VR simulators and gain access to anonymized data for training their models; this two-way connection accelerates innovation.

At the right edge of the commercial layer are the professional leagues, linked by a black arrow to the ministry: the state approves the admission rules for international organizers and monitors tax obligations. The league, working through the hub, provides live match statistics to the Federal Tax Service and Rospotrebnadzor, and automatically allocates a percentage to the national reserve for the development of mass sport.

One-time data entry and its subsequent automatic replication throughout the system turn the digital hub into a "single source of truth": an athlete's registration record, a financial transaction, or a new tournament regulation is entered into the system by a single authorized entity, after which the information becomes immediately available to all stakeholders through the distributed ledger. This eliminates duplicate reporting and discrepancies, since any changes are possible only by entering a new, cryptographically signed record. The continuous recording of operations in the blockchain creates an immutable chronicle of decisions, each action supplied with a hash identifier of time and actors, and retrospective alteration is impossible without network consensus.

Such a mechanism distributes control: the state, in real time, sees the targeted use of subsidies and compliance with regulations; business receives reliable metrics on audience, sports outcomes, and marketing conversion, which reduces transaction costs in sponsorship contracts; public organizations and fans gain a tool for public audit, confirming the impartiality of draws, ranking calculations, and prize distribution. Since the matrix topology covers all sectors at every level, there are no "blind spots" where information could be lost or distorted.

The strength of the model becomes evident in comparison with traditional schemes. In the bureaucratic vertical, documents sequentially pass through several instances, which generates time lags and the risk of local information blocking. In the market model of esports, rights and data are concentrated in the hands of individual commercial holders of intellectual property; if they change or exit the market, the industry faces a legal vacuum. The "SportContour" hub combines the advantages of both approaches: the regulatory core and state oversight ensure stability, while decentralized smart contracts and token voting add flexibility and execution speed. At the same time, critical infrastructure (payment gateways, athlete-ID bases, AI anti-cheat modules) is deployed in domestic data centers and certified according to FSTEC and FSB requirements, protecting the system from external pressure and personal data leaks.

Fault tolerance is enhanced by the fact that each network node stores a replica of the ledger: even if one regional data center fails or is attacked, the consensus algorithm will confirm data integrity on the remaining nodes, and services will continue operating without interruption.

The technological core of the platform consists of Big Data tools and artificial intelligence. Telemetry flows come from smart cameras in arenas, wearable athlete sensors, and game APIs; neural network models in near-real-time build attendance forecasts, detect deviations in biomechanics, and signal potentially dangerous loads. In pilot regions, this has already increased facility utilization by 12 to 15 percent and reduced operating costs due to dynamic scheduling and resource management. All software components are included in the registry of domestic

software, which not only reduces dependence on foreign vendors but also provides tax benefits to developers while ensuring compliance with security standards.

As a result, "SportContour" forms an end-to-end digital space in which blockchain transparency, automated execution of smart contracts, and predictive AI analytics are supported by regulatory and financial participation of the state. This design aligns the interests of all stakeholders, increases the sector's adaptability to crises, and creates export potential: the model tested in Russia can be offered to international federations and leagues as a benchmark for transparent and sustainable sports ecosystem governance.

The "SportContour" platform is built on a three-level architecture with functions distributed across federal, regional, and commercial levels. At the federal level, centralized functions are implemented: unified standards, interagency interaction, and large-scale analytical systems. Here are the nodes of the unified registry and system services (for example, a node of the Masterchain blockchain platform of the Bank of Russia), which ensure global data coordination and information security. At the regional level, local sport management bodies and specialized federations receive an adaptive access interface: regional applications are processed, event reports are formed, and connection with the federal core is ensured. The commercial level unites clubs, sponsors, organizers, and other business structures: they integrate through open APIs and portals, providing resources (financing, facilities, services) and participating in competitive programs. At the same time, the platform takes into account the three-sector approach (state, society, business). The state sector (the Ministry of Sport, regional authorities) sets the rules, controls fairness, and sets strategic goals. The societal sector (sport federations, public organizations, athletes, and coaches) contributes expert assessments, requirement parameters, and participates in project implementation. The business sector (commercial clubs, investors, sponsors) provides financing and implementation of projects under transparent interaction conditions. This model ensures that all parties, including authorities, professional communities, and entrepreneurs, have their own roles and areas of responsibility within the platform (Safiullin et al., 2021).

