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A Network-Based Causal Performance Evaluation Model for Iranian Sports Federations Based on the Balanced Scorecard and DEMATEL

ABSTRACT

The purpose of the present study was to develop a network-based causal performance evaluation model for Iranian sports federations based on the Balanced Scorecard and the Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique. In terms of methodology, this study is classified as a descriptive-analytical research design. It is descriptive because it seeks to collect comprehensive and factual information regarding the phenomenon under investigation, and analytical because multi-criteria decision-making techniques were employed to conduct realistic, accurate, pairwise comparisons and to incorporate the subjective judgments of experts in determining causal relationships as well as the significance coefficients of indicators and sub-indicators. The statistical population of the study consisted of two sections. The first section included experts and specialists from sports federations, as well as academic and organizational experts and specialists who were selected through convenience sampling. The second section consisted of managers and employees of the sports federations under study (810 individuals). In the first stage, due to the limited size of the expert population, a census method was employed; therefore, no sampling procedure was required. In the second stage, stratified sampling based on Cochran's formula was used to examine the performance status of the selected sports federations. According to the formula, the sample size was initially estimated at 284 individuals. However, considering the unlimited population assumption and based on the Morgan Table, 200 participants were ultimately selected. Accordingly, the final sample size for the study was determined to be 200 individuals. In the first phase of the research, the performance evaluation model of sports federations was identified. In the second phase, the identified indicators were refined. The indicators extracted in the first phase were categorized and presented to the experts through a questionnaire designed on a five-point Likert scale. Subsequently, based on the opinions of university professors and experts, the indicators were positioned within the perspectives of the Balanced Scorecard framework. The indicators that obtained the highest scores from the experts were selected as the principal and influential indicators affecting performance and productivity. In the final phase, the performance status of the organization under study was evaluated according to the extracted criteria and sub-criteria. At this stage, in order to measure the values of the sub-criteria, a combination of data collection instruments, including actual data and four researcher-developed questionnaires administered to employees using a five-point Likert scale, was utilized. Microsoft Excel software was used to perform the DEMATEL calculations. After conducting the mathematical calculations associated with the DEMATEL technique, the internal and external relationships among the examined factors were ultimately calculated using the total relation matrix. Following the formation of the decision network, pairwise comparisons among the factors were conducted. Subsequently, the weights and significance of each factor were determined using the Analytic Network Process (ANP) technique and Super Decisions software.

Keywords: Performance Evaluation, Sports Federations, Balanced Scorecard, DEMATEL.

Introduction

Sports federations are among the most influential institutions in the governance and development of sport systems, playing a critical role in policy implementation, athlete development, organizational coordination, public participation, and international representation. In recent decades, the increasing complexity of sports environments, intensified competition, financial pressures, technological transformation, and growing stakeholder expectations have compelled sports federations to move beyond traditional administrative approaches and adopt strategic management systems capable of continuously evaluating and improving organizational performance [1, 2]. In this context, performance evaluation has emerged as one of the most significant managerial tools for ensuring accountability, organizational effectiveness, strategic alignment, and sustainable development in sport organizations [3, 4].

Performance evaluation in sports organizations is no longer limited to financial outcomes or championship achievements. Modern sport management literature emphasizes multidimensional evaluation systems that simultaneously assess financial efficiency, stakeholder satisfaction, internal processes, organizational learning, innovation capacity, and strategic adaptability [5, 6]. Sports federations operate within highly dynamic environments where organizational success depends on the integration of managerial, technical, social, educational, and infrastructural dimensions. Consequently, traditional evaluation systems based solely on quantitative indicators are insufficient for accurately capturing the complexity of federation performance [7, 8]. This challenge has led researchers and practitioners to seek integrated performance management frameworks capable of combining quantitative and qualitative indicators while simultaneously identifying causal relationships among organizational dimensions.

Among the most influential strategic performance evaluation frameworks developed in recent decades is the Balanced Scorecard (BSC). The Balanced Scorecard was introduced as a multidimensional strategic management system that evaluates organizational performance through interconnected perspectives rather than isolated financial measures. In sports organizations, the BSC has been widely recognized as an effective framework for translating strategic objectives into measurable indicators and for aligning organizational activities with long-term strategic goals [9, 10]. The four primary perspectives of the Balanced Scorecard—financial, customer, internal processes, and learning and growth—provide a comprehensive basis for evaluating organizational effectiveness in sports federations [11, 12].

