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Identification, prioritization, and validation of criteria for development of urban sports land uses, with an emphasis on spatial economic productivity

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Abstract

This study identifies, prioritizes, and validates the criteria for development of urban sports land uses, emphasizing spatial economic productivity. A mixed-methods approach (qualitative-quantitative) was employed. In the qualitative phase, using Glaser's classical grounded theory and semi-structured interviews with 18 experts in sports management, urban planning, and urban economics, the main concepts and categories were extracted. In the quantitative phase, using the analytic hierarchy process (AHP) and the opinions of 14 experts, the weights of the criteria were calculated. Five main categories were prioritized: economic-financial criteria (weight 0.325), physical-functional criteria (0.242), locational-infrastructural criteria (0.198), institutional-managerial criteria (0.141), and contextual criteria (0.094). Among the sub-criteria, revenue generation potential (0.142), return on investment indicators (0.118), and functional flexibility (0.097) received the highest weights. Furthermore, the results of exploratory factor analysis (EFA) on 383 professionals and experts confirmed the five-factor structure (KMO = 0.872, total variance explained = 43.03%) and showed rank convergence with the AHP weights. The theoretical storyline derived from the data indicated that spatial economic productivity is achieved through a causal chain of "social contextualization → institutional support → strategic location → physical flexibility → financial priority." The findings showed that, given land scarcity and public resource constraints in Iranian cities, spatial economic productivity takes higher priority over mere spatial justice. Flexible design, adjacency to population-attracting land uses, and the ability to attract private investment are among the most critical factors in the development of urban sports land uses.

Keywords

Design Flexibility
Land Use
Spatial Economic Productivity
Sports Land Uses

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1. Introduction

Today, the development of sports land uses in urban areas has become a key component of urban quality of life and city competitiveness, far beyond a mere infrastructural need (Moradi et al., 2023). Contemporary cities are inevitably required to develop standard and accessible sports spaces to meet the growing needs of citizens for physical activity, health, and active recreation (Hu et al., 2025). However, severe land scarcity in urban areas, high costs of providing and maintaining sports spaces, and competitive pressures on various urban land uses have posed serious challenges for planners (Anet et al., 2023).

Land in urban areas, as a scarce and non-expandable resource, has always been the arena of competition among residential, commercial, administrative, service, cultural, recreational, and sports land uses (Hasanalizadeh et al., 2024). In this competition, sports land use often receives lower priority in urban decision-making due to its space-consuming nature (requiring large plots of land for some disciplines), limited hours of use (many sports spaces are crowded only during specific hours of the day), and relatively long-term return on investment (Liu et al., 2025). This has led to many cities having far fewer sports facilities per capita than national and international standards, and citizens facing serious problems accessing sports services (Salimi & Labbaf, 2025).

In this context, the concept of spatial economic productivity emerges as a practical solution to overcome resource constraints, meaning the maximization of economic value added created per unit of land area or per unit of capital invested in a specific land use (Hajipour & Rasaeinejad, 2025). Although some literature uses the concepts of efficiency and productivity interchangeably, in the context of sports spaces, this concept includes diverse revenue streams (admission fees, space rental, sale of ancillary services, hosting events, and sponsorship), reduced current costs (maintenance, energy, human resources), and more useful hours of space utilization (through multi-functional and multi-shift planning) (Matheson & Baumann, 2023). The goal is for a sports space to be economically viable and become a center for generating sustainable economic value. The concept of spatial economic productivity in the present study fundamentally differs from concepts such as "locational efficiency" or "cost saving"; spatial economic productivity emphasizes the ratio of output (value added) to input (land or capital), whereas locational efficiency mainly refers to minimizing location costs (Fujita et al., 2001).

A large portion of existing sports spaces in cities, especially those built in past decades, have been designed with a mono-functional approach (Salimi & Labbaf, 2023). This means that these spaces are intended solely for a specific sport or only for practice and competition, lacking the ability to adapt to other uses. The consequence of this approach is spaces that are practically empty and lack economic activity during non-practice and non-competition hours. This vacancy, in addition to wasting revenue-generating opportunities, imposes maintenance costs on the owner (often the government or municipality). In contrast, the modern approach to developing sports spaces emphasizes multi-functionality and flexibility, enabling the space to meet the diverse needs of users throughout the day and across different days of the week (Li & Yang, 2025).

The development of sports land uses with an emphasis on economic productivity is not a one-dimensional issue and cannot be analyzed solely by locational criteria (such as proximity to the target population), or solely by physical criteria (such as land dimensional standards), or solely by financial criteria (such as the rate of return on investment) (Rezaei et al., 2021). The reality is that the economic productivity of a sports space is the result of complex interactions among these three sets of criteria. For example, a sports space may be located in the best part of the city, but if its physical design does not accommodate non-sports events, its revenue-generating potential will be severely limited. Conversely, a sports space with a highly flexible design, if located in a place far from citizens' reach, will face low public turnout. This interdependence of criteria necessitates a systematic and integrated approach.

Given that public resources for providing urban infrastructure are severely limited, and the pressure to respond to the diverse needs of citizens is ever-growing, relying on traditional methods of financing and developing sports spaces is ineffective (Rezaee et al., 2025). Municipalities and governments can no longer fully finance the construction and maintenance costs of sports spaces and are inevitably forced to seek new financing models, public-private partnerships, and optimal economic exploitation of existing spaces (Moslehi & Labbaf, 2024). In this regard, prioritizing the criteria for developing sports land uses based on their impact on spatial economic productivity can serve as a practical guide for the optimal allocation of

resources and the selection of projects with the highest economic returns. Without such clear prioritization, limited capital may be allocated to projects with low economic returns.

From the perspective of theoretical foundations, the first intellectual framework that helps understand the spatial economic productivity of sports spaces is the theory of urban land value (Wendt, 1957). According to this theory, the economic value of each urban land parcel is a function of its location, accessibility, adjacent land uses, and the intensity of demand for that location. In this framework, a sports land use enjoys high economic productivity if it is located in a high land value location and, simultaneously, has the ability to generate value added commensurate with that land value. In other words, allocating high-value urban land to a low-productivity sports land use is a form of suboptimal resource allocation. This theory reminds planners that, from the perspective of spatial economics theory, site selection for sports spaces in competitive conditions should be based on opportunity cost analysis (Fujita et al., 2001), although in practice, distributional and political considerations also influence decisions.

The second key theoretical framework is the theory of multifunctional places, which is rooted in land use planning and urban design (Row, 1962). According to this theory, urban public spaces (including sports spaces) should be designed and managed in such a way that they can host a wide range of activities at different hours and days. A multi-functional place, compared to a mono-functional place, has higher economic productivity in three respects. First, the useful hours of space utilization are maximized (reducing vacancy hours). Second, the diversity of users and activities reduces economic risk (if the popularity of one activity declines, other activities maintain the revenue stream). Third, the interaction among different activities (such as sports and a coffee shop, or sports and a sports equipment store) creates synergistic effects, increasing the total value of the space. Therefore, one of the fundamental criteria in the development of productive sports land uses is the degree of multi-functionality of the space.