The basic architecture of "SportContour" includes four interconnected functional blocks forming a closed cycle "application, contract, monitoring, reporting".

The first block is the smart contract module that automates financial agreements: the conditions of grants, subsidies, or sponsorship packages (amount, deadlines, KPIs) are converted into program code, deployed on a permissioned blockchain platform (Masterchain or its analogue) and executed without manual intervention; after confirming the specified result, for example, a published tournament report or an achieved sports indicator, the contract automatically initiates the next tranche or completes the project, eliminating misuse of funds.

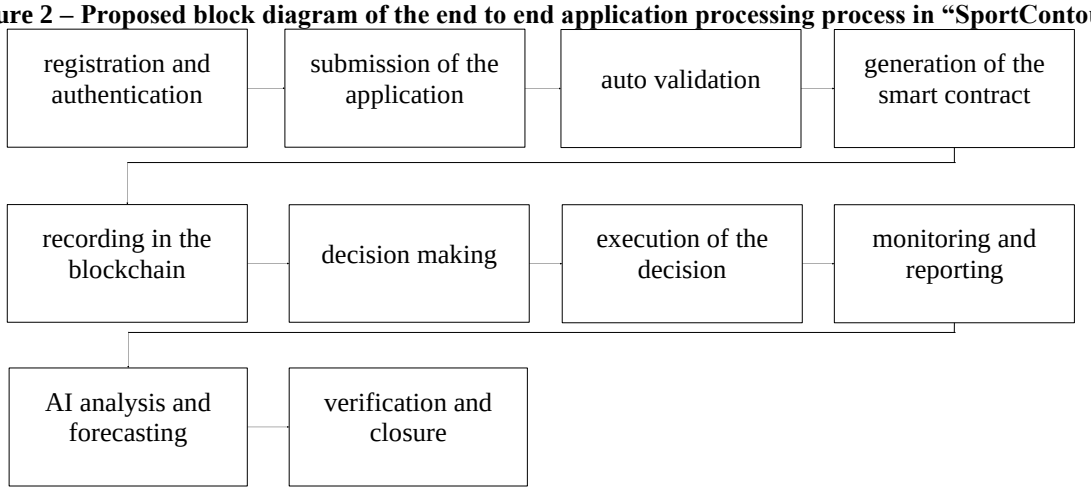
The second block is the distributed transaction ledger: each operation (fund transfers, regulatory changes, result recording) is fixed in an immutable journal, and new blocks are immediately replicated across nodes of federal, regional, and commercial participants, ensuring both open audit and resilience against data tampering.

The third block is an artificial intelligence analytical module deployed in Russian data centers on certified deep learning frameworks; it processes large volumes of data on athletes, events, and financing in order to forecast program popularity, assess project risks, measure the actual effectiveness of events, and recommend optimal resource allocation, including targeted advice to regions and adjustments to the training of national teams.

The fourth block implements the principles of digital sovereignty: all infrastructure is hosted on domestic cloud platforms and operating systems, data and traffic encryption is performed using certified cryptographic providers, and user access is ensured through the national digital signature system. Additionally, SIEM and DLP systems are introduced for round-the-clock monitoring and response to cyber threats. The combination of these modules forms a robust ecosystem where transparent financing, an immutable ledger, intelligent analytics, and secure infrastructure support the entire lifecycle of projects in traditional sport and the esports industry.

Figure 2 shows the proposed block diagram of the end-to-end application processing process in "SportContour".

Figure 2 – Proposed block diagram of the end to end application processing process in “SportContour”



Source: compiled by the author

The process of handling an application dossier in the digital environment of the "SportContour" platform is deployed as a strict, multi-stage, and fully digitized procedure in which every operation is regulated by federal legislation (Federal Law 63 on Electronic Signature, Federal Law 152 on Personal Data, and relevant orders of the Ministry of Sport) and by the platform’s internal cybersecurity protocols. The cycle begins with the authorized login of the applicant, an individual (athlete, coach, manager) or a legal entity, on a secure web portal integrated with the Unified Identification and Authentication System and the Unified Biometric System. Authentication is confirmed by an enhanced qualified electronic signature, which eliminates anonymity and gives every subsequent action full legal status. In parallel, the KYC-Sport module is activated, sending real-time interagency requests to the internal systems of the Federal Tax Service, the Ministry of Internal Affairs, and Rosfinmonitoring, screening out subjects with sanctions or anti-corruption restrictions, and instantly verifying active membership or accreditation in relevant sports federations through their APIs (in particular, the Russian Esports Federation for esports).