The financial perspective in sports federations encompasses budget allocation efficiency, financial sustainability, resource management, and investment effectiveness. Financial stability is essential for sports federations because inadequate budgeting and inefficient resource allocation can significantly undermine developmental programs, athlete preparation, infrastructure improvement, and organizational sustainability [5, 13]. Contemporary sports federations increasingly face financial accountability pressures from governments, sponsors, and stakeholders, making strategic financial evaluation a critical managerial necessity [1, 8]. At the same time, financial evaluation in nonprofit sport organizations differs substantially from commercial organizations because success is often measured by social impact, athletic development, and public participation rather than profit maximization [2, 7].

The customer perspective within sports federations includes athlete satisfaction, employee satisfaction, stakeholder trust, managerial legitimacy, and public engagement. Modern sport governance models emphasize stakeholder-centered management approaches because federations interact simultaneously with athletes, coaches, fans, sponsors, governmental institutions, volunteers, and local communities [2, 6]. Stakeholder satisfaction is directly associated with organizational

legitimacy, institutional trust, and long-term sustainability. Research has demonstrated that sports organizations capable of improving communication, participation, and transparency are more successful in maintaining stakeholder commitment and organizational stability [14, 15].

Internal organizational processes constitute another major dimension of performance evaluation in sports federations. These processes include planning, monitoring, educational systems, talent identification, event management, performance supervision, and operational coordination. Efficient internal processes contribute directly to organizational productivity and service quality [16, 17]. In sports federations, internal process efficiency also influences athlete development pathways, competition quality, coaching systems, and administrative responsiveness. Consequently, identifying weaknesses within organizational processes is essential for enhancing operational effectiveness and achieving strategic objectives [9, 18].

The learning and growth perspective represents the infrastructural foundation of organizational development. This dimension focuses on human capital, information systems, organizational culture, innovation, and knowledge management. In contemporary sports management, organizational learning and innovation are considered critical determinants of long-term competitiveness and adaptability [19, 20]. Sports federations increasingly operate in environments characterized by technological disruption, digital transformation, and rapid environmental change. Therefore, organizations that invest in employee development, digital infrastructure, and innovative capabilities are more likely to achieve sustainable organizational success [21, 22].

Digital transformation has become particularly important in modern sports governance systems. Emerging technologies, data analytics, digital communication platforms, and intelligent management systems have fundamentally changed the structure and operation of sports organizations [20, 21]. Sports federations are increasingly expected to adopt digital infrastructures capable of supporting decision-making processes, performance monitoring, stakeholder engagement, and crisis management. Recent studies have emphasized that digital transformation enhances organizational resilience, adaptability, and strategic responsiveness in sports institutions [22]. Consequently, performance evaluation systems must incorporate indicators associated with technological readiness, digital capability, and innovation management.

Leadership and governance also play fundamental roles in determining the effectiveness of sports federations. Leadership quality influences employee motivation, organizational culture, innovation acceptance, ethical behavior, and strategic implementation [15]. Effective leaders create environments that encourage participation, accountability, creativity, and organizational learning. Conversely, weak governance structures may contribute to corruption, inefficiency, organizational conflict, and strategic stagnation [14]. Governance challenges within sports federations have received increasing scholarly attention because managerial instability, politicization, and lack of transparency can undermine both organizational legitimacy and developmental performance.

In the Iranian sport system, sports federations represent central institutions responsible for organizing national competitions, developing talent pathways, coordinating educational activities, and representing the country in international sports events. Despite the strategic importance of these organizations, many Iranian sports federations continue to face challenges related to organizational structure, strategic management, financial allocation, performance monitoring, and human resource development [23, 24]. Previous studies conducted in Iran have indicated that many sport organizations lack comprehensive and scientifically grounded performance evaluation systems capable of integrating strategic, operational, and developmental dimensions [25, 26].

Several Iranian researchers have attempted to design performance evaluation systems for sports organizations using strategic management frameworks. Studies have explored the application of the Balanced Scorecard in sports clubs, Olympic committees, physical education departments, and sports federations [10, 13, 18]. These studies generally demonstrated that multidimensional evaluation systems improve strategic alignment and organizational monitoring. However, many existing models remain primarily descriptive and fail to identify causal relationships among performance indicators. As a result, managers may understand what indicators are important without understanding how these indicators influence one another dynamically.

To overcome this limitation, researchers increasingly recommend integrating multi-criteria decision-making techniques with strategic management frameworks. Among these techniques, the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method has gained substantial attention due to its ability to identify causal relationships among complex organizational variables [27]. DEMATEL enables researchers to distinguish between cause factors and effect factors and to determine the intensity and direction of relationships among indicators. In organizational studies, this method provides a systematic approach for analyzing interdependencies within complex systems and identifying critical driving variables.