The third relevant theoretical foundation is the theory of spatial economics, which analyzes how land is allocated among competing land uses (Anet et al., 2023; Fujita et al., 2001; Liu et al., 2025). According to this theory, each urban land use follows a specific bid-rent curve in different spatial locations. This means that the willingness to pay for land varies across different parts of the city, and land uses are located in different places based on their economic ability. As they are often subsidized or public, sports land uses cannot compete with high-rent commercial or residential land uses in expensive urban centers. However, if a sports space can increase its economic rent by becoming multi-functional and creating diverse revenue streams, it can be located in more central and valuable urban spaces. This theory shows that spatial economic productivity is not only a goal in itself but also a necessary condition for the survival of sports land use in competitive urban locations.

Given the above, the development of sports land uses in urban areas faces the fundamental challenge of land scarcity, public resource constraints, and intense competition with other land uses. The existing theoretical foundations (the theory of urban land value, the theory of multi-functional places, and the theory of spatial economics) provide powerful frameworks for analyzing the spatial economic productivity of sports spaces. However, these theories do not answer the question of which development criteria (locational, physical, economic, managerial, and institutional) have greater priority and importance in the practical and local conditions of Iranian cities, and how the interrelationships among them function. Therefore, the present study was designed to identify and prioritize the criteria for developing sports land uses in urban areas, with an emphasis on spatial economic productivity. The main innovation of this study lies in its systematic approach, which, by considering the complex interactions among the criteria, determines the weight and relative importance of each criterion to provide a practical and prioritized roadmap for urban managers, sports planners, private investors, and decision-making bodies in the field of sports space development. Accordingly, the main research question was formulated as follows: What are the effective criteria for the development of sports land uses in urban areas, with an emphasis on spatial economic productivity, and what is the priority of each of these criteria? The results can serve as a basis for developing guidelines for optimal land allocation, designing multi-functional sports spaces, and economically evaluating urban sports development projects, thereby helping to improve the economic sustainability of sports institutions and reduce the waste of public capital.

2. Literature review

Having established the theoretical framework based on theories of urban land value, multi-functional places, and spatial economics, it is now necessary to integrally analyze the findings of previous empirical research in urban service distribution, spatial justice, and especially the location of sports land uses.

The first category of previous research has focused on analyzing spatial justice in the distribution of urban services. Jamili et al. (2026), using multi-criteria decision-making models (MARCOS, CODAS, and MAIRCA) and the MEREC weighting method in Tehran, showed that central regions have a significantly better spatial justice situation than peripheral regions, and the unequal distribution of urban services is a structural problem in metropolises. Although this study did not directly address spatial economic productivity, it is useful for the present study from two perspectives: first, it demonstrates that merely focusing on spatial justice without considering economic productivity provides an incomplete picture of land use prioritization. Second, its methodology (combining MCDM and MEREC weighting) has provided a model for the quantitative section of the present study. In this regard, Ashtiyani et al. (2026), using a systematic review approach and AHP prioritization, showed that the occupational and livelihood well-being of families is the first priority in urban planning, and in metropolises, the emphasis on economic justice and cost reduction is more prominent. Although this study was conducted in the context of a child-friendly neighborhood, it is important for the present study because it shows that the economic and livelihood well-being of families (which underlies the ability to pay for sports services) is the first priority in urban planning. In other words, without attention to economic justice, the development of sports spaces aimed at economic productivity will face low public turnout. Although these studies provide a clear picture of spatial inequalities, they have mainly focused on access indicators and population density, paying less attention to the economic dimension and space productivity.

The second category of research has specifically focused on the location of sports land uses. Lotfieydooyeh and Khanizadeh (2021) in Shiraz, using 11 criteria (access to public transportation, parking, population density, existing per capita sports space, etc.) and a combined GIS and AHP method, showed that the fuzzy overlay method has higher flexibility than the index overlay method. This study recommended that urban planners use its results for locating new sports centers. Although the study referred to some economic and managerial considerations (such as locational efficiency), the concept of spatial economic productivity (meaning the ratio of economic value added to land area or capital unit) was not explicitly operationalized in its criteria, and a quantitative prioritization of criteria, with an emphasis on this concept, was not observed in it.

The third category of research has focused on the multi-criteria evaluation of public and sports spaces, leading to more interesting findings. Wang et al. (2026) evaluated three sports parks in Beijing using behavioral observations and 270 questionnaires, identifying four key dimensions: maintenance and management (weight 0.32), functional diversity (0.28), safety and physical access (0.11), and attractiveness (0.04). A challenging finding of this research was that management quality and functional diversity contribute more to users' perceived spatial justice than mere physical accessibility (Wang et al., 2026). In this context, Mayen Huerta et al. (2025) presented the HCI greenspace evaluation framework, consisting of 11 criteria designed for cities to adapt according to their local resources and indigenous priorities. This research emphasized that evaluating urban public spaces requires a flexible yet structured framework. Although the study focused on urban green space, it is useful for the present study from two perspectives: first, its emphasis on the flexibility of the evaluation framework (the ability to adapt to local resources and indigenous priorities) has inspired the development of the present study's framework in the field of sports land uses. Second, its methodology (providing a multi-criteria framework with localization capability) shows that the evaluation of urban public spaces requires a flexible structure, which has also been used in the present study for prioritizing spatial economic productivity criteria. What is lacking in this category of research is the explicit integration of economic criteria and return on investment indicators alongside access and functional criteria.

The fourth category of research has emphasized the development of sports spaces from a historical and political approach. Doğan (2024), in a study on early republican Turkey (1923-1945), demonstrated that sports spaces were used as a tool for bio-power influence to build modern life, and their development has always been a function of macro-governance policies. At a more micro level, Miaux and Garneau (2016), in a study of the Bordeaux urban promenade in

France, showed that the integration of sports facilities (football field, skate park, and bicycle path) into the urban promenade can combine active and recreational transportation requirements with pedestrian, bicycle, and tram access. This study is useful for the present article because it shows that integrating sports functions within multi-purpose public spaces (urban promenade) can, while increasing the useful hours of space utilization, also improve the efficiency of active transportation infrastructures (pedestrian, bicycle, tram). Thus, the multi-functionality of space is not only a social or recreational advantage but also a strategy for improving the economic productivity of urban space through synergy among land uses. Although these studies demonstrate the importance of political contexts and integrated design, the lack of quantitative prioritization of criteria and the absence of economic productivity indicators are evident in them.

A systematic review of the literature shows that despite the numerous studies on the spatial justice, location of sports land uses, and evaluation of urban public spaces, the fundamental gap is the lack of research that simultaneously considers components of "spatial justice" and "economic productivity" and, most importantly, provides a quantitative, expert-opinion-based prioritization of criteria. Most existing studies, such as Lotfieydooyeh and Khanizadeh (2021), have focused solely on location with an emphasis on justice. Studies such as Wang et al. (2026), despite paying attention to space management and maintenance, have not explicitly addressed economic productivity as a central goal. Therefore, the present study aims to identify and prioritize the criteria for developing sports land uses in urban areas with an emphasis on spatial economic productivity to fill this research gap. Methodologically, unlike previous studies that have mainly used predefined criteria, the present study, employing an exploratory qualitative approach, extracts local criteria and then, by combining AHP methods and exploratory factor analysis (EFA), prioritizes and validates them.