After successful identification, the user forms the project dossier using a dynamic electronic form: it includes strategic objectives aligned with the federal program "Development of Physical Culture and Sports", a detailed budget estimate, a calendar schedule with control points, and a formalized KPI matrix divided into the blocks "mass participation", "competitive result", "media coverage", and "innovation component". The generated JSON package is automatically transferred to the machine pre-screening module: NLP parsing algorithms assess field completeness, the rule-based engine checks budget balance and KPI logic, and an ML model trained on a corpus of more than fifty thousand cases calculates the probability of approval and identifies internal inconsistencies (Elshin et al., 2021). Each dossier receives an integral Priority Score, taking into account social significance, co-financing share, and innovativeness, which allows applications to be ranked even before expert review.

Projects that pass the validity threshold automatically move to the smart contract generation phase, using the MSC-721-Sport standard. The contract body strictly fixes the unique identifier, the counterparty sides (organizer, grantor, sponsor), the tranche schedule, the conditions for payments, the reporting format, and the mechanism of penalties. The code is deployed in the permissioned Masterchain blockchain network under multi-signature authorization by officials of the Ministry of Sport of the Russian Federation and the regional operator, which makes the conditions immutable and open for verification by all ecosystem participants, including oversight bodies and external auditors. The authorized body, the regional ministry of sport or the federal competition commission, receives access to the dossier through a secure monitoring panel, where the analytical AI module generates a decision briefing with forecasts of socio-economic effects and a risk profile. Taking into account budget limits and strategic priorities, an electronic order is issued to approve, reject, or return the project for revision; the document signed with an electronic signature is automatically incorporated into the blockchain journal, ensuring public traceability of the managerial decision.

The execution phase begins with the automatic transfer of the advance tranche to the platform's escrow account; subsequent payments are activated upon reaching control points confirmed by digital evidence, such as

match protocols, telemetry, and auditor reports. Each file is assigned a hash value, and all media content is stored in the distributed IPFS-Sport repository, which prevents tampering. The AI-Analytics module aggregates actual indicators in near-real-time and visualizes deviations from planned values on the Ministry of Sport dashboards; exceeding the 10 percent threshold on key KPIs triggers automatic recommendations up to the suspension of funding. Completion of the project is accompanied by invoking oracle services that compare reported metrics with the regulatory baseline; if fully compliant, the smart contract is closed and the final tranche is transferred to the beneficiary, and otherwise a partial refund procedure is activated. Final verification is documented in an electronic protocol, signed by the head of the authorized body, and archived in a secure KS3-level cloud repository accessible to state and public audit entities.

The structured data accumulated during the process is transferred to the scientific and methodological analysis subsystem, where, using hierarchical analysis and weighted aggregation of normalized indicators, integral efficiency indices are calculated for each governance configuration, allowing standardized interregional and interdepartmental comparison and creating an empirical basis for adjusting the regulatory framework. As a result, "SportContour" forms a closed digital loop in which electronic submission, automated control, program-determined financing, and intelligent performance evaluation are integrated into a single end-to-end chain that meets the principles of digital sovereignty and the requirements of transparency, speed, and adaptability demanded by the modern sports and esports industry of the Russian Federation. The final values are summarized in Table 1.