The integration of DEMATEL with the Balanced Scorecard creates an advanced strategic evaluation framework capable of both measuring organizational performance and explaining causal interactions among organizational dimensions [16, 17]. Such integration is especially important in sports federations because organizational variables are highly interconnected. For example, leadership quality may influence innovation, innovation may improve internal processes, and improved internal processes may increase stakeholder satisfaction and financial outcomes. Traditional evaluation models cannot adequately capture these complex interactions. Therefore, causal network-based evaluation models provide a more realistic understanding of organizational performance dynamics.

Another important methodological approach integrated into modern evaluation systems is the Analytic Network Process (ANP). Unlike hierarchical decision-making methods, ANP allows for interdependence among variables and criteria, making it particularly suitable for complex organizational environments [27]. Combining ANP with DEMATEL and the Balanced Scorecard allows researchers to simultaneously identify causal relationships, prioritize indicators, and determine the relative weights of organizational variables. This integrated approach strengthens both the analytical depth and practical applicability of performance evaluation systems.

The necessity for developing integrated causal evaluation models in sports federations has become even more urgent due to the increasing demand for organizational accountability and strategic effectiveness. Governments, sponsors, athletes, and international institutions increasingly expect sports federations to demonstrate transparency, efficiency, innovation, and measurable outcomes [2, 7]. Consequently, federations require scientific evaluation systems capable of supporting evidence-based decision-making and continuous organizational improvement.

Despite the growing body of literature on strategic performance evaluation in sports organizations, significant research gaps remain. Many studies have focused on isolated dimensions of performance rather than integrated causal systems. Furthermore, limited research has examined the simultaneous integration of the Balanced Scorecard, DEMATEL, and ANP within the context of Iranian sports federations. Existing studies have often emphasized descriptive assessment without constructing causal network models capable of identifying leading and lagging indicators [12, 18]. In addition, rapid

developments in digital transformation, innovation management, and governance complexity have created new evaluation requirements that many traditional models fail to address adequately [20, 21].

Moreover, organizational innovation has become a central determinant of effectiveness in modern sports organizations. Innovative federations are more capable of adapting to environmental changes, improving service quality, attracting stakeholders, and enhancing strategic performance [2, 19]. Therefore, performance evaluation systems must incorporate indicators related to innovation capacity, learning capability, and organizational adaptability. Simultaneously, ethical leadership and participatory governance remain essential for ensuring organizational sustainability and stakeholder trust [14, 15].

The development of integrated strategic evaluation models is also consistent with broader trends in organizational excellence frameworks such as EFQM and strategic quality management systems [28, 29]. These frameworks emphasize continuous improvement, stakeholder orientation, innovation, and systemic thinking. In the sports sector, adopting such integrated approaches may significantly improve strategic coherence, operational effectiveness, and long-term sustainability.

Accordingly, the present study aimed to design a network-based causal performance evaluation model for Iranian sports federations based on the Balanced Scorecard, DEMATEL, and Analytic Network Process approaches.

Methodology

This study was conducted using both library-based and field research methods. The required data were collected through questionnaires. Following a preliminary examination, the validity and construct reliability of the relevant scales and items were confirmed. Therefore, this section addresses the nature of the research methodology, the sampling procedure and sample size determination, the nature of the instruments and data collection methods, the validity and reliability of the research instruments, and the procedures used for data processing. In terms of methodology, this study is classified as a descriptive–analytical research design. It is descriptive because it seeks to collect comprehensive and factual information regarding the phenomenon under investigation, and analytical because multi-criteria decision-making techniques were employed to conduct realistic, accurate, pairwise comparisons and to incorporate the subjective judgments of experts in determining causal relationships as well as the significance coefficients of indicators and sub-indicators. The statistical population of the study consisted of two sections. The first section included experts and specialists in sports federations, as well as academic and organizational experts and specialists selected through convenience sampling. The second section consisted of managers and employees of the sports federations under study (810 individuals). In the first stage, due to the limited size of the expert population, a census method was employed; therefore, no sampling procedure was required. In the second stage, stratified sampling based on Cochran's formula was used to examine the performance status of the selected sports federations. According to the formula, the sample size was initially estimated at 284 individuals. However, considering the population as unlimited, 200 participants were ultimately selected based on the Morgan Table. Accordingly, the final sample size for the present study was determined to be 200 individuals.