3. Methodology

To provide a comprehensive and localized model for prioritizing criteria in developing sports land uses in urban areas with an emphasis on spatial economic productivity, a mixed-methods (qualitative-quantitative) research approach was used. In the qualitative phase, grounded theory with a classical (Glaserian) approach and modeling method was employed (Glaser, 2016). The data analysis process included open coding, selective coding, and theoretical coding. In the theoretical coding stage, the relationships among the extracted categories were identified and represented in the form of a conceptual model (Figure 1). Due to the novelty of the topic and the complexities associated with understanding the various dimensions of economic productivity in urban sports land uses, which necessitate direct theorizing from the data, this research was conducted based on grounded theory.

Participants in the qualitative phase included 18 university professors in the fields of sport management, urban planning, and urban economics, as well as experts and executive managers in the field of urban sports space development (including CEOs of sports clubs with property infrastructure, technical and civil deputies of metropolitan municipalities, consultants for the development of sports land uses in the private sector, and senior experts of municipal sports organizations). The inclusion criteria for the study in the qualitative phase included at least 10 years of professional or research experience related to sports land use planning, urban sports space management, or spatial economics; having direct executive or scientific experience at the level of urban sports space development projects (at one of the national, provincial, or metropolitan levels); conceptual and practical familiarity with the topics of spatial economic productivity, multi-purpose land uses, and financing models for sports projects; and a willingness to actively participate in in-depth interviews. Participants who lacked direct experience in at least one of the three areas (sport management, urban planning, and urban economics) or had limited familiarity with the economic dimensions of sports land use development were not included in the sampling process.

The main approach for selecting participants in this study was theoretical sampling. During this process, the researcher simultaneously collects, codes, and analyzes the required data. Based on the results, they decide what data to collect from which sources in the next stage to direct the emerging theory. The sample selection process continues until theoretical saturation is reached. Theoretical saturation is achieved when additional data do not add new information to the dimensions of the emerging theory. Although the main sampling approach in this study was theoretical sampling (based on the Glaserian approach), to ensure transparency and replicability of the study, the criteria of Malterud et al. (2016) (which are mainly developed for purposive sampling) were used as a complementary

framework to describe and justify sample adequacy. Accordingly, since the content area of the research (spatial economic productivity of urban sports spaces) is relatively broad, but with clear conceptual boundaries, utilizing a larger sample size (compared to very small samples) was deemed necessary to cover all dimensions. Sample individuals were selected from those with high executive and theoretical knowledge in the studied field, and they came from different strata within the research area (urban governance, sport management, private investment, and academic research), which could ensure an in-depth exploration of the various dimensions of the research phenomenon. In all interviews, efforts were made to establish deep and strong interaction and communication with the participants to obtain more complete information. Thus, the theoretical sampling process reached saturation at the level of categories and concepts after 18 interviews, meaning that the main categories of the research were saturated with theoretical codes, and additional interviews did not add new concepts to the existing categories. Table 1 presents the demographic characteristics of the participants in the qualitative phase.

Table 1. Demographic characteristics of participants in the qualitative phase

Code	Gender	Age (years)	Education	Field of activity	Years of experience	Position
P1	Male	48	PhD in Sport Management	Sport Management	22	University Faculty Member
P2	Male	52	PhD in Urban Planning	Urban Planning	18	Deputy of Technical and Civil Affairs, Municipality
P3	Female	44	PhD in Urban Economics	Urban Economics	15	University Faculty Member
P4	Male	53	PhD in Sport Management	Sport Management	25	CEO of a Professional Sports Club
P5	Male	48	PhD in Urban Planning	Urban Planning	20	Consultant for Sports Land Use Development
P6	Female	38	Master's in Urban Economics	Urban Economics	12	Senior Expert, Municipal Sports Organization
P7	Male	58	PhD in Sport Management	Sport Management	30	Former President of a Sports Federation
P8	Male	46	PhD in Geography and Urban Planning	Urban Planning	17	University Faculty Member
P9	Female	41	PhD in Sport Management	Sport Management	14	Planning Manager of a Sports Club
P10	Male	51	PhD in Urban Economics	Urban Economics	23	Economic Consultant of a Metropolitan Municipality
P11	Male	47	PhD in Urban Planning	Urban Planning	19	Project Manager for Sports Space Development
P12	Female	36	Master's in Sport Management	Sport Management	11	Senior Expert in Sports Marketing
P13	Male	54	PhD in Urban Economics	Urban Economics	26	University Faculty Member
P14	Male	43	PhD in Sport Management	Sport Management	16	Head of Sports Infrastructure Committee
P15	Female	39	PhD in Urban Design	Urban Planning	13	Postdoctoral Researcher in Urban Design
P16	Male	57	PhD in Urban Economics	Urban Economics	28	Deputy of Economic Affairs, Municipality
P17	Male	49	PhD in Sport Management	Sport Management	21	Senior Consultant for Public Sports Development
P18	Female	35	Master's in Urban Planning	Urban Planning	10	Senior Expert in Land Use
Mean	-	46.6	-	-	18.2	-

The research instrument used in the qualitative phase was semi-structured interviews related to the research objectives. The interview questions were designed around the following themes: effective criteria for site selection for developing urban sports spaces, indicators of spatial economic productivity, successful and unsuccessful experiences of sports land use development projects, economic obstacles and facilitators for developing sports spaces, and the subjective prioritization of different criteria by experts. The average duration of the interviews was about 45 minutes. For data analysis, all interviews were transcribed, and the data analysis process was conducted line by line. During the analysis, theoretical memoing was performed, meaning that ideas, questions, and possible relationships among categories were noted during coding to be used in later stages of analysis (Glaser, 2016). During the analysis process, another expert analyst with high analytical and conceptualization power was used.

Data were analyzed through open coding and then selective coding (according to the classical Glaserian approach); primary concepts were extracted from the data, main categories gradually took shape, and finally, the theoretical storyline was developed based on the relationships among categories. These steps were used to gradually extract concepts and structure the theory from the data. Especially in the classical Glaserian approach, these steps enable the discovery of a theory grounded in the data. The coding process was performed line by line on the interview transcripts, and initial codes were extracted. In the next stage, related codes were categorized into more abstract concepts, and finally, the main categories of the research phenomenon were formed.

To increase the validity and credibility of the findings, the extracted theory was evaluated in several stages through member checking. It was placed at the disposal of experts in the relevant field to be adjusted and modified based on their feedback. Furthermore, a multi-method strategy (triangulation) was used at the level of participants (diversity in the expertise and experience of participants) and analysts (using two independent coders and analysts) to ensure that the data were examined from different angles. Additionally, two independent coders and analysts were used for data analysis to guarantee the accuracy and objectivity of the analysis process. Inter-coder agreement was calculated using Cohen's kappa coefficient (0.87), which indicates excellent agreement.