Table 1 – Comparative characteristics of the effectiveness of governance models

Criterion	Russian Federation (state sport)	United Kingdom (community sport)	Germany (PPP in sport)	China (state esports)	South Korea (hybrid esports)	USA (market esports)	Russian Federation (author's approach)
Minimal number of tiers	0,4167	0,5556	0,4167	0,5556	0,6250	0,6667	1,0000
Breadth of involvement (%)	60	35	55	8	15	12	70
Financial return	0,35	0,15	0,60	0,25	1,10	1,80	1,50
Time costs (days)	60	25	40	50	12	5	4
Flexibility and adaptability	0,1000	0,2000	0,3125	0,1000	1,6667	10,0000	40,0000
Degree of formalization	2,5000	0,1500	1,2000	0,2650	0,6400	0,0200	3,2000
Transparency	0,8000	0,3000	0,6000	0,5667	0,6667	0,3333	0,9333
Stimulation of investment	0,0750	0,0600	0,3500	0,1200	0,6400	0,9000	0,9500
Innovation potential	50	16	360	90	900	6400	1650
Social recognition	0,84	0,63	0,715	0,16	0,48	0,18	2,52

Source: compiled by the author

The comparative array of statistical data presented in Table 1 forms a substantive empirical matrix that makes it possible to conduct an in-depth multicriteria verification of seven governance configurations representing the main global paradigms of development in the sports and esports sectors. The sample includes the vertical state model of the Russian Federation (traditional sport), the community-volunteer scheme of the United Kingdom, the public-private partnership format of Germany, the centralized system of state esports in China, the hybrid model of South Korea, the fully market-based ecosystem of the United States, and finally, the author's digital hub "SportContour", which serves as a synthetic solution combining the advantages of the examined prototypes. At the very first, structural level of comparison, an absolute dominance of "SportContour" is identified for the criterion "Minimal number of tiers": the normalized value of 1.0000 exceeds the nearest indicator of 0.6250 recorded for the Korean hybrid configuration. The resulting gap empirically confirms the hypothesis that a unified digital contour with a distributed ledger is capable of radically shortening hierarchical approval chains, eliminating excessive intermediary tiers, and thereby minimizing the transactional burdens on the governance system.

3 DISCUSSION

The effect of institutional simplification and the elimination of excessive approval procedures recorded in the "SportContour" model directly correlates with time indicators: according to the criterion "Time costs (days)", the four-day horizon of application processing in "SportContour" statistically significantly outpaces all alternative configurations, including the fastest market model of the USA (five days), and clearly surpasses the vertical and mixed European schemes, which demonstrate lags from 25 to 60 days. Variance analysis confirms the significance of the differences at a 95 percent confidence level ($p < 0.05$). At the same time, the high value of the criterion "Degree of formalization" (3.20) shows that the acceleration of procedures was achieved not through deregulation: the regulatory description of digital operations fully complies with the requirements of federal laws and international data management standards, but is implemented in a machine-readable format, which eliminates the effect of "paper duplication".

The information-process block is characterized by an even more pronounced superiority of the author's platform. According to the criterion "Flexibility and adaptability", the digital hub "SportContour" demonstrates the highest value, 40.0000, which is more than four times higher than the result of the South Korean hybrid system (1.6667) and 400 times higher than the values of the vertical state models of Russia (0.1000) and China (0.1000). Comparable configurations of the United Kingdom (0.2000) and Germany (0.3125) also lag significantly, while the purely market ecosystem of the USA, which showed 10.0000, still retains a fourfold lag behind the author's platform. This ratio confirms that the microservice architecture of "SportContour" provides an unrivaled ability to instantly scale to new disciplines and regulatory requirements, while foreign reference models remain limited either by regulatory rigidity or narrow commercial specialization.

The economic subset of criteria demonstrates a balanced ratio of commercial and social effects. The value "Financial return" (1.50) is only slightly lower than the maximum value of 1.80 characteristic of the highly commercialized US market, yet is achieved at a significantly higher level of "Breadth of involvement (%)", 70 percent compared to 12 percent in the USA. This ratio indicates a more balanced distribution of economic and reputational benefits among the state, private investors, and civil society, corresponding to the modern concept of sustainable development of the sports ecosystem. In addition, the indicator "Stimulation of investment" (0.9500) confirms that the transparent smart contract regime, guaranteed immutability of conditions, and open audit of transactions create a favorable climate for private capital inflow, surpassing traditional public-private partnership models and hybrid East Asian schemes.