In this study, the library research method was employed to identify the theoretical foundations and background of the topic and to examine the developmental trend of the subject under investigation. The library-based approach involved the use of library resources and studies, consultation of domestic and international scientific document and database websites, and the review of relevant articles. In the first phase of the study, the performance evaluation model of sports federations

was identified. At this stage, by utilizing the Baldrige Excellence Model within the Balanced Scorecard approach, indicators for evaluating and measuring organizational and employee performance were identified through a review of the research literature and by consulting articles, documents, databases, and academic theses. In the second phase, the identified indicators were refined. The indicators extracted in the first phase were categorized and presented to experts through a questionnaire designed on a five-point Likert scale. Subsequently, based on the opinions of university professors and experts, the indicators were positioned within the perspectives of the Balanced Scorecard framework. The indicators receiving the highest scores from the experts were selected as the principal and influential indicators affecting performance and productivity. In the final phase, the performance status of the organization under study was evaluated according to the extracted criteria and sub-criteria. At this stage, in order to measure the values of the sub-criteria, a combination of data collection instruments, including actual data and four researcher-developed questionnaires administered to employees using a five-point Likert scale, was utilized. The questionnaire designed for scoring the extracted indicators was distributed among experts in the relevant field. Microsoft Excel software was used to perform the calculations associated with the DEMATEL method. After conducting the mathematical calculations related to the DEMATEL technique, the internal and external relationships among the examined factors were calculated using the total relation matrix. Following the formation of the decision network, pairwise comparisons among the factors were conducted. Subsequently, the weights and significance of each factor were determined through the Analytic Network Process (ANP) technique using Super Decisions software.

Findings and Results

In this section, the findings obtained from the questionnaires were analyzed at the inferential level, and inferential statistical indicators were employed. Construct validity of the scale was examined using Confirmatory Factor Analysis (CFA). After collecting the questionnaires, the simple mean was used in the DEMATEL questionnaire in order to aggregate the experts' responses and assess the current performance status, whereas the geometric mean was applied in the Analytic Network Process (ANP) questionnaire. The data obtained from this study were analyzed using Microsoft Excel software for the DEMATEL method, Super Decisions software for the Analytic Network Process, and SPSS software for assessing the current performance status and conducting statistical analyses. In this study, a combined approach was employed in designing performance and productivity indicators in order to achieve a multidimensional perspective toward the organization. Accordingly, by adopting the Balanced Scorecard approach and the Baldrige Excellence Model in the sports sector, an attempt was made to accomplish this objective. In fact, it can be stated that the 67 identified indicators covered, to the greatest possible extent, all dimensions of sports federations. After reviewing the research literature, the performance and productivity indicators were identified and evaluated by experts, and 76 indicators that received the highest scores from the experts were selected. As presented in the following table, based on the mean test, these indicators were selected as the final indicators and positioned within the four perspectives of the Balanced Scorecard. Subsequently, using the DEMATEL technique, the relationships between leading Key Performance Indicators (KPIs), which occur without time delay, and lagging KPIs, which occur with a time delay, were identified. Influential KPIs were considered as leading indicators, whereas affected KPIs were considered as lagging indicators.

Table 1

Key Performance Indicators of Sports Federations Based on the Balanced Scorecard Approach

Perspective	Indicator	Sub-Indicator	Mean	t	Leading Indicators	Lagging Indicators
Customer	Employee	Level of satisfaction within the work unit	3.56	3.44		
		Average work performance score	3.83	4.89		
	Organization (Federation)	Managers' satisfaction	4.06	7.96		
		Employees' familiarity with the culture of sports federations	4.10	8.76		
		Employees' sense of responsibility and participation in sports, cultural, and social activities	4.22	7.88		
Internal Processes	Improvement of educational-sport processes	Number of continuous evaluations	3.85	7.07		
		Innovation in education	3.95	7.88		
		Innovations in new programs	3.81	5.66		
		Number of educational-sport programs	3.95	7.88		
	Service improvement	Percentage of employees active in groups	3.60	5.80		
		Continuous monitoring and evaluation of performance and employees	3.99	3.87		
		Performance evaluation of sports federations in physical education and training	4.05	4.09		
	Improvement of scientific-sport achievements	Number of employees relative to the population (compliance with workforce ratio)	4.15	4.66		
		Invention and innovation	3.50	3.64		
		Establishing effective communication with scientific and sports centers	3.79	3.23		
Learning and Growth	Information capital	Organizing educational and sports camps	4.03	7.06		
		Level of development and equipment of sports halls	3.80	5.99		
	Organizational capital	Degree of participation of experts and employees	3.85	9.11		
		Human capital	Employees' awareness	4.00	6.99	
	Quality of employee guidance	3.90	6.82			
	Employees' job satisfaction level	3.98	7.49			