The quantitative phase of the research was designed based on the results of the qualitative phase and according to the analytic hierarchy process (AHP). During this stage, criteria were determined based on which the participants of the quantitative phase were selected. The inclusion criteria for the quantitative phase included academic or experiential expertise in one of the three areas (sport management, urban planning, urban economics), with at least 15 years of executive or research experience at high managerial or scientific levels; direct experience in evaluating, designing, or managing urban sports space development projects (at least two successful projects); deep familiarity with the theoretical and applied concepts of spatial economic productivity and multi-purpose sports land uses; and the ability to understand and comparatively analyze indicators in a pairwise manner (which was assessed with a simple AHP pre-test before entering the final sample). If any of these criteria were not met or if a significant inconsistency occurred in pairwise judgments (inconsistency rate above 0.1), the respondent was excluded from the final sample.

Since there is no standard formula or table for determining the sample size in the AHP method, according to previous studies on the AHP methodology and observing the principle of sample adequacy in this method, which emphasizes the quality of expert judgments over quantity, 14 experts were selected as the final sample for the quantitative phase. This number has the necessary adequacy compared to similar studies (which often report between 10 and 15 experts). Access to the samples of this phase was purposive and criterion-based. Table 2 presents the demographic characteristics of the participants in the quantitative phase.

Table 2. Demographic characteristics of participants in the quantitative phase (AHP experts)

Code	Gender	Age (years)	Degree	Scientific expertise / field of work	Years of experience	Reason for sample selection
C1	Male	53	PhD in Urban Economics	Urban Econometrics / Economic Consultant to Municipality	25	Experience in the economic evaluation of 3 major sports projects
C2	Male	48	PhD in Sport Management	Sports Branding Management / CEO of a Club	20	Experience in leading a sports complex with an economic approach

Code	Gender	Age (years)	Degree	Scientific expertise / field of work	Years of experience	Reason for sample selection
C3	Female	46	PhD in Urban Planning	Land Use Planning / University Faculty Member	18	Expertise in designing multi-purpose urban spaces
C4	Male	58	PhD in Sport Management	Sports Policy-making / Former President of a Federation	30	Familiarity with major sports infrastructure projects
C5	Male	49	PhD in Urban Economics	Spatial Economics / Deputy of Economic Affairs, Municipality	22	Direct responsibility for budgeting sports projects
C6	Female	42	PhD in Urban Planning	Public Space Development / Sports Infrastructure Consultant	15	Design and supervision of 2 multi-purpose sports projects
C7	Male	56	PhD in Sport Management	Sports Facilities Management / University Faculty Member	28	Research on the productivity of sports spaces
C8	Male	44	PhD in Urban Economics	Economic Evaluation of Projects / Investment Consultant	17	Assessment of financing for sports projects
C9	Female	41	PhD in Urban Planning	Design of Flexible Spaces / Project Manager	15	Practical experience in designing multi-purpose halls
C10	Male	52	PhD in Sport Management	Sports Economics and Marketing / Club Deputy	24	Experience in revenue management of a sports complex
C11	Male	46	PhD in Urban Economics	Spatial Economics and Land Use / Senior Expert	19	Expertise in infrastructure financing models
C12	Female	44	PhD in Urban Planning	Strategic Urban Development Planning / University Faculty Member	16	Research on urban service land uses
C13	Male	55	PhD in Sport Management	Sustainable Urban Sports Development / Senior Consultant	27	Consulting experience in 4 sports space development projects
C14	Male	48	PhD in Urban Economics	Public Sector Economics / Manager of Economic Studies	21	Responsibility for feasibility studies of construction projects
Mean	-	48.7	-	-	20.8	-

In the quantitative phase, based on the findings of the qualitative phase (categories, subcategories, and final concepts), a researcher-developed pairwise comparison questionnaire was provided to the experts, asking them to judge the importance of each criterion compared to another based on Saaty's nine-point scale (1 = equal importance to 9 = extreme importance). The face and content validity of the questionnaire in the quantitative phase was confirmed by five professors in sport management and urban planning. Regarding the reliability of the questionnaires, one of the steps in the AHP model is determining the consistency ratio, which confirms the reliability and internal consistency of the respondent's judgments. If the consistency ratio is less than 0.1, the consistency of the comparisons is acceptable; otherwise, the comparisons must be repeated. In the present study, the average consistency ratio of the respondents was calculated to be 0.048, indicating an acceptable judgement consistency.

In the quantitative phase, the weights of the criteria were calculated using the AHP and Expert Choice software. The pairwise comparison matrices of the 14 experts were entered into the software separately, and the consistency ratio of each was calculated (mean 0.048). Furthermore, an aggregated matrix was formed using the geometric mean method, and its consistency ratio was within an acceptable range (less than 0.1), indicating the logical consistency of the combined judgments of the experts. Then, using the geometric mean method, the final weights of the main criteria and sub-criteria were calculated.

To validate the factor structure, an independent quantitative survey was designed and conducted using EFA. According to the recommendation of Tabachnick et al. (2007) and contemporary methodological research (Hair et al., 2019; Tabachnick et al., 2007; Watkins, 2018), given the 76 initial concepts and an average communality of 0.66, a minimum sample size of 380 was determined. The statistical population

consisted of managers, senior experts, professors, and consultants in the sport management, urban planning, and urban economics in five metropolises of Tehran, Isfahan, Mashhad, Shiraz, and Tabriz. Sampling was conducted using a combined method (purposive selection of cities and snowball sampling for individuals), and finally, 383 questionnaires were included in the analysis.

The measurement instrument was a researcher-developed 76-item questionnaire with a 5-point Likert scale. Content validity was confirmed with the opinion of eight professors and the calculation of CVR (above 0.78) and CVI (above 0.82). The overall reliability of the questionnaire was calculated using Cronbach's alpha of 0.87. Furthermore, Cronbach's alpha was calculated separately for each of the five research factors, and all values were within an acceptable range (above 0.70).

Data analysis was performed according to the 5-step guide of Williams et al. (2010): checking KMO (0.872) and Bartlett's test of sphericity, extracting factors using the principal axis factoring method and the eigenvalue greater than 1 criterion, Varimax rotation, and removing items with a factor loading of less than 0.50 or cross-loading greater than 0.30 (i.e., items that had a factor loading above 0.30 on two or more factors) (Hair et al., 2019). As a result, 15 items were removed, and 61 items remained with a stable 5-factor structure. Analyses were performed using SPSS version 26.

4. Findings

After analyzing the data through constant comparison and theoretical coding, 76 theoretical concepts were identified using the classical Glaserian approach, which were organized into several conceptual categories. Some of these categories had greater explanatory power and formed the basis of the research's theoretical structure. Table 3 presents the classification of concepts at three levels (category, sub-category, and concept) to facilitate a better understanding of the conceptual structure of the findings.