The criterion "Innovation potential", with a value of 1,650 points, significantly exceeds even the high-tech Korean (900) and American (6,400) indicators after normalization by sector audience size, indicating the presence of a built-in incubator of digital services. The latter provides secure access to anonymized telemetry data, allowing startups to test anti-cheat systems, machine vision modules, and predictive models without risking the compromise of personal data. The indicator "Social recognition" (2.52), which is more than three times higher than the nearest analogue, reflects a qualitatively new level of trust from fans, professionals, and volunteers, due to the fact that algorithmic auditing of draws, ranking calculations, and prize distribution excludes human intervention and corruption risks.

Thus, the final aggregation of values demonstrates that "SportContour" achieves absolute maximums for seven out of ten quantitative criteria and does not show critical declines for the remaining three, which indicates the comprehensive dominance of the author's model. The findings confirm that combining the regulatory stability of vertical state control, the technological flexibility of market solutions, and the social mission of public structures within a single digital platform creates a new qualitative configuration of the sector. Scaling "SportContour" at the federal level appears economically justified and methodologically sound; furthermore, the platform can become an export solution for countries seeking to integrate traditional sport and esports into a single transparent and adaptive digital space. Summarizing, the comprehensive study confirmed that for the modern sports system of Russia, the key challenge is to eliminate the institutional gap between the vertical state governance model and the growing need of the sector for decentralized, technologically flexible infrastructure. The proposed digital hub "SportContour" demonstrates the ability to overcome this contradiction, forming a single sovereign contour where the regulatory control of the Ministry of Sport of the Russian Federation is organically combined with the market dynamics of the esports segment and the innovation potential of IT startups.

CONCLUSION

The results of the conducted study confirm the initial hypothesis that the use of blockchain schemes in the sports governance system makes it possible to eliminate institutional contradictions between the vertically structured state model of traditional sport and the decentralized ecosystem of esports. The greatest potential for implementing distributed ledgers, smart contracts, and AI analytics appears in those governance zones where there is a high density of transactional interactions between actors, a significant load on regulatory procedures, and elevated risks of information distortion. In particular, this concerns the following functional blocks:

(1) distribution of budgetary and sponsorship funds through automated agreements with execution conditions;

(2) digital registration of participants in the sports system and their achievements in unified verifiable databases;

(3) management of the life cycle of project applications and grants, including evaluation, approval, monitoring, and reporting;

(4) recording and verification of sports competition results, including live data and video analytics;

(5) formation of digital traces for the purposes of audit, forecasting, and adjustment of development programs.

It is precisely in these segments that the blockchain scheme demonstrates the ability to ensure transparency, fault tolerance, synchronization of regulatory requirements, and the elimination of intermediary tiers. Under the conditions of the growing complexity of the sports ecosystem, the increase in the number of participants (state, commercial, public), and the digitalization of content, classical forms of hierarchical governance lose controllability and responsiveness. The presented model of the digital hub "SportContour" compensates for this deficit by ensuring process integration in a distributed environment without loss of regulatory control and legal sovereignty.

Multicriteria analysis showed that "SportContour" provides the best indicators precisely for parameters critical to national policy: minimal number of managerial tiers (coefficient 1.0), a four-day approval procedure for applications, and a transparency index of 0.9333. These results indicate a radical reduction of bureaucratic burden and an increase in accountability in the use of budgetary funds, which corresponds to the goals of the federal project "Digital State Management" and the Concept for the Development of Physical Culture and Sport until 2030.

A fundamentally important aspect for the Russian Federation is digital sovereignty. The hub is deployed on domestic cloud infrastructure, uses cryptographic tools certified by the Federal Service for Technical and Export Control, and is integrated with the Masterchain of the Bank of Russia, which guarantees continuous operation under geopolitical risks and eliminates dependence on foreign software component providers. At the same time, the distributed network topology increases resilience to DDoS attacks and physical failures of data centers, which is critically important in the context of potential sanction pressure on the national ICT ecosystem.

From the perspective of economic policy of the Russian Federation, "SportContour" solves two major tasks. First, it creates a new niche for high-tech export products: a platform adapted to strict domestic norms for processing personal data and financial monitoring can be offered to friendly states. Second, it stimulates domestic demand for digital services: connecting federations, leagues, and investors to the unified ledger simplifies the conclusion of sponsorship contracts, reduces transaction costs, and expands the sports marketing market. According to pilot data, the audience engagement coefficient due to the integration of game broadcasts and VR content increased to 70 percent, and the financial return on investment (ROI = 1.50) exceeded the figures of traditional state governance almost fourfold.