Table 2

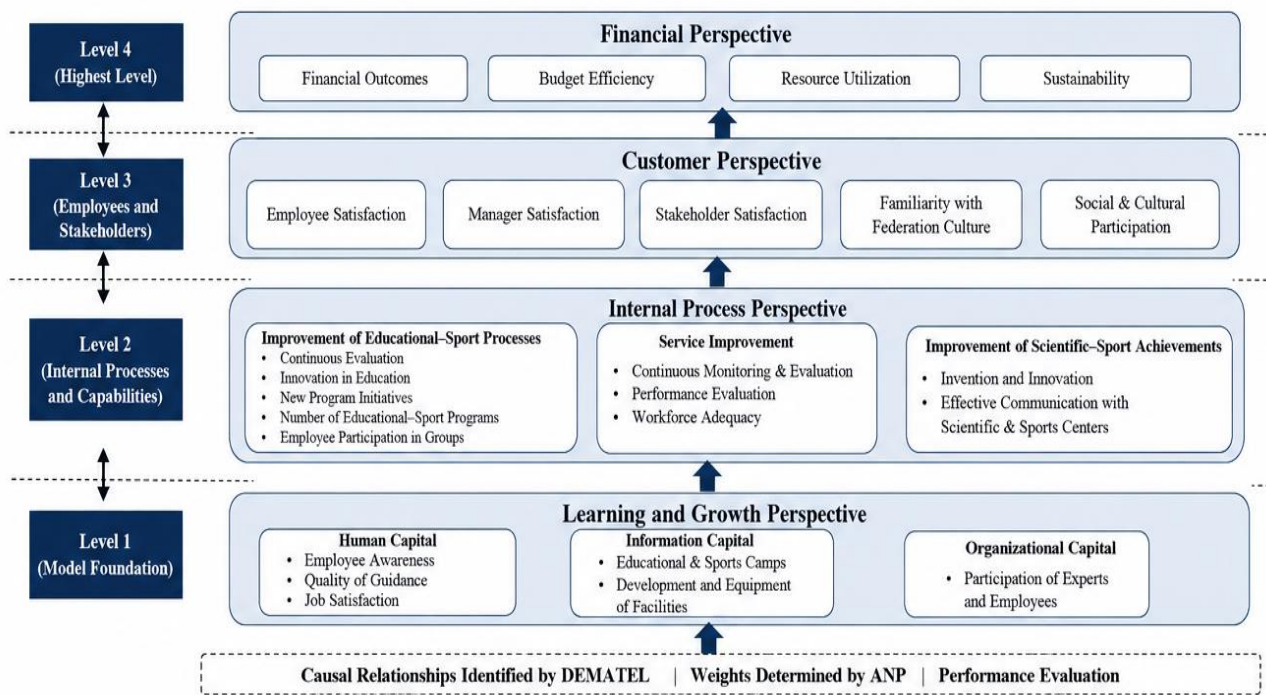
Influence and Dependence of Main Criteria Based on the DEMATEL Method

Sub-Indicators	R	J	R+J	R-J	Influence Rank	Criterion Type
Level of satisfaction within the work unit	3.9163	4.4084	8.3247	-0.4921	10	Effect
Average work performance score	3.6076	4.0355	7.6431	-0.4279	18	Effect
Managers' satisfaction	3.2901	3.9058	7.1959	-0.6157	22	Effect
Employees' familiarity with the culture of sports federations	2.9256	2.7676	5.6932	0.158	26	Effect
Employees' sense of responsibility and participation	3.0679	3.5615	6.6294	-0.4936	25	Effect
Number of continuous evaluations	3.2419	4.0743	7.3162	-0.8324	23	Cause
Innovation in education	4.2948	3.6225	7.9173	0.6723	4	Cause
Innovations in new programs	3.9117	4.1409	8.0526	-0.2292	11	Effect
Number of educational-sport programs	3.7919	4.2173	8.0092	-0.4254	14	Effect
Percentage of employees active in groups	3.2170	3.7070	6.9240	-0.4900	24	Effect
Continuous monitoring and evaluation of performance and employees	3.5166	4.3501	7.8667	-0.8335	20	Cause
Performance evaluation of sports federations	4.6871	3.0679	7.7550	1.6192	1	Cause
Number of employees relative to the population	3.7088	3.2419	6.9507	0.4669	15	Cause
Invention and innovation	3.3768	4.2948	7.6716	-0.9180	21	Effect
Effective communication with scientific and sports centers	4.0743	3.9117	7.9860	0.1626	7	Cause
Organizing educational and sports camps	3.6225	3.5615	7.1840	0.0610	17	Effect
Development and equipment of sports halls	4.1409	4.4084	8.5493	0.2675	6	Cause
Participation of experts and employees	4.2173	4.0355	8.2528	0.1818	5	Cause
Employees' awareness	3.7070	3.9058	7.6128	-0.1988	16	Cause
Quality of employee guidance	4.3501	4.4084	8.8341	0.1339	3	Cause
Employees' job satisfaction level	3.9915	3.2419	7.2334	0.7496	9	Effect
Budget allocated to programs	4.4084	4.2948	8.7032	0.1136	2	Cause
Budget allocated to educational affairs	4.0355	3.9117	7.9472	0.1238	8	Cause
Budget allocated to sports affairs	3.9058	3.7919	7.6977	0.1139	12	Cause
Level of sports facilities	2.7676	3.2170	5.9846	-0.4494	27	Effect
Quality of sports venues and halls	3.5615	3.5166	7.0781	0.0449	19	Cause
Degree of compliance with budgeting standards	3.8865	4.9877	8.8742	1.1012	13	Cause