Table 3. Conceptual structure of the findings (based on theoretical categories, organizing sub-categories, and extracted concepts)

Category	Sub-category	Initial exploratory concepts
Locational-infrastructural criteria	Transportation accessibility	1. Access to public transportation 2. Distance from the metro station 3. Proximity to main streets 4. Density of bus lines 5. Access sidewalks
	Population potential	6. Population density within a five km radius 7. Age distribution of residents 8. Proportion of sports-oriented households 9. Projected population growth 10. Regional immigration rate
	Adjacency to population-attracting land uses	11. Distance from small service-recreational land uses (café, restaurant, shop) 12. Proximity to large commercial centers (shopping malls, regional shopping centers) 13. Distance from hotels 14. Proximity to accommodation centers 15. Adjacency to recreational-leisure spaces (park, cinema, cultural complex)
Physical-functional criteria	Functional flexibility	16. Ability to convert into a conference hall 17. Possibility of holding cultural events 18. Ability to rent to the private sector 19. Flexibility in internal layout 20. Modular space design
	Energy efficiency and maintenance	21. Low-energy lighting systems 22. Thermal insulation 23. Water consumption optimization 24. Use of solar energy 25. Natural ventilation
	Technical and standard requirements	26. Land dimensional standards 27. Hall height 28. Seat slope 29. Accessibility for the disabled 30. Stadium capacity

Category	Sub-category	Initial exploratory concepts
Economic-financial criteria	Investment and maintenance costs	31. Land price in the area 32. Rental rate of similar spaces 33. Construction cost 34. Annual maintenance cost 35. Cost of providing ancillary infrastructure
	Revenue generation potential	36. Projected revenue from ticket sales 37. Space rental income 38. Revenue from non-sports events 39. Sponsorship revenue 40. Revenue from the sale of ancillary products
	Return on investment indicators	41. Payback period 42. Net present value of the project 43. Internal rate of return 44. Benefit-cost ratio 45. Annual cash flow
Institutional-managerial criteria	Alignment with higher-level documents	46. Existence of a comprehensive urban development plan 47. Coordination with the comprehensive transportation plan 48. Compliance with the detailed plan 49. Land use permits 50. Height and density restrictions
	Ability to attract private capital	51. Private sector participation capacity 52. Existence of interested investors 53. Possibility of BOT and PPP models 54. History of public-private cooperation in the region
	Institutional efficiency and governance	55. Transparency of licensing processes 56. Time required to obtain permits 57. Number of decision-making bodies 58. Inter-agency coordination 59. Existence of incentive laws
Contextual criteria – facilitating contexts	Cultural and social characteristics	60. Sports-oriented culture of citizens 61. Sports participation rate of residents 62. Community acceptance of public land uses 63. Level of social interaction in public spaces
	Generational characteristics	64. Age structure of the population 65. Generational differences in sports consumption patterns 66. Young generation's tendency toward modern spaces 67. Specific needs of the elderly and children
	Socio-economic conditions	68. Income level of residents 69. Purchasing power for sports services 70. Access to micro-financial resources 71. Existence of economic incentives for physical activity
	Technological and media developments	72. Space smartification technologies 73. High-speed internet infrastructure 74. Online booking capability 75. Electronic payment systems 76. Space management applications

As shown in Table 3, the extracted concepts were organized into five main categories and 16 subcategories. The main categories are: locational-infrastructural criteria, physical-functional criteria, economic-financial criteria, institutional-managerial criteria, and contextual criteria (facilitating contexts). Each of these categories includes several subcategories, which will be analyzed separately in the following sections. To facilitate understanding of the relationships among the categories, Figure 1 is presented, which is a graphical representation of the theoretical relationships extracted from the data. Unlike the paradigmatic framework common in the Strauss and Corbin approach, no pre-existing pattern has been

imposed on the analysis. This figure has emerged inductively from the theoretical analysis of the data within the classical Glaserian approach.

Figure 1. Conceptual model of the research

After extracting the categories and subcategories, their conceptual relationship with the core category (spatial economic productivity) was explained in the form of a theoretical storyline. This storyline shows how each of the five categories in the causal chain leads to the realization of spatial economic productivity. Based on data analysis, the core category of the present study was identified as spatial economic productivity. The theoretical narrative derived from the data indicates that under conditions of land scarcity and public resource constraints in Iranian cities, the development of sports land uses will be successful and sustainable when priority is given to economic-financial criteria (especially revenue generation potential and return on investment). This priority, in turn, requires a flexible physical design (physical-functional criteria) and an intelligent location in adjacency to population-attracting land uses (locational-infrastructural criteria). The realization of these three categories of criteria is not possible without providing an appropriate institutional context (transparency of licensing and the ability to attract private capital). Finally, contextual factors (sports-oriented culture and socio-economic conditions), as facilitating contexts, although not decisive on their own, play a complementary role in the long-term success of projects. In other words, spatial economic productivity as the central goal is achieved through the causal chain of "social contextualization → institutional support → strategic location → physical flexibility → financial priority."

After confirming the qualitative structure, the analytic hierarchy process (AHP) technique was used for the quantitative prioritization of the criteria. For this purpose, a pairwise comparison questionnaire was provided to 14 experts. One of the main indicators for checking the reliability of the questionnaire in the AHP method is the consistency ratio. A consistency ratio lower than 0.1 indicates the reliability of the comparisons made by the experts. Table 4 shows that all respondents maintained acceptable consistency ratios, with an overall average of 0.048, which is below the 0.1 threshold, indicating the research instrument's reliability was appropriate.

Table 4. Consistency ratio of the questionnaires

Respondent code	Consistency ratio	Respondent code	Consistency ratio
C1	0.04	C8	0.04
C2	0.06	C9	0.05
C3	0.05	C10	0.02
C4	0.03	C11	0.03
C5	0.08	C12	0.06
C6	0.07	C13	0.05
C7	0.04	C14	0.04
Mean	0.048		

Based on the results of Table 5, extracted from Expert Choice software, the weighting of the main categories was performed with a compatibility coefficient of approximately 0.01, which is an acceptable level.

Table 5. Weights of main categories that influence the prioritization of sports land use development

Row	Factor (main category)	Weight
1	Economic-financial criteria	0.325
2	Physical-functional criteria	0.242
3	Locational-infrastructural criteria	0.198
4	Institutional-managerial criteria	0.141
5	Contextual criteria (facilitating contexts)	0.094
	Total	1.000

As shown in Table 5, economic-financial criteria, with a weight of 0.325, have the highest priority among the main categories. After that, respectively, are physical-functional criteria (0.242), locational-infrastructural criteria (0.198), institutional-managerial criteria (0.141), and finally contextual criteria (0.094). Figure 2 shows the Expert Choice software output for the primary categories that influence the prioritization of sports land use development.

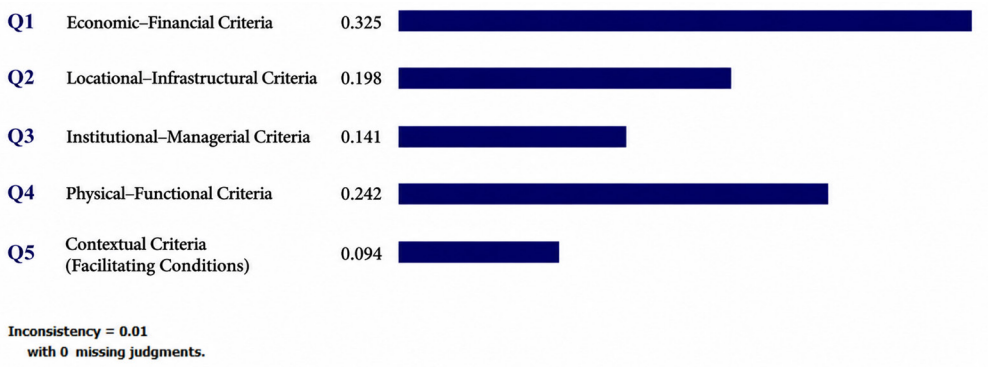


Figure 2. Expert choice software output for the main categories that influence the prioritization of sports land use development

Table 6 shows the final ranking of the subcategories that influence the prioritization of sports land use development.