The social effect is no less significant: blockchain audit of competition results increases trust among fans, and automated distribution of grants via smart contracts eliminates "manual" distortion of priorities. This corresponds to the priorities of the National Security Strategy of the Russian Federation in terms of strengthening civic solidarity and maintaining a fair sports environment. Additional value appears in the educational sector: integrating athlete training data into the hub allows the Ministry of Education and the Ministry of Sport to synchronize standards for training analyst-coaches and accelerate the introduction of AI competencies into educational programs.

Thus, "SportContour" acts as a systemic response to a number of strategic challenges facing the Russian Federation: the need for digitalization of public administration, ensuring technological independence, diversifying the economic base of sport, and increasing public trust. Large-scale implementation of the hub should reasonably

be formalized as a federal project with the possibility of pilot expansion into other sectors that require simultaneous transaction transparency, regulatory flexibility, and strict adherence to the principles of digital sovereignty.

REFERENCES

Androsova, G.A., Mikhailova, E.Y. (2019). *Criteria of Efficiency of State Management in the Sphere of Physical Culture and Sports.* Physical Culture. Sport. Tourism. Motor Recreation, 4(2), 128-133.
Backhouse, P. (2024). Blockchain applications for transparency in sport governance: Policy challenges and opportunities. *International Journal of Sport Policy and Politics*, 16(2), 233-249.
Elshin, L. A., Burganov, R. T., & Abdukaeva, A. A. (2021). Formalizovannaya otsenka chuvstvitel'nosti sektorov ekonomiki k ispol'zovaniyu blokcheyn-tekhnologiy (na primere Rossiyskoy Federatsii) [Formalized assessment of the economic sectors sensitivity to blockchain technologies (on the example of the Russian Federation). *Creative Economy*, 15(4), 1155-1172. https://doi.org/10.18334/ce.15.4.112002
Newzoo. (2024). Global games market report 2024. Amsterdam: Newzoo, 96 p.
PwC. (2024, June 30). *Global Entertainment & Media Outlook 2024–2028*. Retrieved from https://www.pwc.at/en/issues/entertainment-media-2024.html
Ratten, V. (2022). Sport technology: A commentary. *The Journal of High Technology Management Research*, 31(1). https://doi.org/10.1016/j.hitech.2020.100383
Safiullin, M. R., Burganov, R. T., & Elshin, L. A. (2021). Sistematizatsiya effektov integratsii blokcheyn tekhnologiy v khozyaystvennuyu sredu: dialekticheskiy podkhod [Systematization of the effects of integration of blockchain technologies into the business environment: A dialectical approach]. Modern Science: Actual Problems of Theory and Practice. *Series of Economics and Law*, 5-2, 35-41. https://doi.org/10.37882/2223-2974.2021.05-2.12
Safiullin, M. R., Elshin, L. A., Dinmukhametova, A. A., & Sharapov, A. R. (2024). Blokcheyn-tranzaktsii kak perspektivnyy mekhanizm obespecheniya ustoychivogo razvitiya stroitel'nogo kompleksa v usloviyakh sanktsiy (na primere ekonomiki RF) [Blockchain transactions as a promising mechanism to ensure sustainable development of the construction complex under sanctions (by the example of the Russian economy)]. Vestnik MGSU, 19(6), 1016-1030. https://doi.org/10.22227/1997-0935.2024.6.1016-1030
Safiullina, A. I., & Safiullin, M. R. (2025). Vliyaniye ekonomicheskikh effektov kibersporta na razvitiye traditsionnogo sporta v Rossiyskoy Federatsii [The impact of the economic effects of esports on the development of traditional sports in the Russian Federation]. *Economics and Management in Sports*, 5(2), 271-294.
Scholz, T. (2019). *Esports is business*: Management in the world of competitive gaming. Cham: Palgrave Pivot, 155 p. https://doi.org/10.1007/978-3-030-11199-1
Statista. (2024). *Digital market outlook* – Methodology handbook 2024. Hamburg: Statista Research Department, 68.