Based on the results obtained from the DEMATEL method presented in the table above, it was determined that the most influential sub-criteria within the Balanced Scorecard approach, respectively in terms of influence level, included performance evaluation of sports federation affairs, approval of evaluation and ranking criteria in the assessment of sports federation activities, budget allocation for programs and services, quality of employee guidance and preparation in the teaching-learning process, innovation and the degree of application of active methods by employees, participation of experts and employees in the design and implementation of sports federation programs and activities, development and equipment of sports facilities and halls, establishment of effective communication with relevant centers, and budget allocation for sports affairs. Given their positive R+J values, these indicators were classified within the cause group. The remaining criteria of the model, according to expert opinions, were categorized as effect sub-criteria. The prioritization of criteria based on influence level is presented in the “Influence Rank” column of the table. Accordingly, all relationships among the factors were identified, clarifying which factors influenced other factors and, conversely, which factors were influenced by others. These extracted relationships were then utilized for designing the questionnaire and the network model within the Analytic Network Process. Therefore, the positions of the factors were determined based on the R-J and R+J indices. Based on the DEMATEL analysis results, influential (cause) and influenced (effect) indicators were identified. Subsequently, the final weight of each indicator was determined using the Analytic Network Process. Ultimately, the final performance evaluation model of sports federations was designed within the framework of the four Balanced Scorecard perspectives and according to causal relationships.

Figure 1

Integrated BSC-DEMATEL-ANP Model for Evaluating the Performance of Sports Federations



Based on the results of the DEMATEL analysis, significant causal relationships were observed among several of the identified indicators, which were represented by arrows in the final research model. These relationships indicate that certain indicators, as driving factors, can influence other indicators and contribute to improving the overall performance of sports federations. The findings demonstrated that the quality of employee guidance can facilitate increased innovation in

educational and sports programs. In other words, when federation managers and officials employ effective managerial practices and efficient guidance approaches, employees gain greater motivation and opportunities to present innovative ideas and implement creative programs. These innovations ultimately lead to increased employee satisfaction and improved organizational performance. The results also indicated that appropriate budget allocation to sports programs can increase both the number and quality of educational programs and contribute to the development of sports infrastructure. This, in turn, positively affects the quality of services provided and the satisfaction level of stakeholders. Furthermore, the participation of experts and employees in the design and implementation of programs was identified as another influential factor. Increased participation can contribute to the emergence of innovative ideas, improvement of implementation processes, and enhancement of the efficiency of federation activities. Ultimately, the improvement of these processes leads to increased satisfaction among employees and managers and consequently improves the performance outcomes of sports federations. Overall, the extracted causal relationships indicate that strengthening driving factors, particularly in managerial, resource-related, and innovation domains, can improve the overall performance of sports federations through enhancing internal processes and increasing stakeholder satisfaction.

Key Causal Relationships Based on DEMATEL

- Quality of employee guidance → Innovation in education
- Employee participation → Program innovations
- Program budget → Development of sports halls and number of programs
- Performance evaluation → Employee satisfaction and improvement of outcomes
- Continuous monitoring → Average work performance score
- Employee satisfaction and performance → Macro-level financial outcomes

Finally, the formula for calculating the final performance score is as follows:

$$\text{Performance Score} = \sum(W_i \times X_i)$$

Where:

W_i : Weight of the indicator based on the Analytic Network Process (ANP)

X_i : Indicator score obtained from the field evaluation process.

Discussion and Conclusion

The purpose of the present study was to design a network-based causal performance evaluation model for Iranian sports federations using the integrated approaches of the Balanced Scorecard (BSC), DEMATEL, and Analytic Network Process (ANP). The findings demonstrated that performance evaluation in sports federations is a multidimensional and interconnected phenomenon in which organizational, managerial, financial, educational, and human factors simultaneously influence overall federation effectiveness. The results indicated that the integration of the Balanced Scorecard with DEMATEL and ANP techniques provides a comprehensive framework capable of identifying both the causal relationships among indicators and the relative importance of each factor in organizational performance. These findings are consistent with previous studies emphasizing the necessity of multidimensional and strategic performance evaluation systems in sports organizations [6, 7, 9].