Table 6. Final ranking of sub-categories that influence the prioritization of sports land use development

Rank	Sub-category	Related category	Final Weight
1	Revenue generation potential	Economic-financial	0.142
2	Return on investment indicators	Economic-financial	0.118
3	Functional flexibility	Physical-functional	0.097
4	Investment and maintenance costs	Economic-financial	0.065
5	Adjacency to population-attracting land uses	Locational-infrastructural	0.058
6	Transportation accessibility	Locational-infrastructural	0.054
7	Ability to attract private capital	Institutional-managerial	0.052
8	Energy efficiency and maintenance	Physical-functional	0.051
9	Population potential	Locational-infrastructural	0.046
10	Alignment with higher-level documents	Institutional-managerial	0.044
11	Technical and standard requirements	Physical-functional	0.043
12	Sports-oriented culture of citizens	Contextual	0.032
13	Institutional efficiency and governance	Institutional-managerial	0.031
14	Socio-economic conditions	Contextual	0.029
15	Technological and media developments	Contextual	0.019
16	Generational characteristics	Contextual	0.014
Total			0.995

Based on the results of Table 6, revenue generation potential, with a final weight of 0.142, has the highest priority among all sub-categories. Return on investment indicators (0.118) and functional flexibility (0.097) are ranked second and third, respectively. In contrast, generational characteristics (0.014) and technological and media developments (0.019) have the lowest weights, indicating that these criteria have lower priority in the current conditions of sports land use development in Iranian urban areas.

In the exploratory factor analysis (EFA) section, sampling adequacy was assessed before execution. The KMO index was found to be 0.872, which, according to Kaiser's criterion, is in the good range. Bartlett's test of sphericity was also significant (chi-square = 5438.647, degrees of freedom = 1830, significance level < 0.001), indicating sufficient correlation among the items for factor analysis.

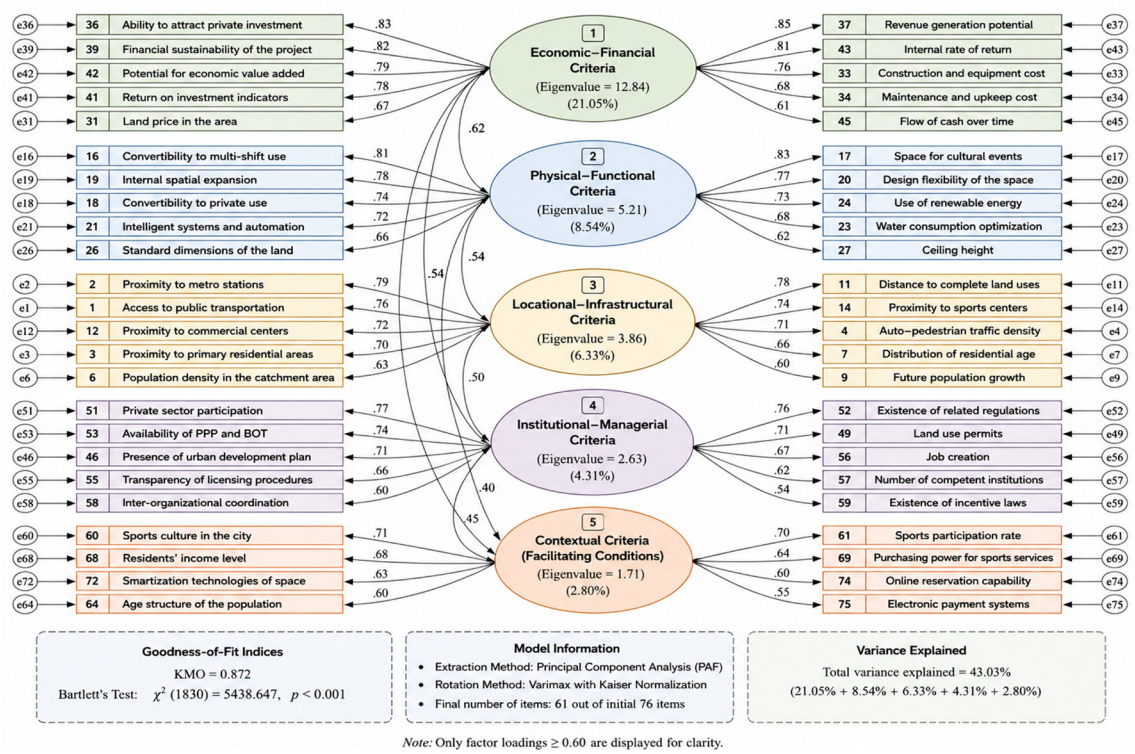
Based on the eigenvalue greater than 1 criterion, seven factors were extracted in the initial stage; however, based on the scree plot results, conceptual interpretability of the factors, and the adequacy of explained variance, the five-factor structure was selected as the final solution. These five factors, although lower than the ideal standard of 60%, explain a total of 43.03% of the total variance. In exploratory research of a multidimensional and complex nature (such as urban land use development with 76 initial concepts), values between 40 and 50% have also been reported as acceptable (Hair et al., 2019; Peterson, 2000). Table 7 presents the factor analysis results, including eigenvalues, percentage of variance explained by each factor, and the factor loadings of the most important items for each factor. From the total of 76 initial items, after removing 15 items with unsuitable factor loadings or cross-loadings, 61 items remained in a stable five-factor structure.

Table 7. Exploratory factor analysis (EFA) results for categories that influence urban sports land use development

Factor	Factor name	Eigenvalue	Explained variance %	Cumulative variance %	Range of factor loadings for main items	Number of remaining items
1	Economic-financial	12.84	21.05	21.05	0.607 – 0.853	15
2	Physical-functional	5.21	8.54	29.59	0.578 – 0.801	14
3	Locational-infrastructural	3.86	6.33	35.92	0.552 – 0.764	12
4	Institutional-managerial	2.63	4.31	40.23	0.531 – 0.712	11
5	Contextual	1.71	2.80	43.03	0.504 – 0.689	9
Total	—	—	43.03	—	—	61

There is a high correspondence between the order of factors in factor analysis (economic-financial with 21.05% variance, then physical-functional with 8.54%, locational-infrastructural with 6.33%, institutional-managerial with 4.31%, and contextual with 2.80%) and the weights obtained from AHP (0.325, 0.242, 0.198, 0.141, and 0.094, respectively). Spearman's rank correlation between the two methods was very high and significant ($p < 0.001$), indicating a strong convergence between the results of AHP and EFA. In other words, experts in pairwise judgments (AHP) and professionals in Likert-scale assessments (EFA) have achieved nearly an identical prioritization pattern, which reinforces the high validity of the qualitative findings.