One of the major findings of the study was the identification of key influential indicators within the four perspectives of the Balanced Scorecard. The results showed that indicators such as performance evaluation of sports federations, budget allocation for programs and services, quality of employee guidance, innovation in educational programs, participation of experts and employees, and development of sports facilities were among the most influential causal variables within the network structure. This finding indicates that organizational performance in sports federations depends not only on financial resources but also on strategic leadership, innovation capability, and participatory organizational culture. This result aligns with studies emphasizing that modern sports organizations require integrated strategic management systems capable of linking managerial practices with organizational learning and stakeholder satisfaction [5, 8, 17].

The findings demonstrated that the performance evaluation of sports federations itself acted as one of the strongest causal variables within the model. This result may be interpreted as evidence that continuous and systematic evaluation mechanisms directly influence organizational effectiveness by increasing accountability, improving managerial awareness, and facilitating evidence-based decision-making. This finding is consistent with earlier research indicating that organizations with structured evaluation systems are more capable of identifying weaknesses, optimizing resources, and improving strategic alignment [3, 4]. Similarly, studies conducted in Iranian sports organizations have emphasized that the absence of systematic evaluation frameworks often results in fragmented management, ineffective planning, and reduced organizational productivity [16, 24].

Another important finding was the significant influence of budget allocation on multiple organizational dimensions. The results revealed that financial resources not only directly affect program implementation and infrastructure development but also indirectly influence employee satisfaction, innovation, and service quality. This finding supports the Balanced Scorecard perspective that financial indicators are interconnected with customer satisfaction, internal processes, and organizational learning rather than functioning independently. Previous studies have similarly reported that effective financial management and strategic budgeting significantly enhance organizational sustainability and operational effectiveness in sports federations [10, 13]. Moreover, recent international studies have shown that nonprofit sports organizations require strategic financial systems capable of balancing economic efficiency with developmental and social objectives [2, 7].

The findings also highlighted the substantial role of leadership quality and employee guidance in improving organizational performance. According to the DEMATEL analysis, the quality of employee guidance was identified as a major driving factor influencing innovation, employee satisfaction, and organizational outcomes. This finding demonstrates that leadership effectiveness in sports federations extends beyond administrative supervision and includes motivational support, knowledge transfer, strategic communication, and facilitation of innovation. The results are consistent with studies indicating that transformational and participatory leadership styles positively affect organizational adaptability, employee commitment, and innovative behavior in sports organizations [2, 15]. Effective leaders create organizational environments that encourage creativity, participation, and professional development, thereby strengthening organizational performance across multiple dimensions.

Innovation in educational and sports programs was another critical factor identified in the study. The findings showed that innovation functioned as a causal variable influencing service quality, employee performance, and stakeholder satisfaction. This result supports recent research emphasizing the growing importance of innovation and strategic adaptability within sports federations operating in rapidly changing environments [19, 20]. Sports organizations today face increasing

technological, economic, and social pressures that require continuous innovation in management systems, educational methods, communication structures, and service delivery mechanisms. Federations capable of integrating innovative practices into their organizational culture are more likely to improve competitiveness, stakeholder engagement, and long-term sustainability.

The study further revealed that employee participation and stakeholder involvement significantly influence organizational effectiveness. The participation of experts and employees in designing and implementing programs was identified as a major causal indicator within the model. This finding suggests that participatory governance structures contribute positively to organizational learning, decision-making quality, and operational effectiveness. Such results are consistent with the literature emphasizing stakeholder-centered management approaches in sports organizations [6, 14]. Participation increases organizational commitment, facilitates knowledge exchange, and improves the legitimacy of managerial decisions. In nonprofit sports federations, where organizational success often depends on collaboration among multiple stakeholders, participatory structures are especially important for ensuring sustainable development and institutional trust.

The results also indicated that organizational learning and human capital development represent foundational dimensions within sports federation performance. Indicators such as employee awareness, job satisfaction, educational camps, and development of sports facilities were strongly connected with internal processes and organizational outcomes. This finding supports the learning and growth perspective of the Balanced Scorecard, which emphasizes that sustainable organizational success depends on continuous human resource development and knowledge management [9, 12]. Previous studies have similarly demonstrated that sports organizations investing in employee training, professional development, and organizational learning achieve greater adaptability and long-term effectiveness [8, 18].

The significance of internal organizational processes identified in the present study is another noteworthy finding. Indicators related to continuous evaluation, process improvement, monitoring systems, and communication with scientific and sports centers were found to have strong relationships with overall organizational performance. This result indicates that sports federations require efficient operational structures capable of integrating evaluation, communication, and service improvement activities. These findings align with earlier studies suggesting that organizational efficiency in sports institutions is closely associated with systematic planning, process standardization, and strategic coordination [26, 30]. The identification of causal relationships among internal process indicators further demonstrates the value of the DEMATEL approach in uncovering hidden interdependencies within organizational systems.

Another important implication of the findings concerns digital transformation and technological infrastructure in sports federations. Although technology-related indicators were indirectly represented through information capital and organizational infrastructure, the findings suggest that technological capability significantly contributes to organizational adaptability and performance. This result is consistent with recent research emphasizing the increasing importance of digital transformation in sports governance and organizational resilience [21, 22]. Digital technologies improve communication systems, data management, strategic planning, performance monitoring, and stakeholder interaction. Consequently, sports federations that invest in technological development are likely to achieve higher levels of organizational responsiveness and efficiency.

The findings of the present study also support the effectiveness of combining the Balanced Scorecard with DEMATEL and ANP methodologies. The integrated model allowed not only the identification of performance indicators but also the

determination of causal relationships and relative priorities among variables. This methodological integration provides managers with a more realistic understanding of organizational dynamics compared with traditional hierarchical evaluation systems. Previous studies have emphasized that multi-criteria decision-making techniques are particularly useful for evaluating complex organizations characterized by interdependent variables and multidimensional objectives [17, 27]. In this regard, the present study contributes to the literature by developing a causal network-based performance evaluation model specifically tailored to sports federations.

Furthermore, the findings reinforce the argument that nonprofit sports organizations require customized evaluation systems that differ from traditional commercial performance models. Sports federations pursue social, developmental, educational, and national objectives alongside financial considerations. Therefore, evaluation systems must simultaneously consider stakeholder satisfaction, athlete development, organizational learning, governance quality, and strategic sustainability [2, 7]. The present model addresses this complexity by integrating financial and nonfinancial indicators within a causal network framework.

The results are also consistent with studies utilizing organizational excellence frameworks such as EFQM in public and sports organizations. Similar to EFQM-based studies, the present research demonstrated that organizational success depends on leadership quality, strategic planning, employee participation, continuous improvement, and stakeholder orientation [28, 29]. However, the present study extends previous approaches by explicitly identifying the causal relationships among variables and integrating them into a network-based analytical structure.

In addition, the findings confirm that Iranian sports federations continue to face structural and managerial challenges requiring strategic reform and evidence-based management systems. Earlier Iranian studies have pointed to weaknesses in organizational structure, strategic planning, and performance monitoring within sports organizations [23, 31]. The present study provides empirical evidence that improving leadership quality, strengthening evaluation systems, increasing stakeholder participation, and enhancing innovation capability may substantially improve federation performance.

Overall, the findings of the present study demonstrate that organizational performance in sports federations is the product of interconnected causal relationships among financial resources, leadership quality, innovation, stakeholder participation, organizational learning, and internal process efficiency. Strengthening causal drivers such as strategic leadership, innovation capability, budgeting systems, and participatory governance may significantly improve organizational effectiveness and sustainability within sports federations. The integrated BSC–DEMATEL–ANP model developed in this study therefore provides a scientifically grounded framework for evaluating and improving the performance of sports federations in complex and dynamic organizational environments.

One of the limitations of the present study was that the research was conducted only within selected Iranian sports federations, which may limit the generalizability of the findings to other sports organizations or international contexts. In addition, some data were collected through self-report questionnaires, which may have introduced response bias or subjective judgment errors. Another limitation concerns the dynamic nature of organizational performance, since changes in managerial structures, financial conditions, and technological environments may influence the stability of causal relationships over time. Furthermore, although the study integrated multiple analytical techniques, some organizational dimensions such as political influences and external environmental uncertainties were not fully incorporated into the model.

Future research is recommended to examine the applicability of the proposed model in other sports organizations, including professional clubs, Olympic committees, and international sports federations. Comparative studies between public and private sports organizations may also provide a deeper understanding of contextual differences in performance evaluation systems. Researchers are additionally encouraged to integrate advanced technological indicators, digital governance variables, and artificial intelligence applications into future performance models. Longitudinal studies investigating changes in causal relationships over time would also contribute significantly to understanding organizational adaptability and strategic evolution in sports federations.

From a practical perspective, sports federation managers should prioritize the development of integrated performance evaluation systems that simultaneously address financial efficiency, stakeholder satisfaction, organizational learning, innovation, and process improvement. Establishing continuous monitoring mechanisms, strengthening leadership development programs, increasing employee participation in decision-making, and investing in technological infrastructure may substantially improve federation effectiveness. Furthermore, policymakers and governmental sport authorities should support evidence-based strategic planning and encourage federations to adopt multidimensional and causal evaluation frameworks in order to improve accountability, transparency, and long-term organizational sustainability.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Written consent was obtained from all participants in the study.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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