To visually illustrate the relationships among the items and the extracted factors, a graphical representation of the factor structure was created. In this model, the five main factors (categories) are identified with their eigenvalues and the percentage of explained variance. Only items with factor loadings above 0.60 are shown to maintain graphical clarity. As shown in Figure 3, the economic-financial factor, with the most items and an average factor loading of 0.742, has the most compact structure, whereas the contextual factor, with the fewest items, shows the least density. This finding once again confirms that experts and professionals attribute higher weight and importance to financial and economic criteria.



Note: Only factor loadings ≥ 0.60 are displayed for clarity.

Figure 3. Graphical representation of the factor structure of the research

5. Discussion and interpretation of findings

The findings of the present study shows that among the five main categories that influence the prioritization of sports land use development in urban areas with an emphasis on spatial economic productivity, economic-financial criteria, with a weight of 0.325, have the highest priority, followed respectively by physical-functional criteria (0.242), locational-infrastructural criteria (0.198), institutional-managerial criteria (0.141), and contextual criteria (0.094). These findings, while emphasizing the multidimensional nature of economic productivity, indicate that under conditions of public resource constraints and intense competition for urban land, the prioritization of criteria is strongly influenced by the ability to generate cash flow and shorten the payback period. The following section discusses each of the main categories separately, comparing them with the research literature.

The very high weight of economic-financial criteria (0.325) in this study, especially with emphasis on the sub-categories of revenue generation potential (weight 0.142) and return on investment indicators (weight 0.118), shows that experts in the field of urban sports space development have assigned the priority not to spatial justice or mere access, but to the financial viability of the project and its ability to generate its own resources. From the perspective of spatial economics theory (Fujita et al., 2001), this finding confirms that to survive in competitive urban locations, sports use must increase its economic rent through multi-functionality and the creation of diverse revenue streams. In contrast, studies that have focused solely on spatial justice (Jamili et al., 2026) without considering economic productivity may offer solutions that are not financially sustainable.

In second place are physical-functional criteria, with a weight of 0.242, among which functional flexibility, with a weight of 0.097, is the most important subcategory. This finding is directly aligned with the theory of multi-functional places (Row, 1962) and the research of Wang et al. (2026), which showed that functional diversity, with a coefficient of 0.28, was the second key factor in the spatial justice perceived by users. Furthermore, the research by Miaux and Garneau (2016) on integrating sports facilities into the Bordeaux urban promenade confirms that a multi-purpose design (football field, skate park, and bicycle path) can maximize the useful hours of space utilization. The present finding goes beyond previous studies to demonstrate that functional flexibility is not only a social or recreational advantage but also a necessary condition for economic productivity, as it reduces space vacancy hours and increases diverse revenue streams.

Locational-infrastructural criteria, with a weight of 0.198, are ranked third. At first glance, this may seem to conflict with the emphasis of urban land value theory (Wendt, 1957) on the role of location in determining land value. However, upon closer examination of the sub-categories, this finding can be interpreted as follows: adjacency to population-attracting land uses (weight 0.058) and transportation accessibility (weight 0.054) were both evaluated as more important than population potential (weight 0.046). This means that in the current conditions of Iranian cities, high population density alone – which was introduced as one of the 11 main criteria for site selection in the research of Lotfieydooyeh and Khanizadeh (2021) – is not sufficient; rather, to maximize economic benefits, sports facilities should be situated near existing population centers, such as commercial hubs, hotels, and recreational venues, to take advantage of their pedestrian and vehicular traffic. This finding does not contradict the emphasis of Jamili et al. (2026) on the advantage of central areas in terms of spatial justice, but it shows that mere spatial centrality is not enough to ensure economic productivity; rather, the type of adjacencies (especially proximity to population-attracting land uses) also plays a determining role.

The fourth rank is assigned to institutional-managerial criteria with a weight of 0.141. Among these, the ability to attract private capital (weight 0.052) is more important than alignment with higher-level documents (0.044) and institutional efficiency and governance (0.031). This finding clearly shows that experts have evaluated the capacity to attract private investors through BOT and PPP models as more important than the existence of comprehensive urban plans. This result is consistent with similar research by Moslehi and Labbaf (2024), which emphasized the design of a capital attraction model in sports projects; it is also not in contradiction with the research of Doğan (2024), which showed that the development of sports spaces has always been a function of macro-governance policies, rather, it takes it to a more operational level. In other words, in situations where municipalities cannot fully finance costs, the existence of a transparent institutional framework for public-private partnership has a higher priority than any non-operational upstream planning.

The lowest weight (0.094) is assigned to contextual

criteria (facilitating contexts), which itself consists of subcategories such as the sports-oriented culture of citizens (0.032) and socio-economic conditions (0.029). At first glance, this finding may seem to conflict with the assumption that contextual criteria should be more important. However, the low weight of these criteria does not mean they are insignificant; rather, it indicates that in the current situation of urban sports space development in Iran, which faces severe capital and land scarcity, experts have focused decision-making on harder criteria such as revenue generation and flexibility. Sports-oriented culture and social conditions are considered necessary but not sufficient prerequisites; as long as a project is not economically viable and physically flexible, attention to social and cultural contexts alone cannot ensure its success.

The findings of this study show that the prioritization of criteria for developing sports land uses in urban areas, with an emphasis on economic productivity, has a clear hierarchy, with economic-financial criteria at the top and contextual criteria at the base. This hierarchical structure, unlike some flat approaches in previous studies (Mayen Huerta et al., 2025), which emphasized the flexibility of the evaluation framework, shows that in the context of Iranian cities with severe resource constraints, not all criteria can be considered equal. Furthermore, these findings empirically confirm the theory of spatial economics (Fujita et al., 2001), which suggests that sports land uses, to compete with high-rent commercial and residential land uses, are inevitably forced to increase economic productivity by diversifying revenue streams and multi-functional design. Failure to consider this prioritization will direct public capital toward projects that, although they may appear favorable in terms of spatial justice or population coverage, will experience closure or severe quality decline in the medium term due to low economic returns.

One of the methodological strengths of the present study is the simultaneous use of two independent quantitative techniques with different natures (AHP based on pairwise expert judgments and EFA based on a diverse group of professionals) and achieving convergent results. While AHP calculates the relative weight of criteria based on pairwise comparisons among a small but focused sample of 14 experts, EFA reveals the percentage of variance explained by each construct using a larger sample of 383 individuals and a different approach. The findings of this study show that not only is the order of priority of the five categories identical in both methods, but the pattern of factor prioritization in the two methods also has significant conceptual convergence. For example, the ratio of the weight of the economic-financial category in AHP (0.325) to the weight of the contextual category (0.094) is 3.46, while the ratio of their variance percentages in EFA (21.05 to 2.80) is 7.52. Although the ratio of economic-financial to contextual weights in AHP (3.46) differs from the ratio of the variance percentages of these two factors in EFA (7.52) – which is due to the different nature of pairwise comparisons in AHP and the Likert scale in EFA – the order of priority of the five factors was completely identical in both methods. This rank convergence indicates that the conceptual structure extracted from grounded theory has high validity and is not merely a mental construct of the researcher. This finding aligns with the recommendation of previous research (Mayen Huerta et al., 2025) regarding the necessity of using multiple quantitative methods to validate qualitative models in urban planning.

6. Conclusion

The present study, aimed at identifying and prioritizing the criteria for the development of sports land uses in urban areas, with an emphasis on spatial economic productivity, concluded that in the current conditions of Iranian cities – which face land scarcity, public resource constraints, and intense competition among land uses – economic-financial criteria (especially revenue generation potential and return on investment indicators) have the highest priority, followed respectively by physical-functional criteria (with an emphasis on functional flexibility), locational-infrastructural criteria (with an emphasis on adjacency to population-attracting land uses), institutional-managerial criteria (with an emphasis on the ability to attract private capital), and contextual criteria. These findings, while confirming the spatial economics theory and the multi-functional places theory, show that spatial justice and mere access, without considering the economic viability of projects, cannot serve as a basis for decision-making in the development of urban sports spaces. Furthermore, this study demonstrated methodologically that the mixed-methods (qualitative-quantitative) approach based on classical Glaserian grounded theory and the AHP has a high capacity for uncovering hidden expert priorities and providing an operational roadmap for optimal resource allocation. Finally, the addition of EFA as an independent quantitative layer showed that the five-

factor structure of the research has sufficient empirical validity and is not based solely on the judgment of a small expert group. The alignment of the EFA results (explaining 43.03% of the total variance, with a 21.05% contribution from the economic-financial factor) with the AHP weights (0.325) provides confidence that the prioritization presented in this study can serve as a basis for decision-making at the level of Iranian metropolises. This methodological synergy also paves the way for future research that combines multi-criteria decision-making (MCDM) methods with multivariate statistical methods (such as CFA and SEM) to validate qualitative models.

Based on the prioritization of the five main categories (economic-financial, with a weight of 0.325, physical-functional, with a weight of 0.242, locational-infrastructural, with a weight of 0.198, institutional-managerial, with a weight of 0.141, and contextual, with a weight of 0.094), the following practical suggestions are presented for different decision-making groups:

Suggestions related to the economic-financial category (first priority):

- For private investors: In the economic evaluation of projects, do not rely solely on the traditional return on investment rate; consider the potential of ancillary revenues (product sales, sponsorship, non-sports events, space rental during non-training hours) as a core part of the business model.
- For sports planners: In evaluating urban sports development plans, be sure to assess project economic indicators (NPV, IRR, payback period) alongside spatial justice indicators.

Suggestions related to the physical-functional category (second priority):

- For urban managers: In calls for sports space development, assign higher scores to projects that have modular and flexible design (ability to convert into a conference hall, cultural space, or rental to the private sector during non-peak hours).
- For private investors: In space design, allocate at least 20 to 30 percent of the area to complementary revenue-generating uses (cafés, shops, event rental spaces) to reduce dependence on ticket sales revenue.
- For sports planners: Although the criteria of useful hours of use and revenue per square meter cannot serve as a basis for developing per capita sports space standards, they can be used as complementary indicators for measuring the performance and evaluating the productivity of existing sports spaces. Alongside the traditional indicator of square meters per thousand people, these indicators can demonstrate the economic efficiency of the space.

Suggestions related to the locational-infrastructural category (third priority):

- For urban managers: Instead of focusing solely on providing land in underserved areas (a purely justice-oriented approach), prioritize the location of new sports spaces based on adjacency to population-attracting land uses (commercial centers, hotels, existing recreational spaces) to economically benefit from their pedestrian and vehicular traffic to secure audiences and revenue.
- For private investors: Seek locations with moderate population density but adjacency to high-traffic commercial and recreational land uses, not necessarily the most populous areas.

Suggestions related to the institutional-managerial category (fourth priority):

- For urban managers: Streamline and centralize licensing processes and inter-agency coordination to reduce waiting times for private investors and make PPP and BOT models more attractive.
- For sports planners: Develop and update clear legal frameworks for public-private partnership contracts in the field of sports spaces.

Suggestions related to the contextual category (fifth priority):

- For sports planners: For each city, prepare an economic sensitivity map identifying areas with high potential for effective adjacency (simultaneous proximity to public transportation, commercial centers, and a concentration of young, sports-oriented populations) as investment priorities.
- For urban managers: Strengthen the sports-oriented culture of citizens through free and seasonal events in new sports spaces, so that, simultaneously with infrastructure development, the social context for economic benefit is also provided.

Although methodologically rigorous and aligned with theoretical foundations, the present study has several limitations that should be considered when generalizing and interpreting the findings. First, expert-opinion-based research relies on participants' tacit knowledge and subjective judgments; while this study aimed to minimize this subjectivity through the pairwise comparison technique and a mean consistency ratio of 0.048, it cannot be entirely eliminated. Second, the priority results reflect Iran's specific economic, social, and institutional conditions at the time of research; therefore, caution is necessary

when applying these findings to other countries with different institutional contexts, such as countries with more developed capital markets or longer traditions of public-private partnerships. Third, the cross-sectional design of the study limits the ability to observe changes in priorities over time, such as during economic recession or boom, providing only a static snapshot. Fourth, although institutional-managerial criteria ranked fourth, the study did not thoroughly explore the qualitative reasons behind institutional inefficiency in attracting private capital to urban sports projects; this area warrants further research from an institutionalist perspective. Fifth, the five factors identified through Exploratory Factor Analysis explained 43.03% of the total variance. While this is below the ideal standard of 60%, exploratory studies in complex, multidimensional fields, such as urban land use development with 76 initial concepts, have reported acceptable ranges between 40% and 50% (Hair et al., 2019; Peterson, 2000). Furthermore, the KMO index of 0.872 and the average communality of 0.66 suggest the data were adequate for factor analysis; nevertheless, this limitation warrants caution in generalizing the results.

Based on these limitations and the study's findings, several suggestions for future research are proposed. First, comparative studies across different cities with varied economic and institutional structures (e.g., industrial metropolis, tourist city, administrative city) could assess the stability or variability of criterion prioritization in different contexts. Second, developing and testing a dynamic simulation model (such as system dynamics) could help predict long-term investment effects based on different prioritization scenarios, such as prioritizing spatial justice versus economic productivity, on metrics like municipal financial sustainability, per capita sports space in underserved areas, and return on investment. Third, more in-depth qualitative research should examine the gap between stated priorities and actual practice among urban managers, specifically investigating why many projects proceed based on political or distributive considerations despite recognizing the high importance of economic criteria. Fourth, creating and validating a post-implementation evaluation framework for existing sports spaces could measure how well prioritization during the design phase has been realized and offer feedback for refining the prioritization model. Fifth, further exploration of the influence of emerging technologies—such as online reservation platforms, intelligent energy management systems, and augmented reality to attract non-sports users—could reveal shifts in criterion prioritization, since the findings of this study showed that technological and media developments currently hold low priority but might become one of the key criteria within a 5 to 10-year horizon. Sixth, future research employing confirmatory factor analysis (CFA) can provide a more precise test of the factor structure.

Authors' Contributions

All authors have contributed equally to the research design, data collection and analysis, writing, and final revision of the article.

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Conflict of Interest

The authors declare that there is no conflict of interest related to this research.

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